AIM HIRE TEXAS

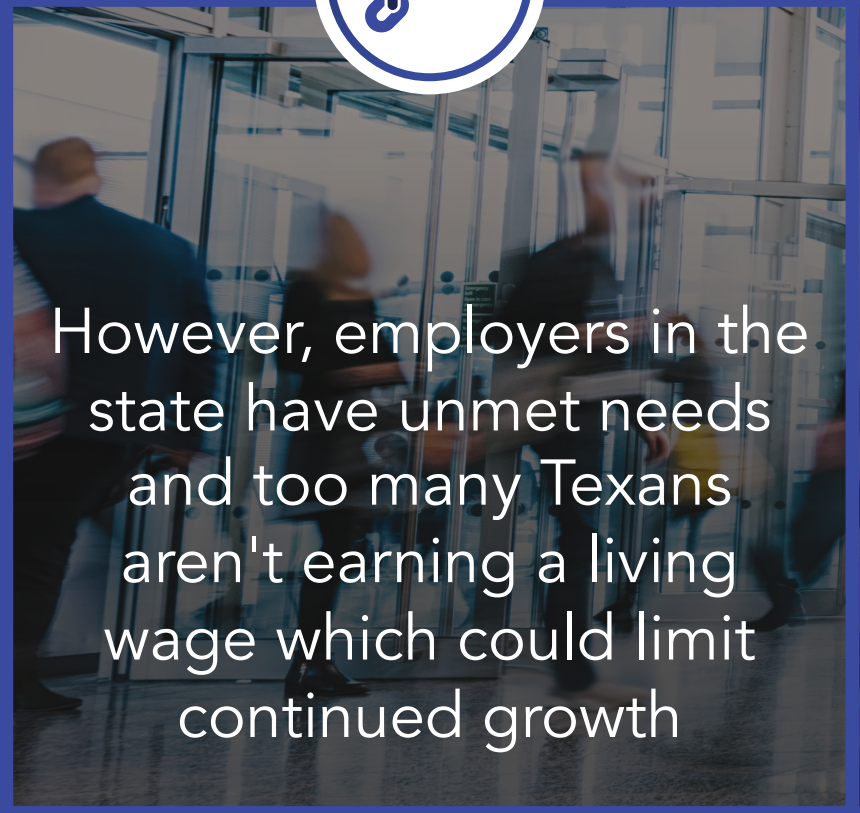
Aligning Talent with Good Jobs for All

Aim Hire Texas Workforce Issues

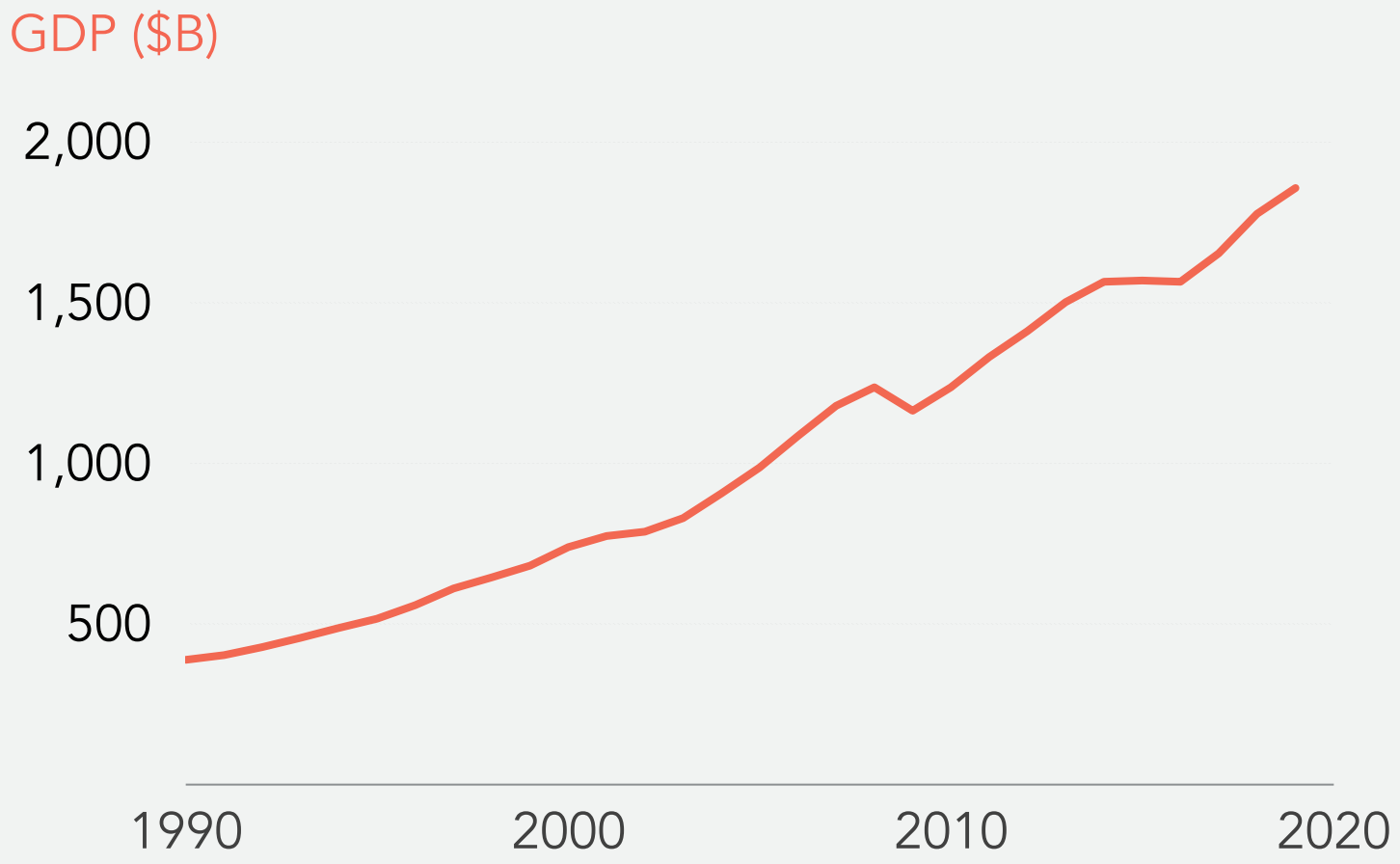
February 2021

Our Initial Findings

Leveraging workforce as a strategic advantage will ensure continued economic growth in Texas



Texas is winning on economic growth



#1

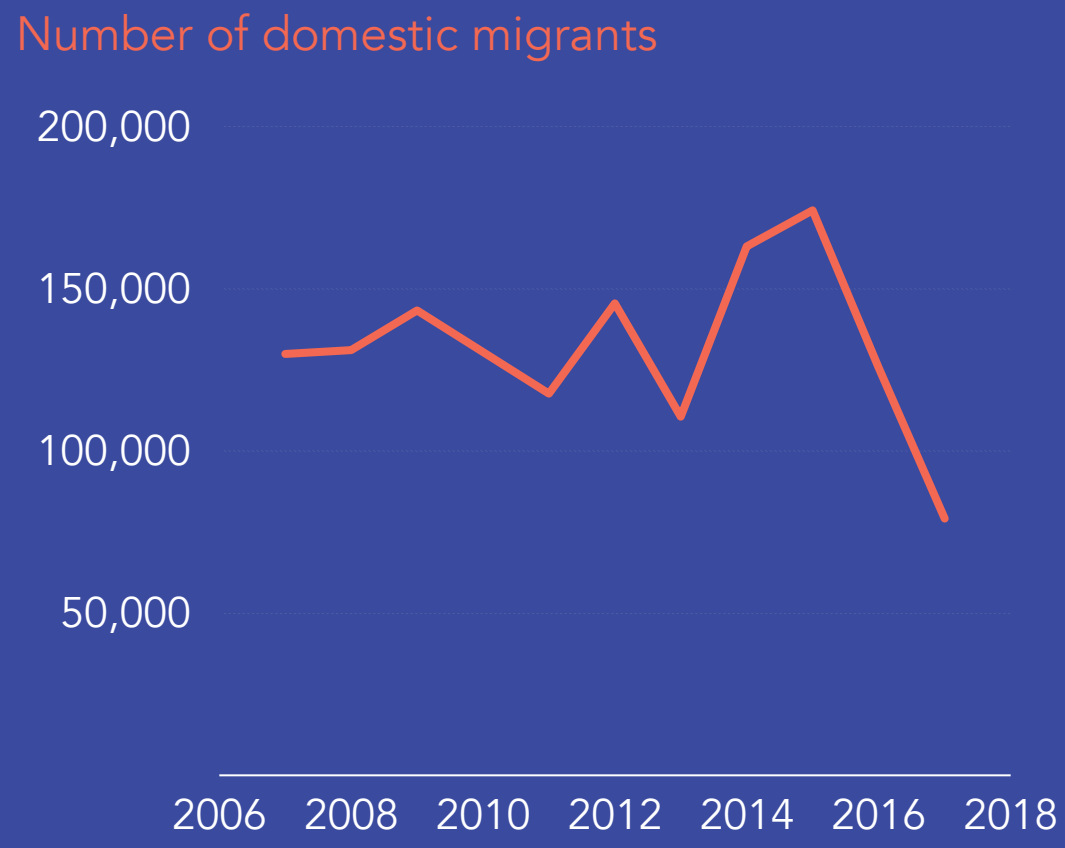
in the nation
GDP growth

Source: Texas Comptroller, Fall 2019 Economic Forecast, Current Dollar GDP; U.S. Bureau of Economic Analysis, 2019 Annual, Real GDP Growth

But Texas depends on highly educated migrants to fill high skill jobs...

Migrants **1.5x** more likely to have a Bachelor's degree than native Texans

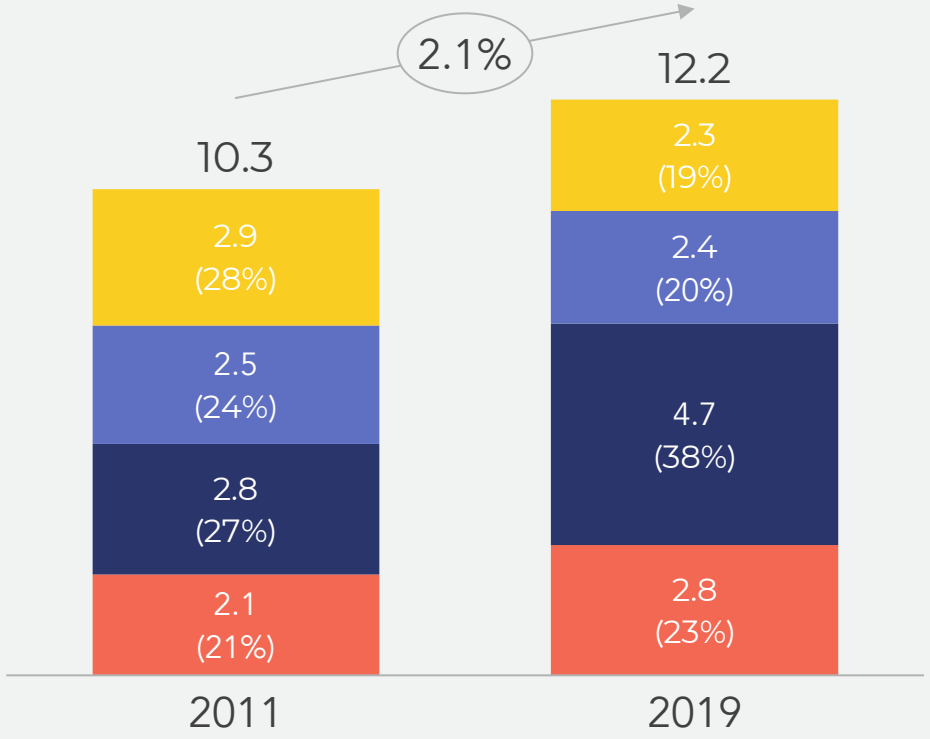
...and domestic migration is volatile



Source: Federal Reserve Bank of Dallas, 2018; Dallas Morning News, 2018

Since 2011, Texas added ~2M jobs, mostly in mid-low wage jobs

All jobs, Texas



Wage Band: Grouping	2019 Salary	2011 – 2019: Jobs Added	CAGR
High:	>$65K	- 0.5 M	-2.5%
Mid-High:	$45-65K	- 0.1 M	-0.6%
Mid-Low	$25-45K	+1.9 M	+6.8%
Low	<$25K	+ 0.6 M	+3.3%
Total		+ 1.9 M	2.1%

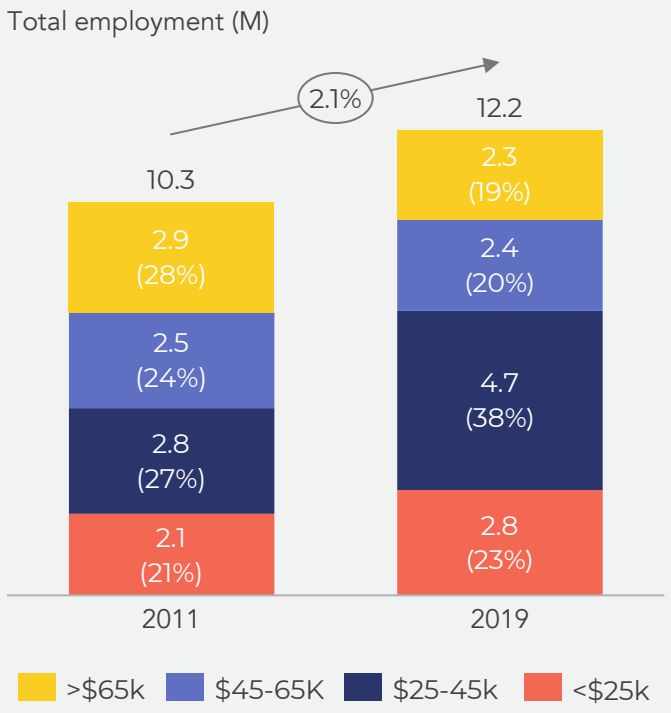
Growth concentrated in mid-low or low wage jobs, which are "living wage" only for smaller family sizes or if households have two earners; for an average family of 3, a household would need 2 or more jobs

Note. Assigned each detailed SOC code to a wage band based on available data then summed for each band. Derived 2019 bands for Texas using aligned wage band definitions, based on United Way's ALICE Project and adjusted to get to 2011 using cost of living adjustment of 3.4% annually over the last decade for the Texas. Detail for ~200kmostly low wage job employees become unavailable with the added granularity to the data pull of industry by occupation.
Source: Texas Workforce Comission (TWC) Occupational Employment Statistics (OES) report (2019) and Bureau of Labor Statistics((BLS) OES Texas database (2011)

Compared to US, Texas had less growth in higher wage jobs

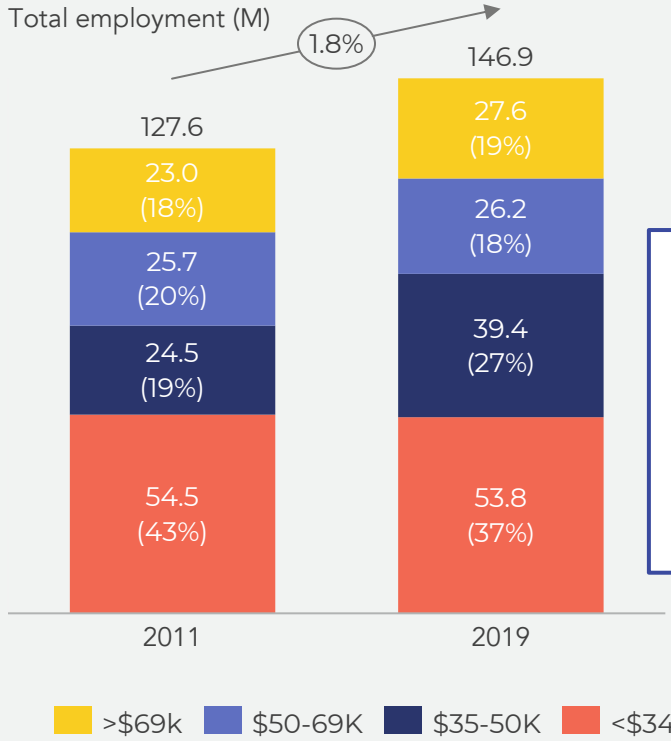
All jobs

TX: Wage Bands



TX '11-'19 CAGR	vs	US '11-'19 CAGR
-2.5%		2.3%
-0.6%		0.2%
6.8%		6.1%
3.3%		-0.2%

US: Wage Bands



Growth in Texas much more concentrated in low and middle wage jobs vs. the nation as a whole

Note. Assigned each detailed SOC code to a wage band based on available data then summed for each band. Derived 2019 bands fusing aligned wage band definitions, based on United Way's ALICE Project for Texas and MIT Living Wage calculator for the United States and adjusted to get to 2011 using cost of living adjustment of 3.4% and 1.8% annually for Texas and the United States, respectively over the last decade. Detail for ~200kmostly low wage job employees for Texas become unavailable with the added granularity to the data pull of industry by occupation.
Source: TWC OES report (2019), BLS OES Texas database (2011 for Texas in 2011 and 2019 for the US)

To continue to grow, Texas needs to develop resident talent to better meet the needs of Texas employers

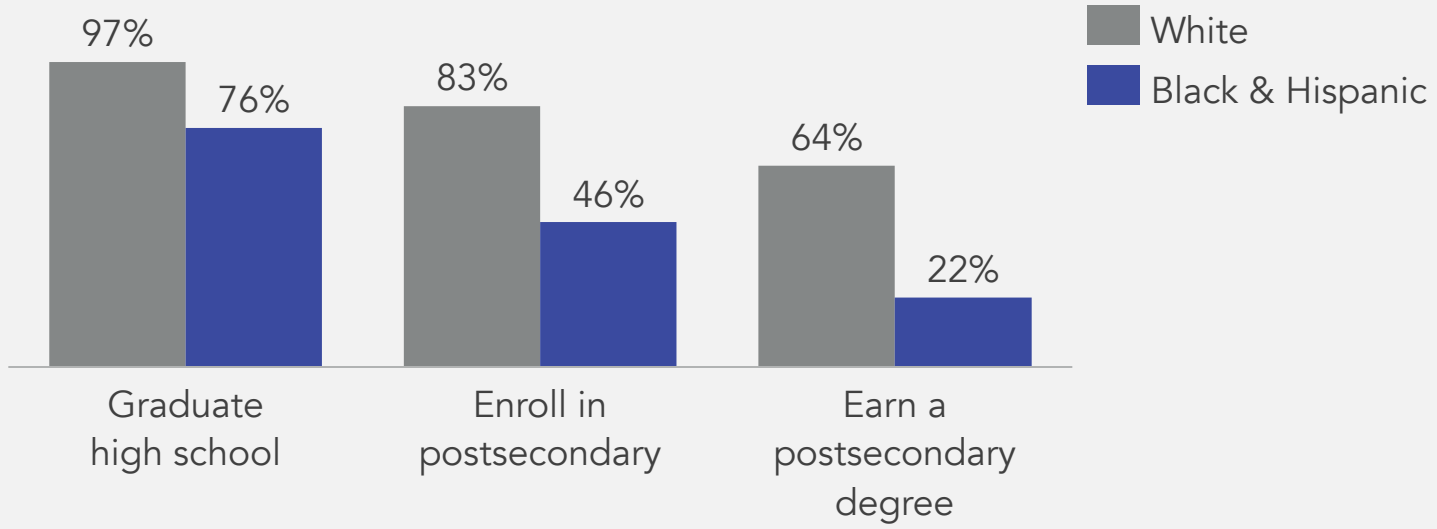
Today, 46% of employers can't fill vital jobs...

...and only 56% of Texas households earn a living wage

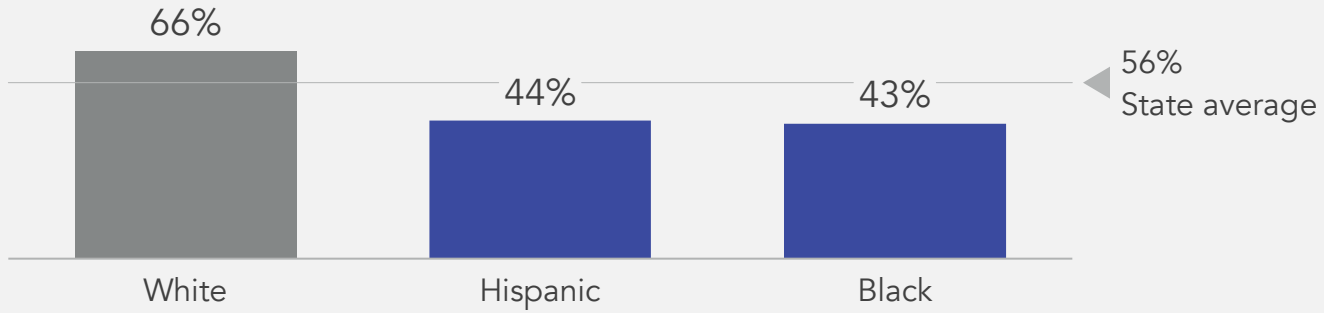
Source: forwardontalent.org/stories/greaterhoustonpartnership/; Household Living Wage – United Way's "Asset-Limited, Income-Constrained, Employed" (ALICE)

These Career Challenges are magnified for people of color, with stark inequities in postsecondary credentials and living wage

Less likely to graduate and earn a credential



Less likely to live in a house earn a living wage



Source: Dallas Thrives Report Nov 2020; https://unitedforalice.org/demographics/texas

Rural areas are critical to the state economy…

Texas is home to 9 of the 15 fastest growing nonmetro counties in the US

…but are facing unique challenges

- Jobs recovery from COVID-19 slower in rural areas
- Resources spread over larger geographic area with smaller tax base to fund education and workforce programs
- Many rural Texas communities don't have access to broadband

Source: United State Department of Agriculture, Rural Employment and Unemployment. https://www.ers.usda.gov/topics/rural-economy-population/employment-education/rural-employment-and-unemployment/.

Aim Hire Texas Goals

AHT Will Drive Systemic Progress With Four Big Goals

Stronger Households

Grow the percentage of Texans earning a living wage

Shared Prosperity

Increase the likelihood that Texans of all backgrounds earn a living wage

Current Employers Thrive

Improve Texas employers' access to a trained labor force

State Uses Talent

Attract new employers to the state to access the state's talent

There will be a significant boost for the Texas economy by achieving these goals

1.2M
More living wage households by 2036

Up 10 pp from 2018 households earning a living wage

$31B
Increase in annual household earnings

Up 5% from 2018 household earnings

Driving greater economic growth and prosperity in Texas

Sources: Texas Demographic Center's Population Projections Program; Oxford Economics proprietary database on household projections; United Way for ALICE Texas Household Budgets; American Community Survey; American Community Survey PUMS; BCG analysis

AHT will focus on these 6 Key Drivers to build better workforce outcomes for Texas

1. **ORGANIZE FOR SUCCESS:** Align state structures and governance across education, workforce, and economic development
2. **STRENGTHEN STRATEGIES:** Strengthen and align state and regional workforce development strategies, data, priorities, and targets
3. **MOBILIZE RESOURCES TO ACTION:** Leverage funding to incentivize action towards state targets (e.g., living wage attainment, equitable outcomes)
4. **GROW & INNOVATE PATHWAYS:** Launch new programs to build a representative, diverse talent supply to meet demand and shape future workforce
5. **INVEST IN TECHNOLOGY & INFORMATION:** Grow latest technology and tools that can inform and empower individuals to find jobs and support employers to find talent
6. **FOSTER EMPLOYER ENGAGEMENT:** Broaden the way employers engage and recruit talent

We need more Texans to earn degrees…

…but more importantly relevant degrees and certifications

To drive better outcomes for all Texans and employers, we must update our education and workforce systems

Four challenges to overcome in strengthening education and workforce systems

Data and tools

Data and tools not optimized to help Texans make better decisions

Skills alignment

Educators and employers not aligned on necessary skills

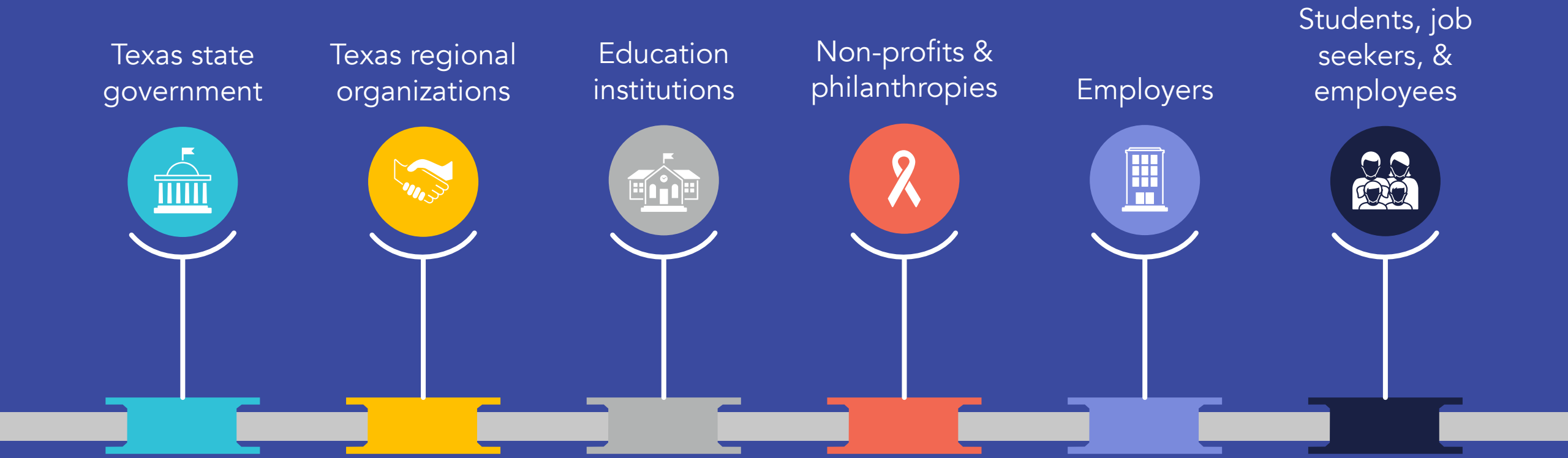
Programs & incentives

Programs and incentives not aligned to changing workforce needs

Employers under-utilized

Employers under-utilized in state strategy formation

Addressing these challenges will require all hands-on deck



What role can you play?

Texas state government: Lay the groundwork for near-term actions and key drivers; provide guidance for regions, educators, and employers on how to align their efforts to state goals

Texas regional partners: Create a strategy aligned to state goals, using state processes and involving relevant stakeholders

Education providers: Engage local workforce boards and employers in reviewing and updating curricula and pathways

Non-profits & philanthropies: Expand and fund programs aligned to state goals that help students and workers gain credentials and skills

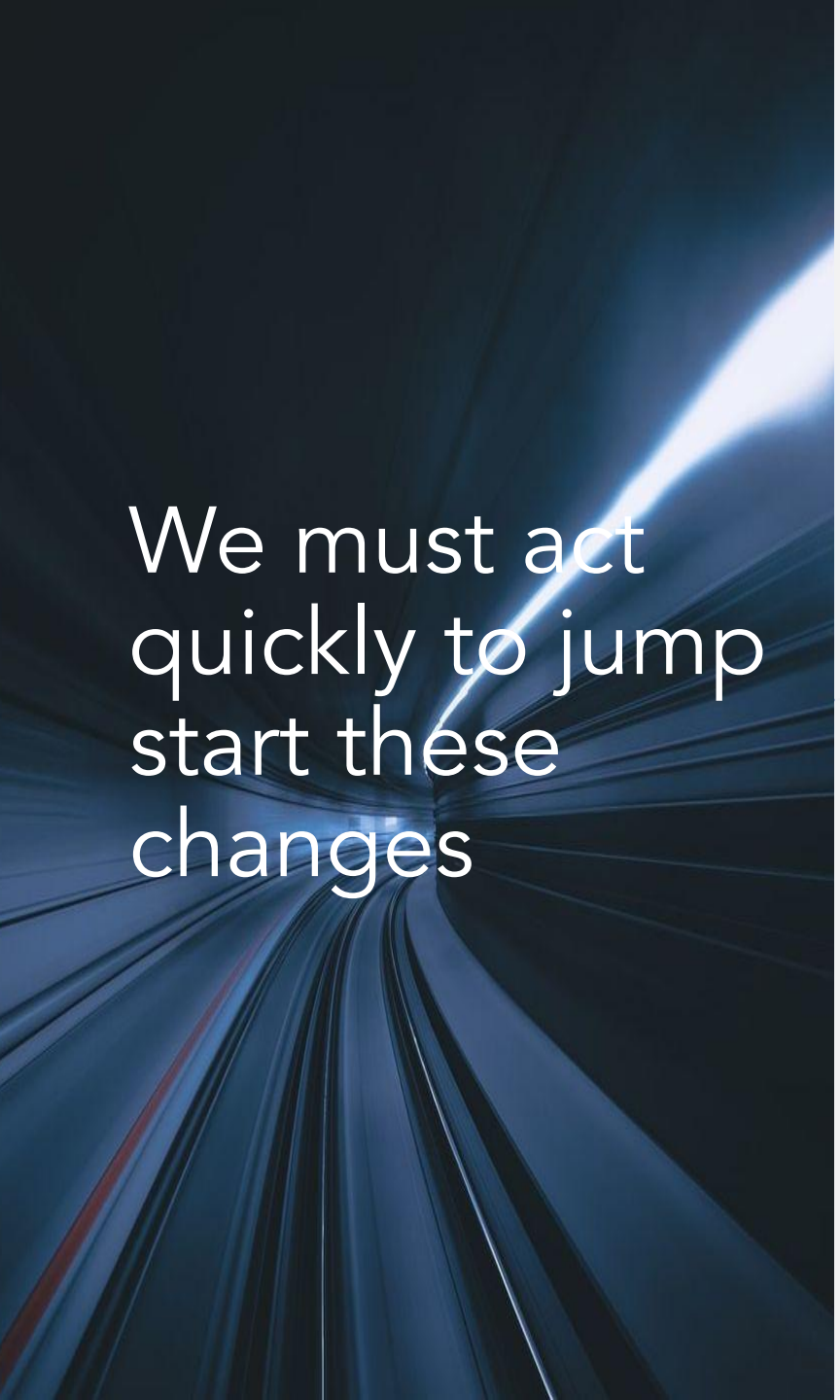
Employers: Get involved in regional and state planning; provide more opportunities and support for your workers to upskill/ reskill

Students, job seekers, & employees: Take an active role in your own skills development

Your actions will help build a stronger future Texas

Texas has an opportunity to align Texas' talent with workforce needs of the future…

…and make its workforce a strategic advantage for the state of Texas



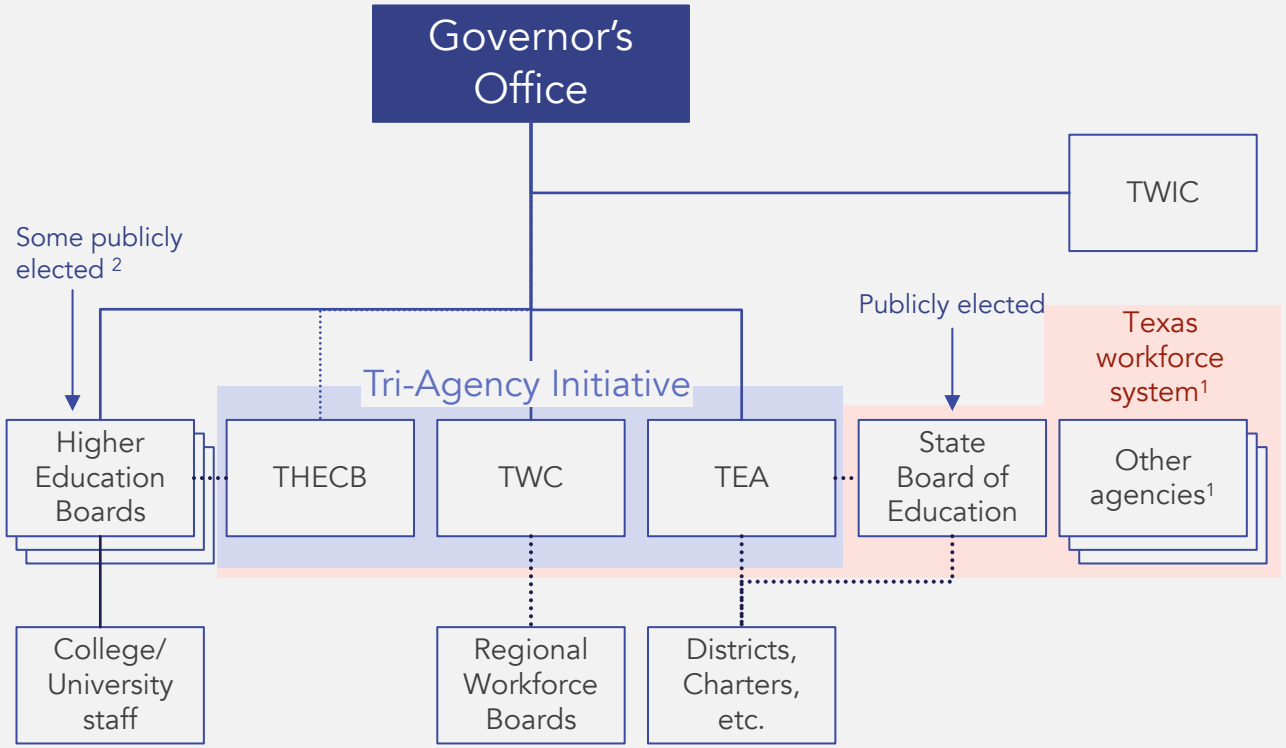
Actions to start today:

- Strengthen current Tri-Agency collaboration
- Support Tri-agency data modernization and longitudinal data linking efforts
- Adopt a more comprehensive state and local planning process using clear state workforce goals
- Mobilize all career programs to maximize attractive Texas jobs of the future

Key Driver 1

ORGANIZE FOR SUCCESS: Align state structures and governance across education, workforce, and economic development

State and regional workforce and education structures are complex with disaggregated power. Support and enhance the leadership authority of the Tri-Agency Initiative.



Direct appointment	Governor directly appoints head of agency or board
Indirect appointment	Governor appoints a Board to select commissioner
Direct oversight	Direct accountability for strategic direction and operations
Indirect oversight	Sets strategy and some rules, but entity has autonomy on specific strategy and operations

1. Texas workforce system is made up of TWC, TEA, THECB, THHSC, TDCJ, TJJD, TVC, Office of governor Econ development and tourism, Association of workforce boards; 2. Some community and technical college boards are publicly elected
Source: Agency websites; Stakeholder interviews

Tri-agency initiative can Lead to Better Data, Planning, Innovation

Some initial progress, though more opportunity to improve coordination exists

2016 → Feb 2020 → Today & the future

Partnership established

Effort spearheaded out of Governor's office to better align these common agency efforts

Mandate of tri-agency group:

- Assessing local economic activity
- Examining workforce challenges and opportunities
- Considering innovative approaches to meet the state's workforce goals

First report recommended several courses of action

- Building partnerships amongst the agencies and other stakeholders
- Aligning goals of 60x30TX with workforce needs in TX
- Strengthening PreK-12 education to establish the students' foundation

Progress report highlights several initiatives since forming, though many were already in-flight

The initiatives created and strengthened some programs, including:

- 60x30 TX Higher Education plan
  - Initiatives supporting adults who attended but didn't complete a degree
  - Track and increase rates of FAFSA and ApplyTX completion
- College readiness
  - Launched Texas OnCourse, a statewide college and career readiness initiative
  - Created P-TECH to provide students with work-based experience
- Career readiness
  - THECB and TWC launched the Internship Toolkit as a primer and guide on internships for employer

However, most initiatives already in flight - limited new progress

November 2020 report details strategies and actions items to accomplish 3 priorities

- Supporting efficient and flexible pathways leading to high-wage, in-demand jobs
  - Creating mapping pathways
- Providing students support needed to succeed in educations and in transition to the workforce
  - Reducing barriers in education
- Creating and infrastructure for agency collaboration to ensure improved outcomes
  - Developing modern data infrastructure

Potential further opportunities to address in the future

Potential to engage and catalyze the effort by:

- Encouraging agencies to dedicate and share resources to serve outline priorities
- Developing robust data management system between agencies
- Championing higher expectations and outcomes for programs

Source: Stakeholder interviews; triagency.texas.gov

Key Driver 2

STRENGTHEN STRATEGIES: Strengthen and align state and regional workforce development strategies, data, priorities, and targets

Shared Strategies Will Drive Clear Outcome Reporting

Administering agency	Program		Amount		Scale	Outcomes
Texas Workforce Commission (through local workforce boards)	WIOA	Rehabilitation Services (Title IV)	$320m	$650m	*data tracked but not published*[4]	*data tracked but not published*[4]
		Adults & Dislocated Adults (Title I)	$140m		~10k receiving training	~70% credentials, ~60% skills gain
		Adult Education (Title II)	$80m		~94k *(2016)*	*~58% employed on completion (2016)*
		Youth (Title I)	$60m		~2k receiving training,	~40% credentials, ~47% skills gain
		Wagner-Peyser– (Title III)	$50m		~11k receiving training, ~500k total served	~70% employed
	TANF Choices		$90m	$110m	~19k received employment services	*73% employed on completion (2017)*[5]
	SNAP Employment and Training		$20m		~30k received job training	*62% employed on completion (2017)*[5]
	Skills Development Fund			$30m	~9k employees retrained	~3,500 new jobs created
	Trade Adjustment Assistance		$20m	$33m	~1k trained	72.3% employed upon completion
	Apprenticeship Chapter 133		$6m		~6k enrolled	~6,400 enrolled; 86% completion
	Senior Community Service Employment Program		$4m		*~285 (2017)*	*45% employed in Q4 (2017)*
	Self-Sufficiency Fund		$3m		*~5.5k (2017)*	*32% employed in Q4 (2017)*
Texas Education Agency (TEA)	Perkins	Windham School District	$60m	$120M	~68k served in 2018/19	38% received credential (vs. target 35%[3]); note: national avg is 56%
		Secondary & Secondary Corrections CTE	$20m		~1,400k students enrolled in CTE[2]	
Texas Higher Edudcation Coordinating Board (THECB)		Career and Technical Education	$40m		~200k enrolled	
		CTC - Academic Education		$30m	*unclear/not found*[6]	*unclear/not found*[6]

1. Only includes occupational training data reported by TWC 2. No breakdown between corrections and regular students 3. Texas performance targets are below comparable states; e.g. NY: 50%, CA: 88%, FL: 50%; 4. Performance monitored by Rehabilitation Council of Texas; 5. Based on Q4 employment after program exit; 49% at Q2 for TANF Choices; 74% at Q2 for SNAP E&T; 6. Pre-2005, THECB published CTC Statewide Factbook; no more recent data or report discovered

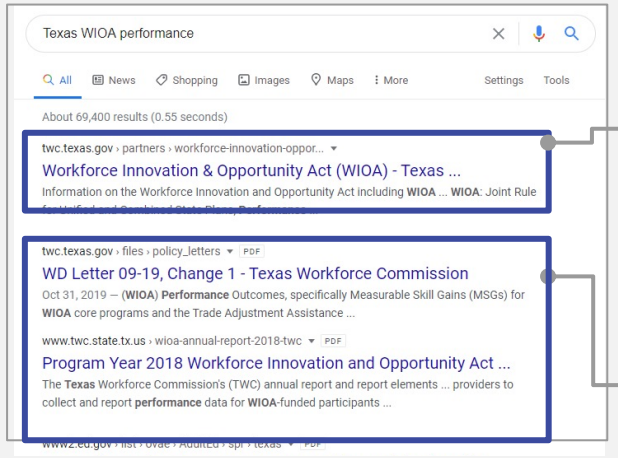
Note: Data shown for 2019, unless otherwise noted; CTC = Community and Technical College; CTE = Career and Technical Education

Source: TWC Annual Report; Windham School District Annual Report; Perkins Data; DoL WIOA Reports; Rehabilitation Council of Texas report; TWC Apprenticeship Related Instruction Cost Study, Fiscal Years 2018-2019

No 2019 data found
2019 data, per TWC

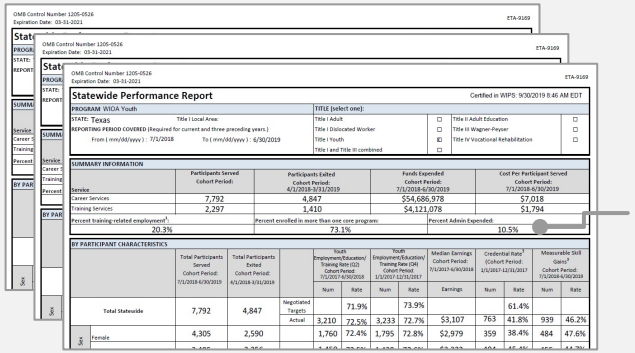
Texas' Workforce Reporting: More About Process Than Performance

Texas WIOA outcomes not easily found through TWC, most focus on guidance/ process...



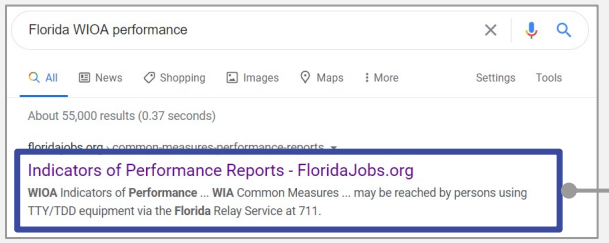
First page navigates to TWC site for WIOA, but no further outcomes data provided on that site- page provides information on requirements, eligibility, etc., no public outcomes data apparent

Other top search results lead to pages on process, guidance, the state's WIOA plan, but did not include comprehensive, quantitative performance data



Quantitative WIOA outcomes data only found through Department of Labor website for WIOA Title I and III, reported via individual pdf documents

...while similar search for Florida leads directly to comprehensive, digestible performance data tables



First search result navigates to main webpage on Florida Jobs website...

...that has clearly organized links to current and historical performance and outcomes data

Statewide

Measures	PY2019-2020 4th Quarter Performance	PY2019-2020 % of Performance Goal Met For Q4	PY2019-2020 Performance Goals	PY2020-2021 1st Quarter Performance
Youth:				
Employed 2nd Qtr After Exit	81.50	107.95	75.50	81.40
Median Wage 2nd Quarter After Exit				$3,900
Employed 4th Qtr After Exit	80.00	115.94	69.00	79.00
Credential Attainment Rate	78.40	103.84	75.50	75.60
Measurable Skill Gains				50.90

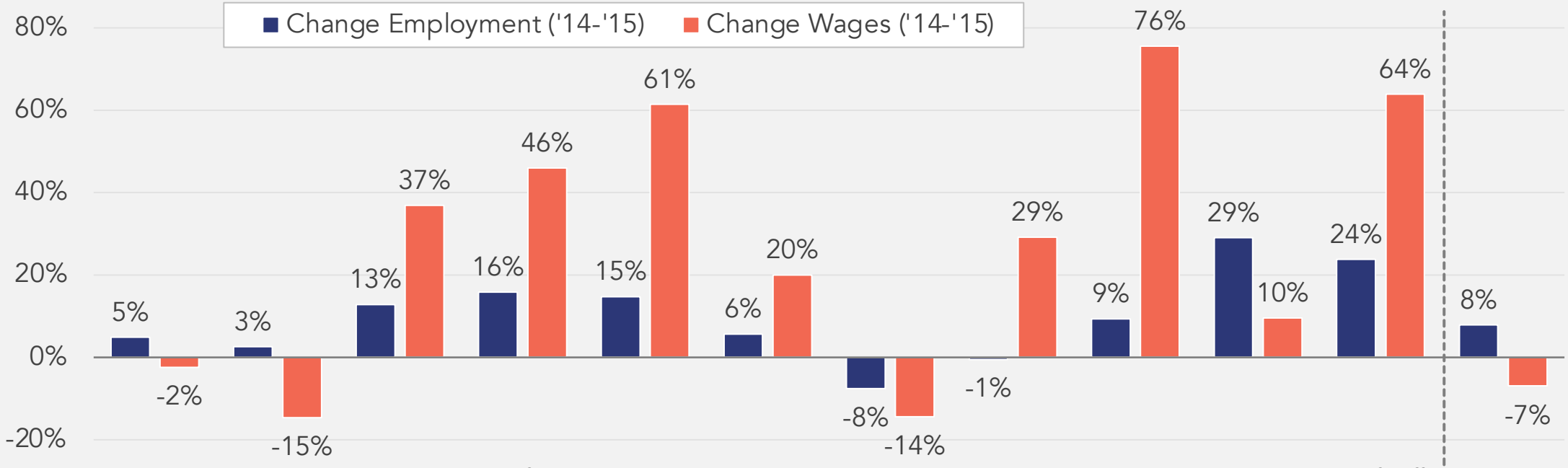
Not Met (less than 90% of negotiated)
Met (90-100% of negotiated)
Exceeded (greater than 100% of negotiated)

Clicking on any one of the links above downloads a clean, organized table of statewide outcomes metrics and comparison to targets

Source: Texas WIOA Report; Florida WIOA Performance Reports; DoL WIOA Reports

Texas Workforce Commission Programs Have Mixed Results for Participants

Largest enrollment programs gain jobs but wages decline



	Employ. Services	Veteran	SNAP E&T	Workforce Inv. Act	TANF Choices	Skills Dev. Fund	Rapid Response	Apprentices hips	NCP Choices	Trade Adj. Assistance	Self-Suff. Fund	All (Excluding Emp. Services)*
Cohort Size (2014-2015)	1.0m	100.0k	51k	38.5k	29.6k	11.0k	5.4k	14.6k	3.8k	1.3k	21	268k
Expend. Per Participant	$50	n/a	$401	$1.9k	$2.7k	$2.5k	n/a	$1.3k	$2.7k	$10.4k	$2.6m	n/a

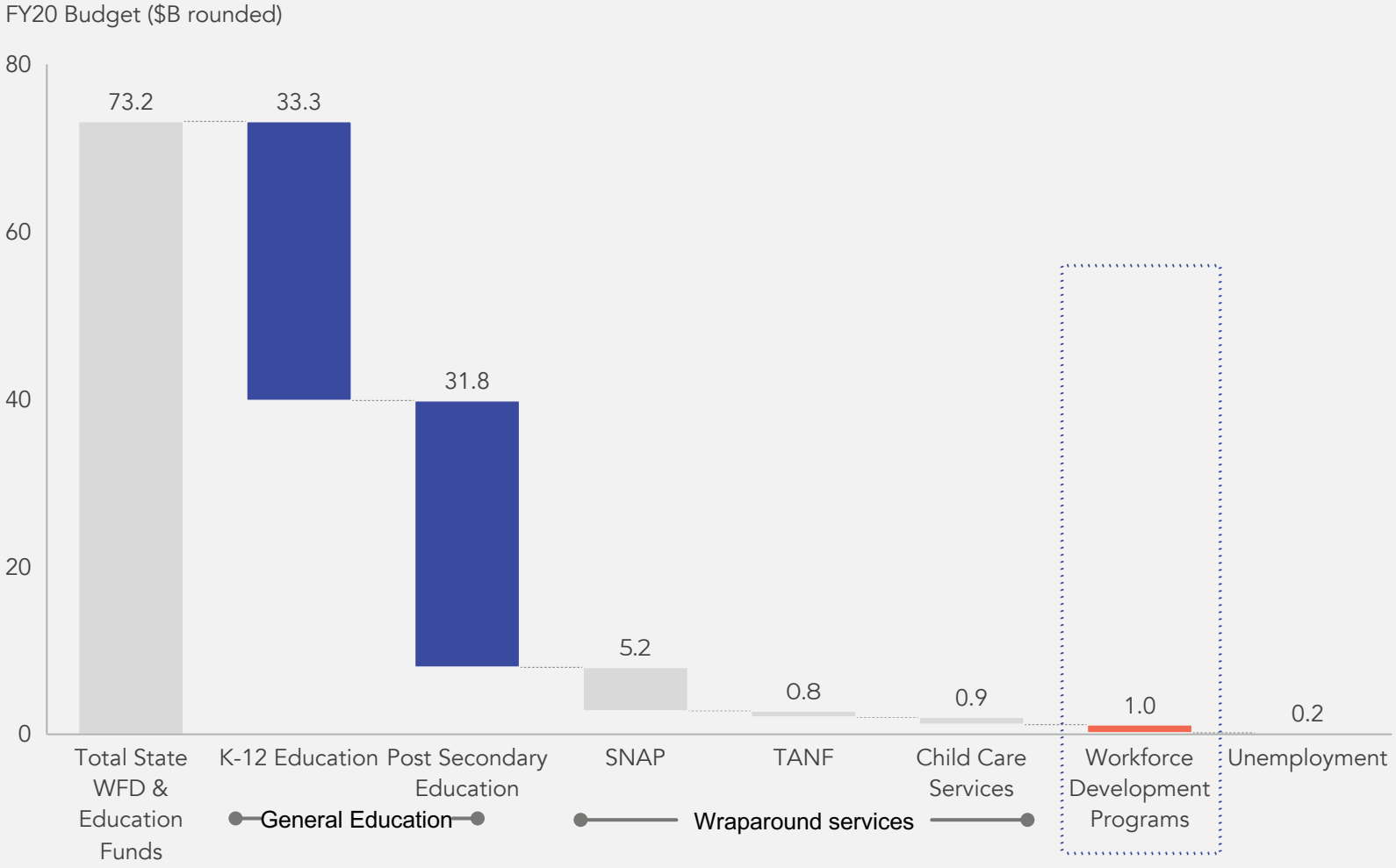
Source: Texas Workforce Commission, Labor Market and Career Information Center, Workforce Program Exit Cohort, 2014-2015: First Year Report (Dashboard), https://lmci.state.tx.us/researchers/dashboard/Workforce/WF1_1415/WF1_1415_Dash.asp .
Expenditures found in TWC Operating Budget for Fiscal Year 2020. https://www.twc.texas.gov/files/agency/fy-2020-operating-budget-twc.pdf
*All excludes employment services due to the massive sample size and the fact that most employment services interventions are simply placing/responding to job postings

Key Driver 3

MOBILIZE RESOURCES TO ACTION: Leverage funding to incentivize action towards state targets (e.g., living wage attainment, equitable outcomes

Texas Spends about $70B for Education and Workforce

WORK IN PROGRESS



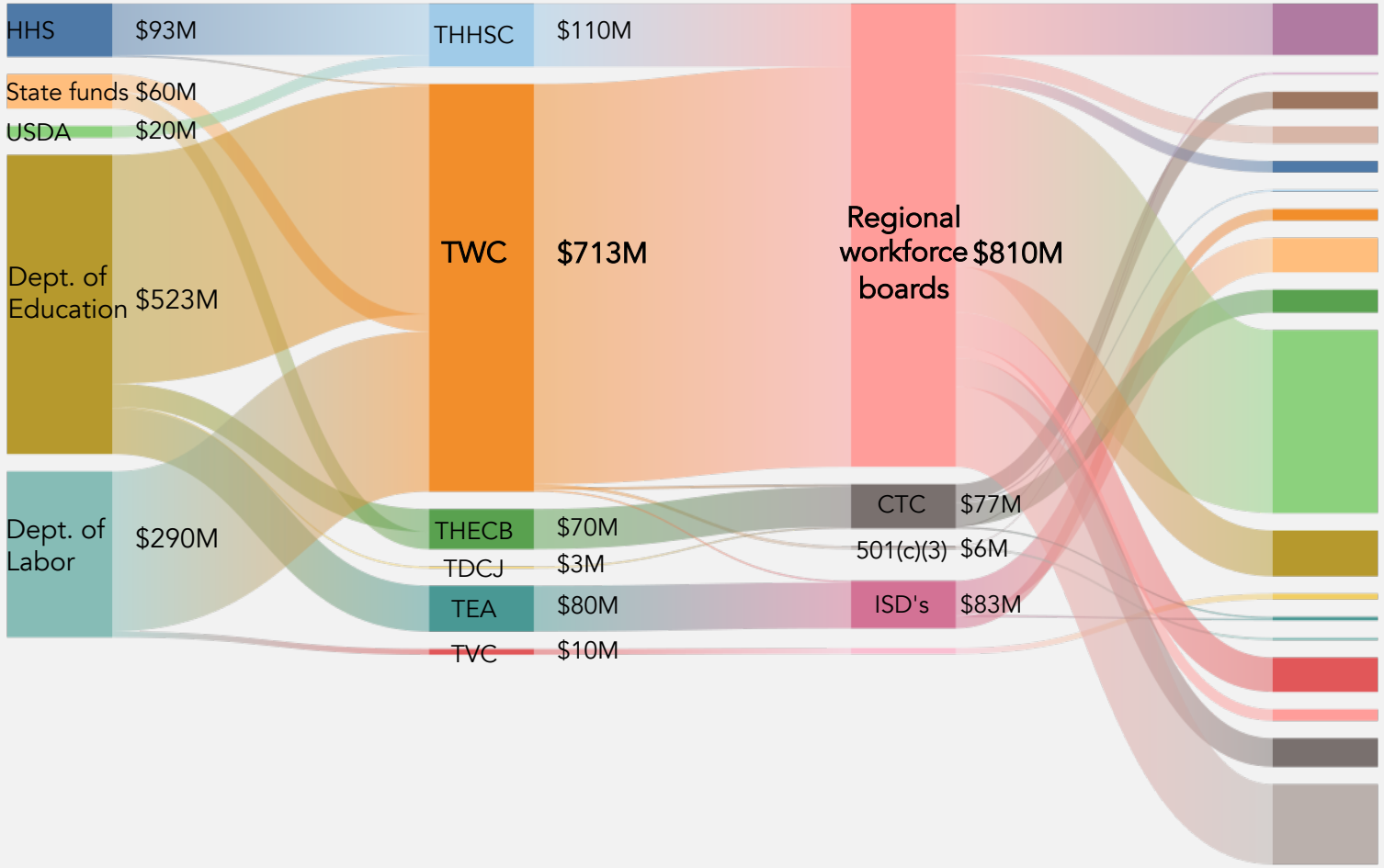
Notes

- **General Education:**
  - K-12: Funding for public schools that is administered through TEA
  - Post-secondary: Funding for public post-secondary institutions (2-year, 4-year, technical, and health institutes)
- **SNAP:** Supplemental Nutrition Assistance Program (SNAP) provides food purchasing assistance for low-income individuals.
- **TANF:** Temporary Assistance for Needy Families (TANF) is a federal program aiding low-income families.
- **Child-care services:** child-care programs administered by Texas Workforce Commission
- **Workforce development programs** include all federally funded programs (e.g.WIOA), programs for persons with disabilities, SNAP E&T & TANF Choices employment programs, and other workforce programs
- **Unemployment:** UI claims, appeals, and tax collections

Notes: TANF & SNAP include funding for employment and training funding, that amount was excluded from the $5.2bn and $0.8bn and included in workforce dev.
Source: FY20 GAA, 2019 THECB sources and uses, 2020 TEA budget;

70% of Texas' workforce funding flows from the federal government, through TWC, and to regional workforce boards to run programs

Texas Workforce Development Programs Funding Flows



Program Name	$M
TANF Choices	$90M
Self sufficiency fund	$3M
CTC—Academic Education	$30M
Skills Development Fund	$30M
SNAP Employment & Training	$20M
CTC—Post Secondary Corrections	$3M
CTE Secondary & Corrections (Perkins V)	$20M
Secondary Education Windham (Perkins V)	$60M
CTC—Technical Education (Perkins V)	$40M
WIOA—Rehabilitation Services Title IV	$320M
WIOA—Adults Title II	$80M
Veteran Employment & Training	$10M
Apprenticeships	$6M
Senior Employment	$4M
WIOA—Title I Youth	$60M
Trade Adjustment Assistance	$20M
WIOA—Wagner-Peyser Title III	$50M
WIOA—Title I Adults & Dislocated Adults	$140M

Source: Texas Workforce Investment Council, Texas Workforce System Program Directory; TX GAA FY 20-21; TEA Federal Grant Awards

Key Driver 4

GROW & INNOVATE PATHWAYS: Launch new programs to build a representative, diverse talent supply to meet demand and shape future workforce

In the future…

71% of jobs will require a postsecondary credential

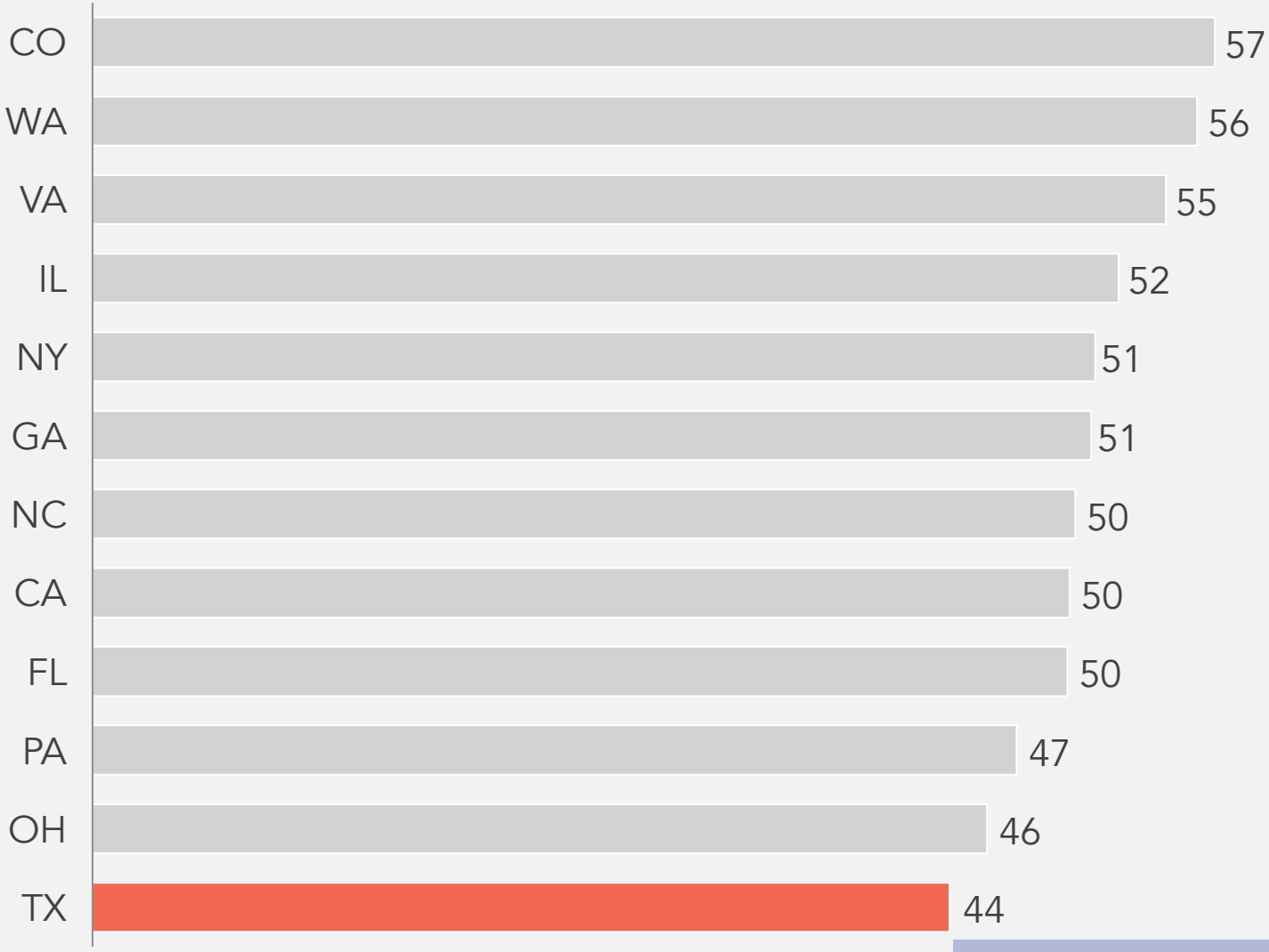
But today…

23% of Texas high school graduates earn a college degree

Note: Based on Texas high school graduates in the Class of 2008 who earned a college degree within 6 years of graduating high school
Source: Georgetown Center on Education and the Workforce, 2020; Texas Public Higher Education Almanac, 2020

Texas ranks last among peers in postsecondary credentials

Percent of population with a postsecondary credential



Note: Indicator is percent of Texans age 25-64 with a postsecondary credential | Source: Lumina Foundation, 2019

Alternative credentials offered in Texas and online have unique advantages for upskilling

Texas has hundreds of alternative credentialing institutions with many online options

600+ Vocational schools

20+ Coding bootcamps[1]

Countless Online courses & certifications

Private institutions also offer online credentialing options

Grow with Google

Google Professional Certificates
3-6 month online bachelor's-level equivalent certifications

IBM SkillsBuild
Free, skills-focused online learning platform

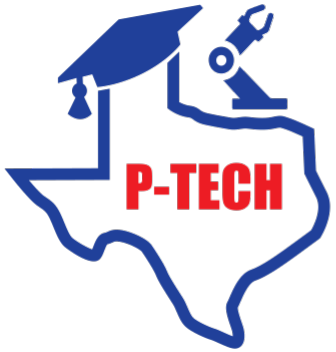
These options offer unique advantages for prospective and current employees in Texas

- Up-to-date curriculum
- Short and often online
- Jobs/skills focus
- Lower cost
- Accessible while employed

1. Bootcamps defined as educational institutions offering full-time instruction totaling at least 30 hours per week in at least one technical discipline, typically lasting between three and twelve months; Source: Texas Workforce Commission; "State of the Coding Bootcamp Market Report 2020", Career Karma; Grow with Google; IBM SkillsBuild; UT Austin Boot Camps

Texas incubating innovative high school models…

TEXAS EARLY COLLEGE HIGH SCHOOL



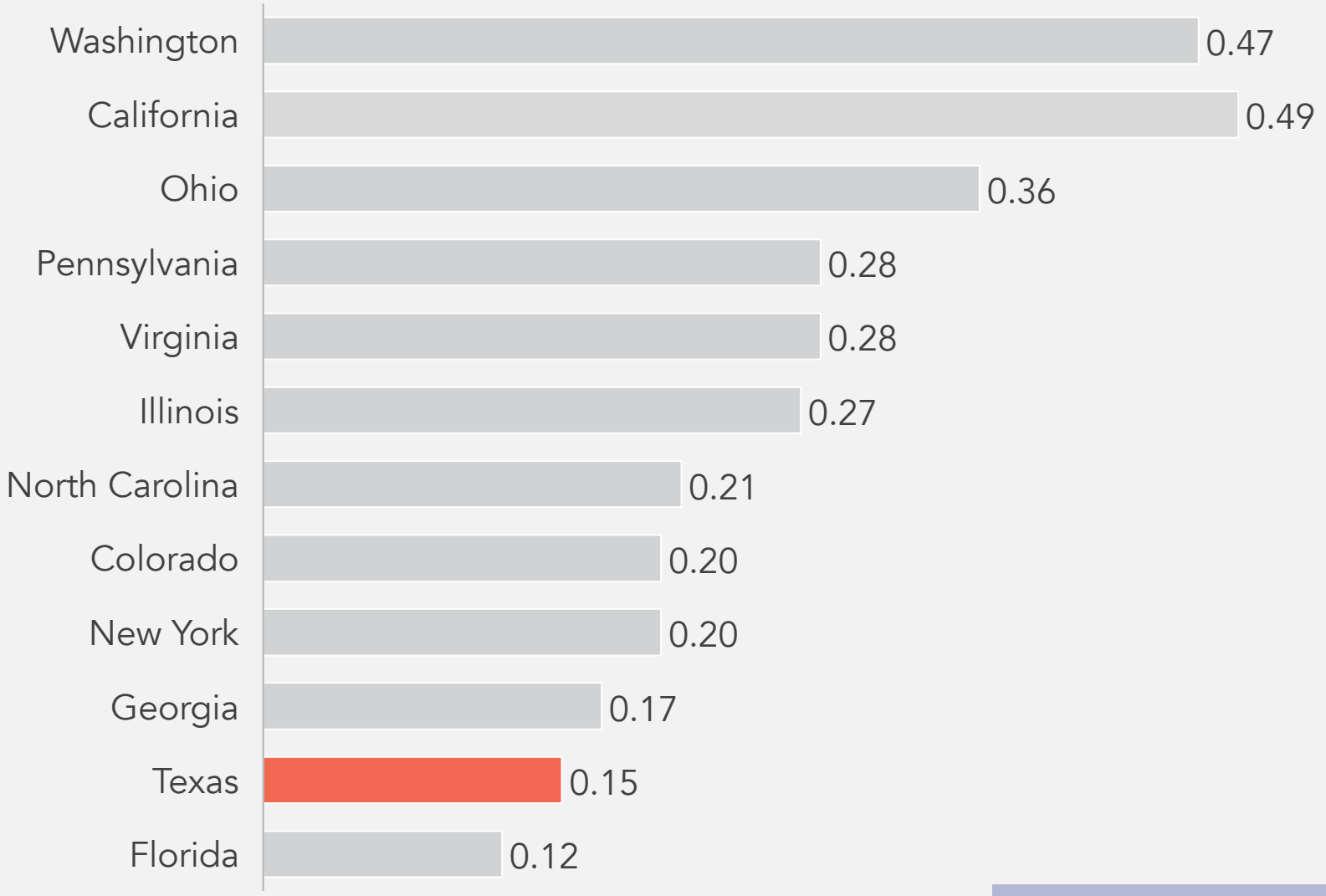
PATHWAYS IN TECHNOLOGY EARLY COLLEGE HIGH SCHOOL

TEXAS SCIENCE, TECHNOLOGY, ENGINEERING & MATH

…but only serving a fraction of high school students

Texas lags in offering apprenticeships, a method of skills development valued by employers

Apprenticeship % of total workforce



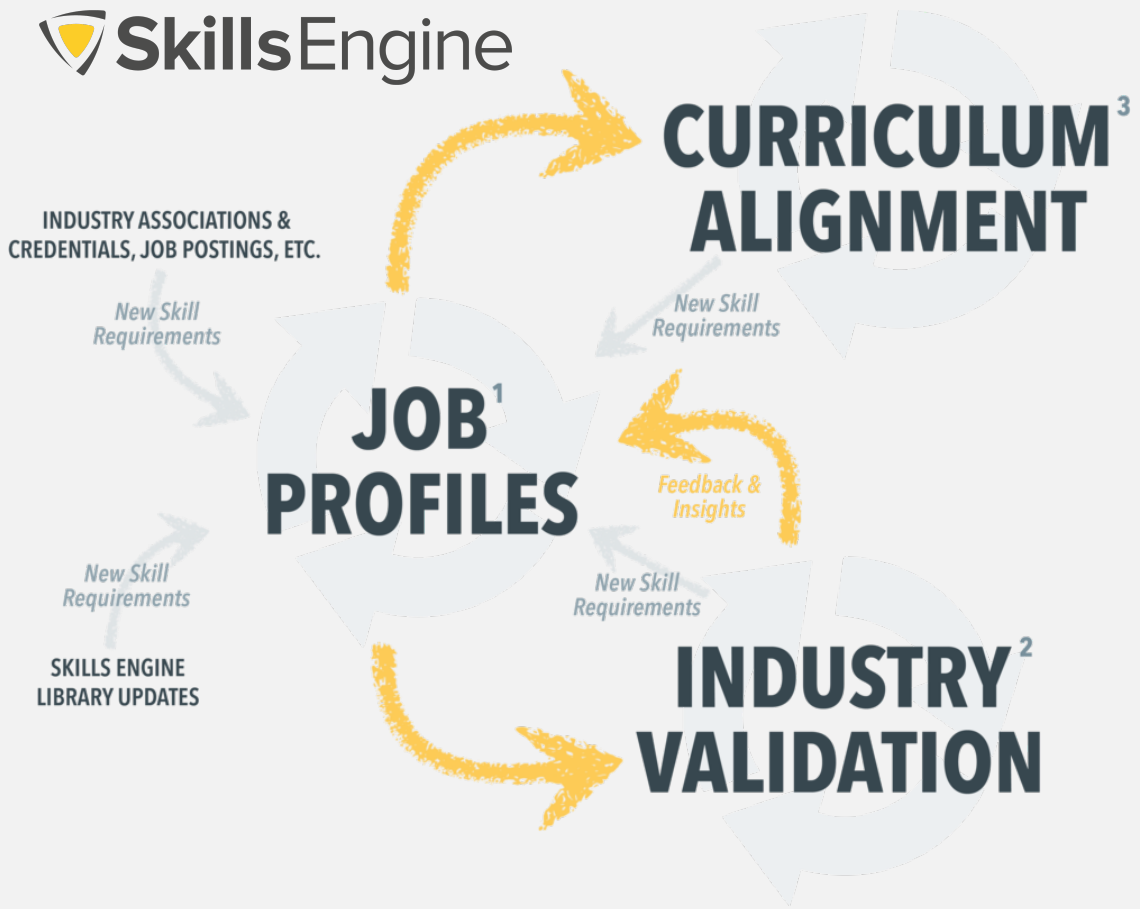
Source: U.S. Department of Labor, Registered Apprenticeship National Results Data Extract, Fiscal Year 2019

Groups in Texas are expanding the use of skills-based curricula and job descriptions

SkillsEngine, an affiliate of Texas State Technical College, is using the Calibrate engine to help develop employer-verified, skills-based curricula

Calibrate helps employers build customized job profiles, validates required skills with experts and employers, and works with educators to align curricula

TEA is also using Calibrate to refine the career and technology education course catalog with the help of Texas employers



Source: SkillsEngine Calibrate

State systems are struggling to keep programs, pathways, and incentives aligned to fast-changing workforce needs

Technology changes will drive the creation of new jobs in Texas

	Job Families	Projected # of Jobs in New Categories in 2036 (K)	Top 5 Largest New Jobs per Family
15	Computer & Math	~270	• Software application developers • Systems software developers • Data engineers • Data analysts • Data integration specialists
11	Management	~96	• IT infrastructure services managers • Test managers • Applications services managers • Data governance managers • Information security managers
13	Business & Financial Ops	~64	• Product owners • Project analysts • Process improvement analysts • Change analysts • Business analysts
17	Architecture & Engineering	~34	• Cloud implementation engineers • Mechatronics engineers • Manufacturing engineers • Industrial engineering technologists • ICT engineering technicians
25	Education	~5	• Education, guidance, school, and vocational counselors
21	Community & Social Svcs	~4	• Employment program coordinators
	Total	**~475**	

Note: Full list of new categories of jobs with projected number of jobs for each in 2036 in appendix; While many of these jobs exist in market today, considered "new" as no direct 1:1 mapping in SOC ontology exists today; Source: Faethm Job Demand Projection Model

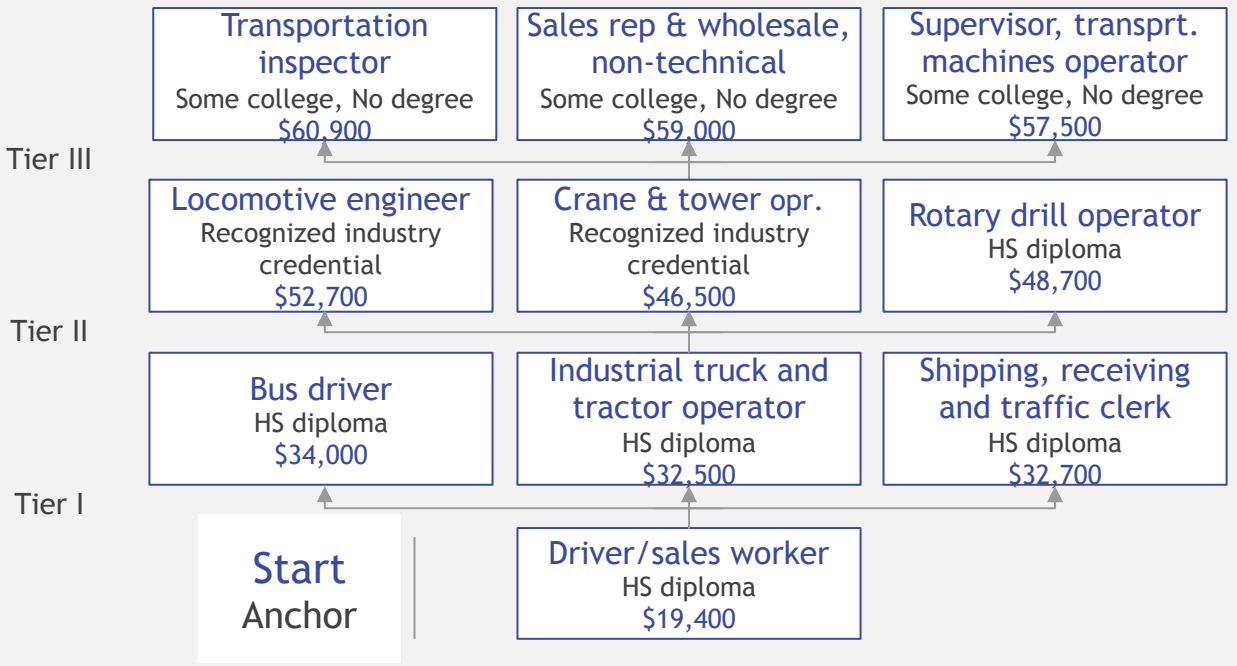
Texas programs can help track career progressions ("lattices") with better data.

Some early work underway, though manually done for only a handful of careers

Career lattices can provide insight into pathways that do not require investment in education

- Useful tool to identify **opportunities that occur naturally "on-the-job"** over time
- On-the-job pathways can elevate a worker from an **entry-level job to a high-skill, high-wage position** without any investment in education
- Providing **visibility into career progressions** helps workers make informed decisions about their ability to switch jobs and weigh the cost-benefit for pursuing further education

Career lattice "rising the ranks" example



Implications & Potential Solutions

- **Develop career progressions** database tracking outcomes after starting a job
- **Identify promising jobs** that have established record of elevating worker wages over time
- **Make career progression** findings publicly available for prospective workers to use in career planning

Source: "Everyone Starts Somewhere: Career Pathways to Heart of Texas Target Occupations", page 45, 2017

Top Certificate, Associate programs earn higher wages & growth than low wage Bachelor's programs

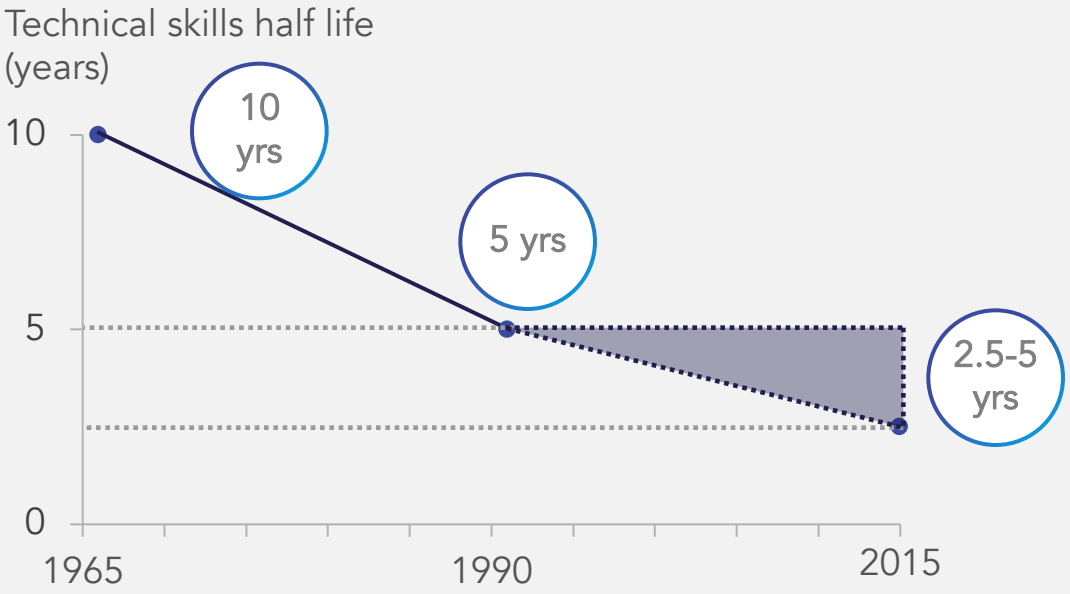
Pathways	Top & Bottom Programs *By 5-year median wage*		Employment Rate (5-Year)	Median Wage Yr 1/5/ 10			Wage Δ Y1 to Y10
Certificates	Top 3	1. Science Technologies	88%	55.4	87.5	102.3	+85%
		2. Transportation & Materials Moving	96%	34.2	62.3	71.9	+110%
		3. Engineering Technologies	69%	40.9	51.5	57.4	+40%
		...					
		18. Visual & Performing Arts	61%	24.3	30.2	43.6	+79%
		19. Culinary, Entertainment, & Personal Services	45%	21.1	27.4	31.9	+51%
	Bottom 3	20. Family & Consumer/Human Sciences	61%	22.0	24.6	26.9	+22%
Associate's degree	Top 3	1. Science Technologies[1]	89%	59.6	97.6	108.8	+82%
		2. Construction Trades[2]	82%	51.1	67.7	67.7	+32%
		3. Health Professions & Related Programs	87%	51.0	60.9	66.3	+30%
		...					
		29. Communication, Journalism, & Related	73%	23.5	32.3	40.0	+55%
		30. Visual & Performing Arts	61%	24.3	32.2	36.4	+65%
	Bottom 3	31. Family & Consumer/Human Sciences	71%	24.8	28.4	31.0	+25%
Bachelor's degree[3]	Top 3	1. Engineering	82%	64.8	84.3	107.7	+66%
		2. Transportation & Materials Moving	78%	53.9	77.7	89.5	+66%
		3. Computer & Information Sciences	82%	55.1	74.5	93.5	70%
		...					
		27. Communications Technologies	79%	29.2	44.5	46.2	+58%
		28. Psychology	71%	30.1	44.1	53.6	+78%
	Bottom 3	29. Visual & Performing Arts	69%	30.8	43.3	50.5	+64%

1. Driven by select technician roles (e.g., Nuclear & Industrial Radiologic Technicians) that produce disproportionately high wages (>$125k); 2. Sample size dropped significantly after 5-year mark to 68 respondents and wages dropped to $63.9k average, so assumed wages were constant; 3. Excluding master's and doctoral degrees from calculation; Notes: Data shown for all cohorts, all institutions; Source: U.S. Census PSEO Explorer using public-use datasets

Certificates & associate's top 3 wages outpace bachelor's degrees bottom 3 fields of study

Across education and workforce systems, there's not common usage or cataloging of skills, and traditional pathways don't put enough emphasis on skills attainment

Today's pace of technological change means skills become obsolete faster than ever

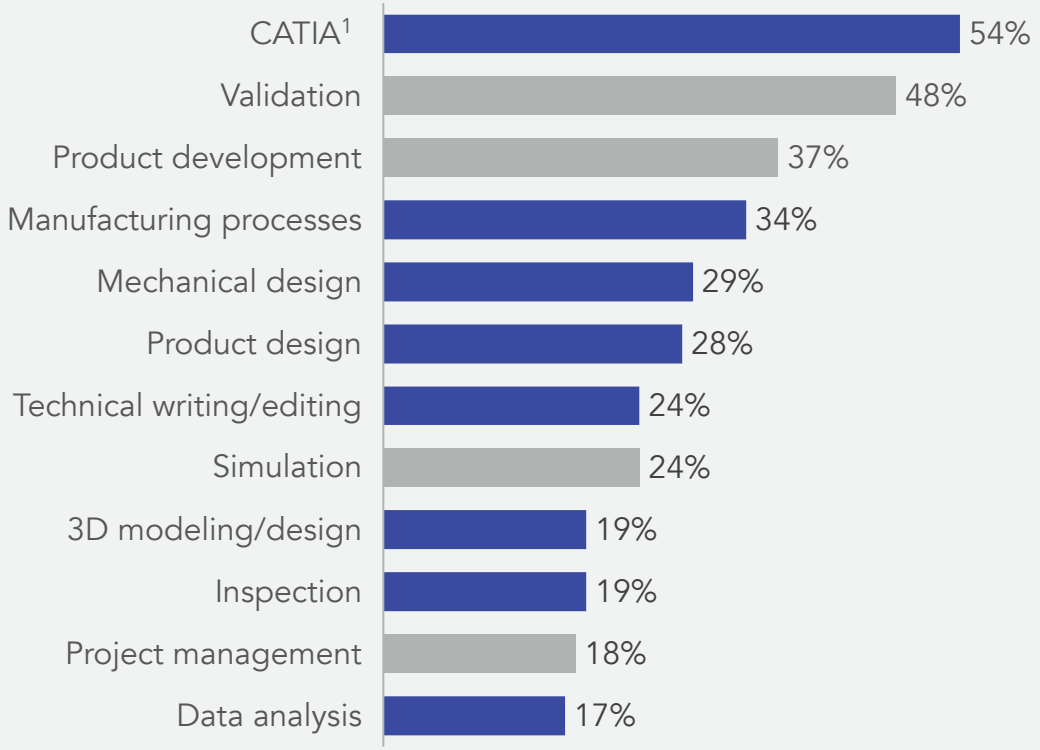


Workers today will have to learn new skills throughout their careers to keep up with the pace of change

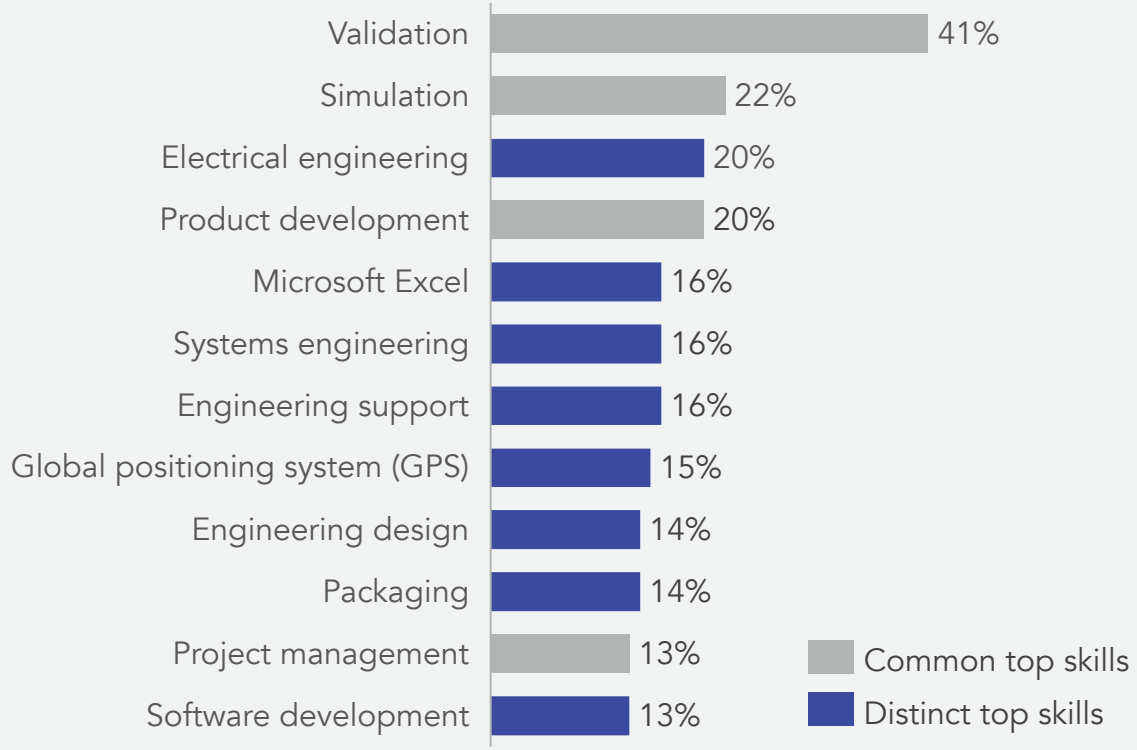
Source: IEEE Skills Prediction; BCG analysis

Specific skills distribution and needs will vary by employer, so skills profiles should be customized in accordance with local needs

Tesla: Top skills for mechanical engineers



GM: Top skills for mechanical engineers



Customizing per local needs allows regional differences to be reflected in skills and pathways analysis

1. Computer-aided three-dimensional interactive application
Source: Burning Glass 2018

To use skills data effectively, Texas will need a better skills inventory and data

Potential statewide approach

Create skills profiles for priority jobs across Texas

Partner with a skills intermediary to make an initial draft skills profile for priority jobs, with:

- Critical skills
- Distinguishing skills
- Emerging skills

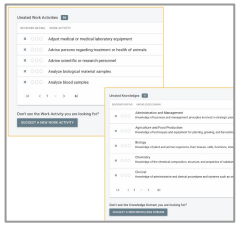
Illustrative list of potential partners, based on preliminary scan:

ACE

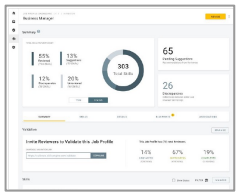
CREDENTIAL FINDER BETA

Apply DACUM or similar process to validate skills profiles for Texas[1]

Conduct stakeholder focus groups for Texas priority jobs to validate skills & identify gaps and make available to regions as starting point



Surveys & focus group of Texas employers

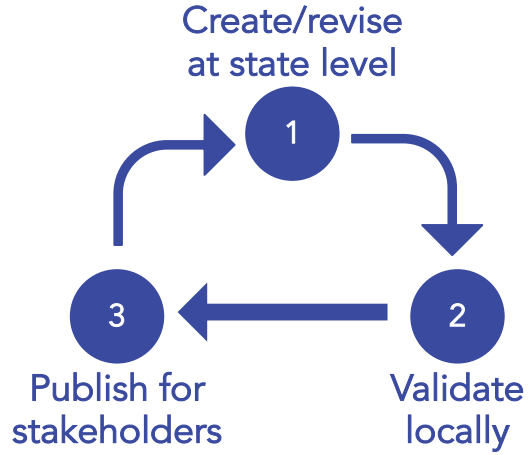


To skills profiles for jobs validated by Texas employers

Screenshots from SkillsEngine/ Calibrate platform, an example tool for this step

Localize skills profiles at regional level and add to skills profile

Enable regional employers to revise and validate profiles based on local needs, update into state strategy plan



1. Developing a Curriculum (DACUM) is a process that uses a focus group in a facilitated storyboarding process to capture the major duties and related tasks included in a job, as well as any necessary knowledge, skills, and traits;

Projections of growing job families in 2036 reinforce need for strong interpersonal and job-specific skills

Proj. skills needed for net new living wage jobs in 2036 by job family

	Job family	Net new living wage jobs (K)[1]	Skills required for jobs in Texas
1.	Transportation & Material Moving	255	10 / 59 / 31
2.	Healthcare Practitioners & Technical	215	22 / 45 / 3 / 30
3.	Management	202	25 / 30 / 7 / 38
4.	Business & Financial Operations	196	14 / 41 / 10 / 36
5.	Construction & Extraction	191	12 / 57 / 2 / 29
6.	Office & Administrative Support	188	12 / 40 / 9 / 39
7.	Computer & Math	153	11 / 33 / 22 / 34
8.	Sales & Related	146	10 / 40 / 6 / 44
9.	Installation, Maintenance, & Repair	126	11 / 63 / 2 / 25
10.	Food Prep & Serving	117	12 / 42 / 46
	Other 13 job families	*511*	
	Total	**2.3M**	

Implications & Potential Solutions

Expand externships & work-study programs to expose students to jobs in these job families early

Strengthen all Texas pathways' ability to develop job-agnostic interpersonal skills to support broad employer needs

Ensure training and education programs and pathways align curricula and programs to skills development

[1] Projected number of jobs in 2036 with 2019 statewide median incomes over $25K based on TWC annual growth rate projections per job between 2018-2028, projected forward and applied through 2036; 2. Based on Faethm analysis of skills highly utilized for all jobs in Texas in a job family
Note: Data shown for top 10 job families with full analysis included in handover materials for remaining job families
Source: TWC Occupational Employment Statistics report used for 2019 jobs; TWC Employment Projections report for 2018-2028 job annual growth rates; Faethm proprietary skills to jobs mapping, ONET skills taxonomy; BCG analysis

Analysis of job postings for individual jobs reveals top skills across skills categories demanded by Texas employers

Texas employers demand many job-specific & interpersonal skills

Select illustrations per TWC priority jobs[1]	Top skills demanded by Texas employers[2]	
Healthcare Practitioner Jobs		
Registered Nurses	• Patient care • Treatment planning	• Telemetry • Patient education
Practical and Vocational Nurses	• CPR • Patient care	• Home health • Treatment planning
Installation, Maint. and Repair Jobs		
Automotive Service Technicians	• Auto repair • Customer service	• Teamwork/collaboration • Preventative maint.
Bus & Truck Mechanics, & Diesel Engine Specialists	• Preventative maintenance • Welding	• Customer service • Computer literacy
Heating, Air Conditioning, & Refrigeration Mechanics	• HVAC • Communication	• Ventilation • Customer service
Construction and Extraction Jobs		
Electricians	• Electrical systems • Wiring	• Communication • Schematic diagrams
Plumbers and pipefitters	• Plumbing systems • Water heaters	• Commercial plumbing • Customer service
	General business skills Job-specific skills	Tech & digital skills Interpersonal skills

Expand vocational, trade & apprenticeship pathways to **build job-specific skills** and with additional emphasis on **interpersonal and customer service skills**, required across jobs

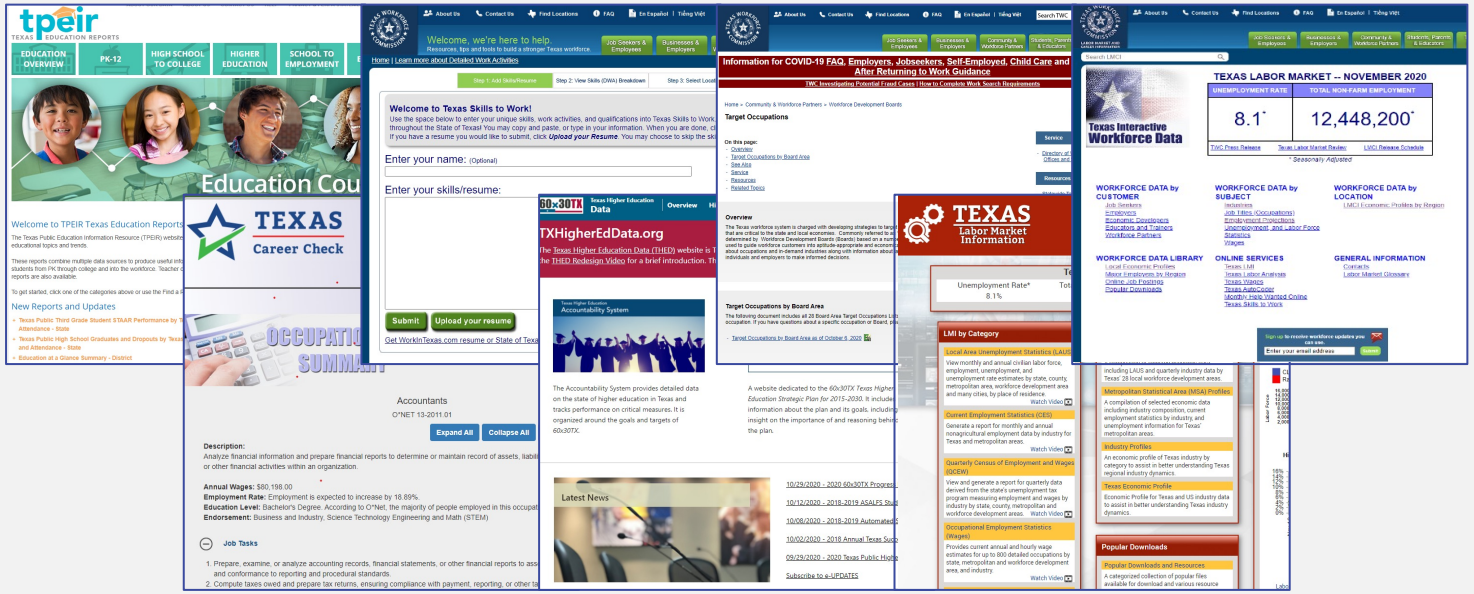
Work with employers (through regular convenings or surveys) to **validate skills demanded and identify gaps in quality** of these skills as delivered by Texas's pathways

1. Jobs shown are a subset selected for illustrative purposes from TWC's list of target occupations, which is a compilation of target jobs identified by each regional WDA; 2. Burning Glass analysis of ~3M job postings in Texas posted during 2019, accessed as of October 30, 2020;
Source: Texas Workforce Commission target occupation list; Burning Glass extract files included as part of handover materials

Key Driver 5

INVEST IN TECHNOLOGY & INFORMATION: Grow latest technology and tools that can inform and empower individuals to find jobs and support employers to find talent

Data not easy to find or use spread across many state websites



It's hard for Texans to learn from these websites which jobs are good, growing, and will provide a living wage

It's also hard to see what skills and credentials are needed to get a good job

Current data limitations make it difficult to understand talent gaps

- No data on actual pathways taken by Texans
- Graduates supply not adjusted for people that leave Texas or don't join the workforce
- No data on how many Texans use alternative pathways for credentials
- No way to determine if workers are part-time vs. full-time or hourly vs. salaried

New Credentials within and outside traditional degrees need better data to compare results and value.

Bachelor's degree & above produces best outcomes, but highest investment; newer paths filling need with shorter, more industry-linked curricula

	Scale		Effectiveness		Investment		Additional Considerations
Pathway	Graduates	Growth[1]	Employment rate	Median wage	Average cost[2]	Average duration	
Certificates	M 75k grads	+0.9% '18-'19	M 70% (5-yr)	ML $44k (5-yr)	$2.2k[3] (4th nat'l.)	~1 year	• **Certificates: Most variable** employment & wage outcomes, but select fields provide reliable path to **middle to high wages** • **Associates: Stackable**, thus providing additional flexibility vs. certificates • Bachelors: Highest investment required, with typically highest outcomes • Across traditional education, median wage varies widely by program- top Certificate & Associate's programs produce outcomes on par with or better than Bachelor's
Associate's degree	M 97k grads	+2.9% '18-'19	M 74% (5-yr)	MH $47k (5-yr)	$2.2k (4th nat'l.)	2 years	
Bachelor's degree & above	H 208k grads	+2.9% '18-'19	H 77% (5-yr)	MH $62k (5-yr)	$8.6k (23rd nat'l.)	4 years	
Career & Tech. Education	H 199k grads	+20.9% '17-'18	M 70% (1-yr, employed or enrolled in Texas)[4]	L $12k[5] (1-yr)	Free (for K-12 enrolled)	4 years (enrolled in grades 9-12)	• Promising path to strengthen high school students' paths to certificates/ jobs • Several Roundtable employers cited desire to increase emphasis on K-12 CTE
Work-based learning[6]	No clear record exists				Free (for workforce prog. participants)	Varies	• Unique opportunity to "earn-and-learn" • Several models, but no clear "playbook" • Several Roundtable employers interested in growing paths & helping remove barriers
Alternative credentialing					Varies	Varies	• Most **agile and innovative** pathway, promising for alignment with employers • Still newly maturing space, with little data/ accreditation at scale

1. Change in enrollment from prior year, based on last year of available data; 2. Annual cost of tuition; 3. Assuming same price as associate's degree; 4. Employed, enrolled in college, or both- only includes students enrolled in Texas public institutions or employed in Texas; 5. Median wage in the 4Q of graduation year for those who are employed and not enrolled in school; 6. 20k+ apprenticeships in Texas (16.1% growth from '18 to '19);
Sources: CTE: Texas Public Education Information Resource; Traditional Postsecondary: U.S. Census PSEO Explorer (employment and wages) and NCES IPEDS (graduates and growth, based on 421 public and private institutions in Texas); Apprenticeships: U.S. Dept of Labor; Texas Public Higher Education Almanac; Additional considerations: Aim Hire Texas Employer Round Table, November 13, 2020

High
Medium
Low

Lack of consistent data availability makes evaluating pathways difficult

	Pathway	Graduation rate	Employment rate	Median income 1-year	Median income Longitudinal	Career paths ("lattices")
Traditional Postsecondary	Certificates	✓	✓	✓	✓	✗
	Associate's degree	✓	✓	✓	✓	✗
	Bachelor's degree & above	✓	✓	✓	✓	✗
Emerging & Non-Education	Career & Technical Education (CTE)	✓	✓	✓[2]	✗	✗
	Work-based learning[1]	✗	✗	✗	✗	✗
	Alternative credentialing	✗	✗	✗	✗	✗

✓ Data available, by institution and degree program (CIP); ✓ Data available, with limitations (see comment box for details); ✗ Limited or no data available

1. Limited apprenticeship data available through U.S. Department of Labor; 2. CTE data from TPEIR provides employment rate and median wage in Q4 of a student's graduating year, approx. 6 months after they completed their course of study;
Sources: CTE: Texas Public Education Information Resource; Traditional Post-secondary: U.S. Census PSEO Explorer; Apprenticeships: U.S. Dept of Labor

Implications & Potential Solutions

Traditional pathways have robust data by degree and institution, with longitudinal employment and income; however, **all data points reported by industry only, not by job (SOC code);** expanding data here would help us determine if graduates employed in relevant jobs to their field of study

Expand reporting on **K-12 CTE outcomes:**

- Longitudinal employment tracking (only tracked today at Q4 post-graduation)
- Add granularity by student achievement (e.g., certifications earned) & by field of study (vs. in aggregate today)
- Add granularity of employment by job type (currently only tracked by industry)

Build statewide repository of **alternative credentials** and **work-based learning programs** and begin tracking outcomes

Build "career lattices" dataset to understand on-the-job pathways that lead to living wage careers

Education and workforce data and tools not sufficient to:

Guide educators on how best to prepare students for the workforce

Advise policymakers in the creation of data-driven legislation

Provide Texans with easy-to-use tools to find and prepare for attractive jobs

Data availability and outcomes for federally funded programs

Program	Completion	Outcomes	Quality
WIOA	Number of participants: • Enrolled • Receiving training • Exiting program 1	• Employment rate after exit 2 • Median earnings 2	• Credential rate • Measurable skills gains
Perkins V	• Graduation rate	• Academic proficiency • Post-program placement (job, school, military) 3 4 - Post-secondary placement	• Credential rate • Credit attainment • Work-based learning participation
TANF Choices;	• NA 5	• Job placement 6	• NA 5
SNAP	Participants completing: • Training or ed • On job training	• # in unsubsidized employment 2 • Median earnings 2	• NA

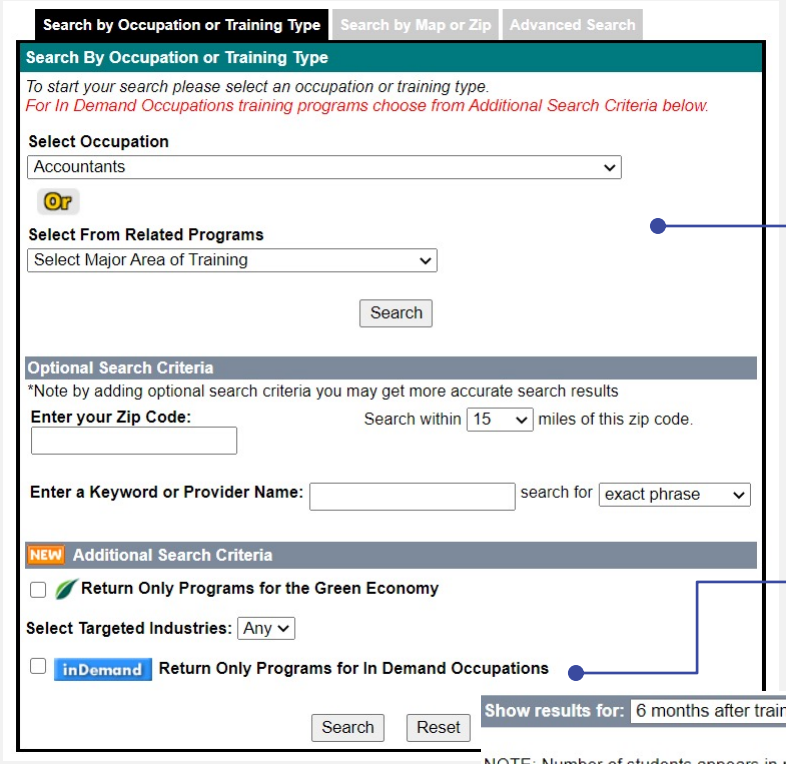
Source: WIOA Performance Indicators; Perkins V Core Performance Indicators; TANF Performance Measurement

Limitations and solutions

1. Does not indicate if participants completed program
   - Improve by adding graduation
2. Only measures 2nd & 4th quarters
   - Track data longitudinally
   - Measure change in income
3. Placement but not earnings/wage tracking post completion
   - Include wage measures
4. No longitudinal data tracking, stops at near-term placement
   - Collaborate across agencies to track long-term data
5. TANF only requires tracking of job
   - Track further data on quality, beyond federal requirements
6. Yes/No metric no additional data
   - Include wage information in metric

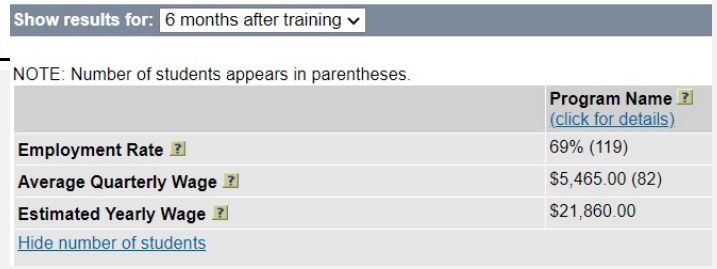
Several states have gone beyond federal requirements to publish more usable and transparent data for performance evaluation

New Jersey: searchable ETP[1] list with outcome data



Users can search for providers by occupation or by training area

Users can filter for programs that lead to high demand occupations

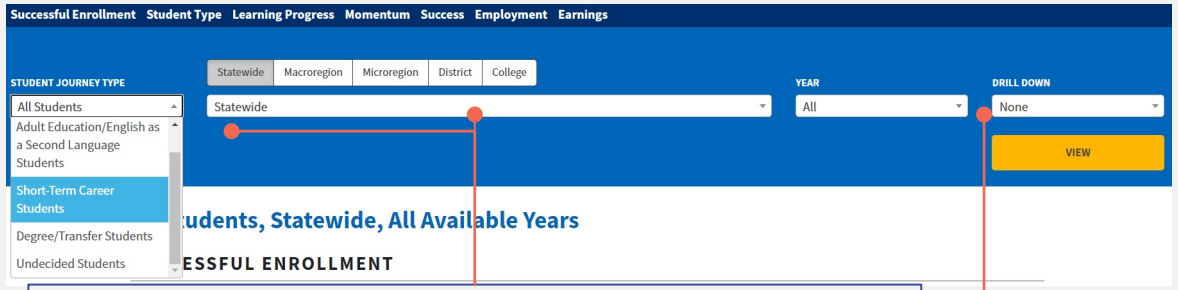


Once a program is selected, users can view outcomes for that program

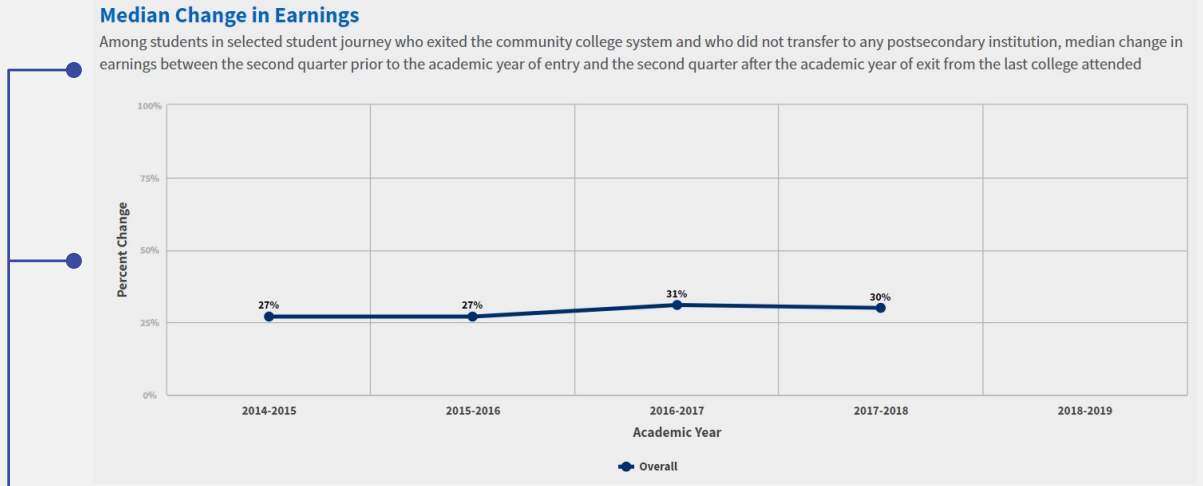
1. Eligible Training Provider

Source: New Jersey ETP Search; CalPass Launchboard

California: interactive dashboard with community college program outcomes



Programs and colleges can by searched by region, journey type, and student demographics and characteristics



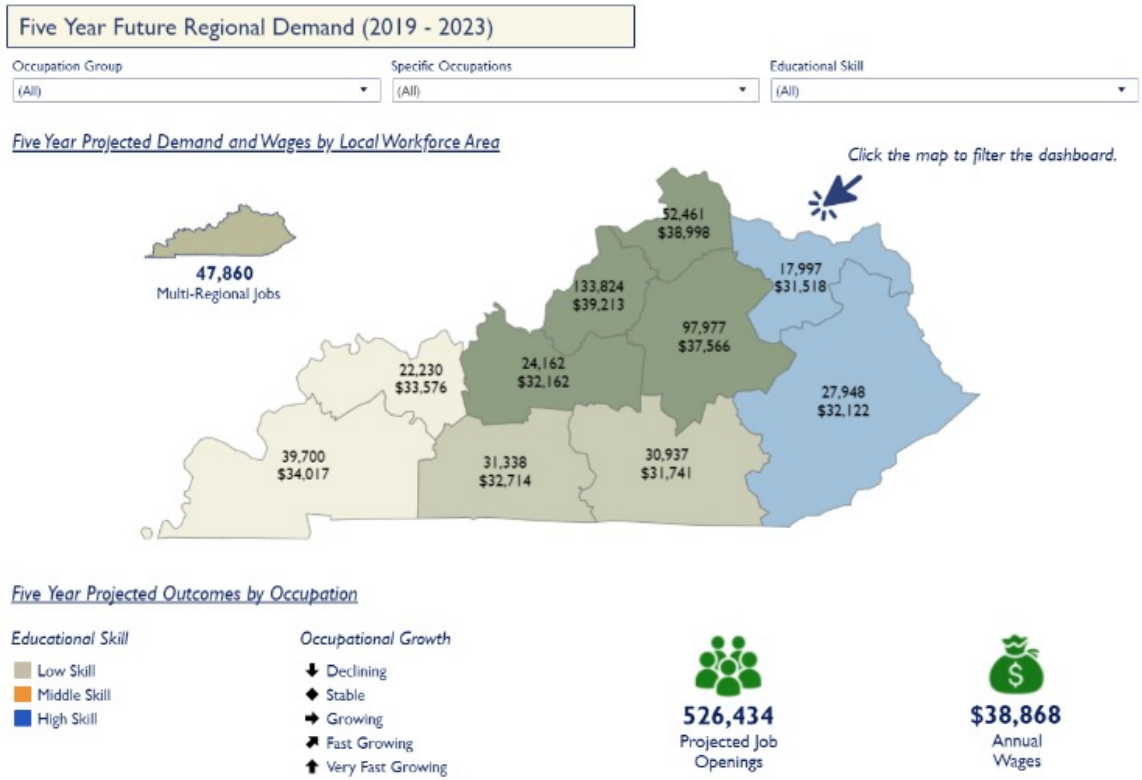
Charts of each metric are displayed in the page with definitions of each metric

Source: New Jersey ETP Search; CalPass Launchboard

Some states have even more comprehensive tools to guide users

Kentucky's KYSTATs :

- Projects job growth by region
- Tracks education and workforce trends to inform policy decisions
- Helps job seekers explore occupations by skills, desired salary, and major or certification
- Shows expected job openings, salary info, and state pathways to gain required credentials for each occupation



Key Driver 6
FOSTER EMPLOYER ENGAGEMENT: Broaden the way employers engage and recruit talent

Despite being the primary beneficiary of Texas talent, employers are not consistently engaged in state and regional strategy setting, curriculum and pathway development, or evaluation of workforce development program effectiveness

"We need to ensure that we offer new and diverse onramps to careers. For example, if someone without a degree has an interest in and an aptitude for our work, can we offer training and a pathway to be hired? If a current employee wishes to advance, can we support upskilling or reskilling?"

Mary Barra, Chairman and CEO of General Motors
Business Roundtable member

UPSKILL HOUSTON

Upskill Houston, a Greater Houston Partnership initiative, has mobilized more than 200 employers, educators, public officials, and stakeholders

Using the US Chamber of Commerce's Talent Pipeline Management approach as a framework, established industry sector councils for:

1. Petrochemical
2. Oil and gas
3. Advanced manufacturing
4. Healthcare
5. Construction
6. Port and Maritime
7. Utilities

Since the inception of the Upskill Houston sector council, the petrochemical sector has already seen:

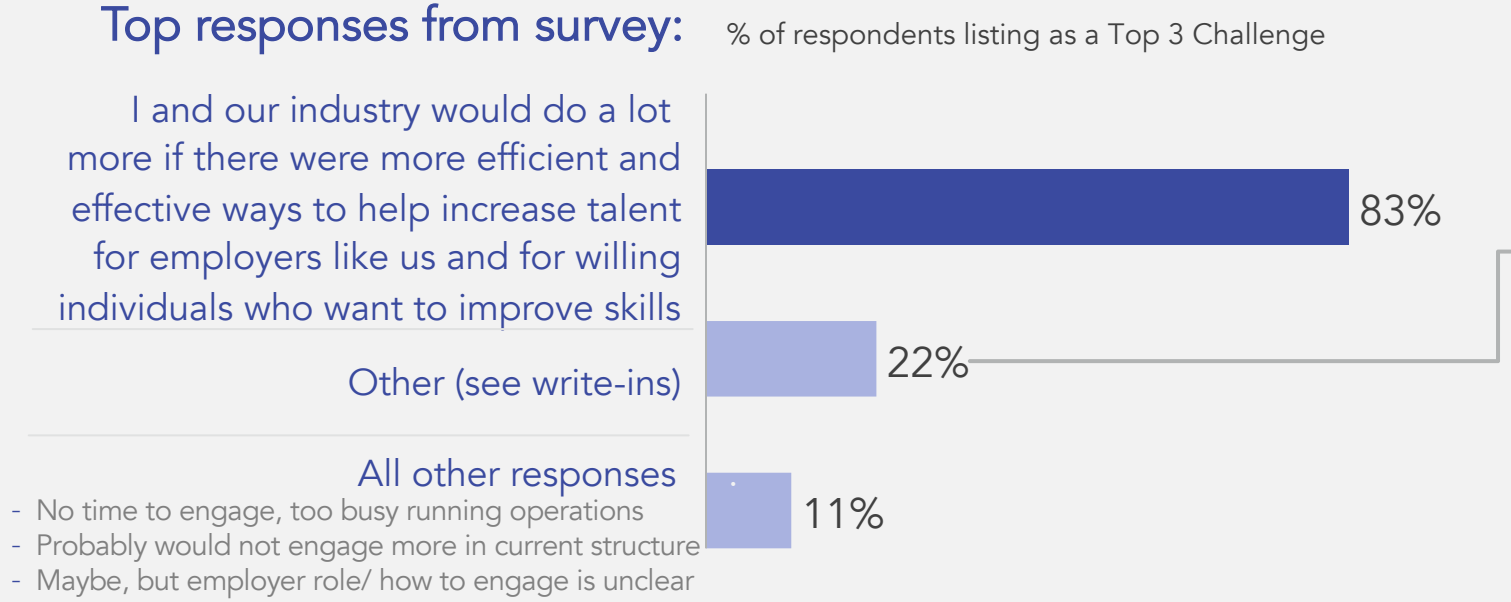
- 32% increase in enrollment in petrochemical courses at community colleges
- 42% increase in completion rates for degrees and technical training programs

Source: UpSkill Houston

Employer Challenges To Workforce Engagement

Survey Question: Could you and your company/ organization participate more in workforce improvement programs if these were organized better?

Top responses from survey:



Other: Write-in responses

- We regularly participate in workforce improvement programs
- The state's funding model and curriculum for CTE programs needs to better support the unique challenges rural educators and employers face
- Programs could be better structured to industry needs to make them more effective
- Seems like it is always the same companies doing the heavy -lifting for the benefit of all. No issue with collaborative concept but effort and resources burden needs to be spread more broadly across companies

Thought Starters: Questions for discussion

- What are other ways in which participating in workforce development programs are not working?
- Do you think online/ virtual trainings can help fill any of these gaps? New technologies?
- What changes would you like to see in future training programs?

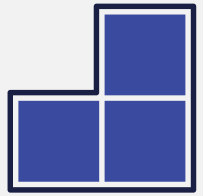
Source: Texas 2036 Employer Roundtable Pre-Survey responses, n=18

CEOs of large US companies have committed to place greater emphasis on skills in hiring

Over 80 Business Roundtable members have committed to better recognize and evaluate skills of all job seekers and to develop internal training programs to help upskill their own employees. Committed actions include:

Rewriting job descriptions with a skills focus

Publishing clear job advancement pathways for current employers



Creating training modules to help employees reach the next career step

More Wage Data and Background Materials

compiled by Boston Consulting and Faethm

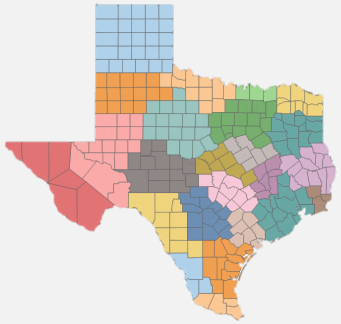
Wage Data Structure Overview

Regional Boundaries

Defined 24 regions, mostly aligned to 28 WDAs per TWC regional geographies, aggregating in some WDAs[1] to represent larger MSAs

- Note: Potential to further summarize (e.g., into ~7 regions) for aggregating analysis

Note: data limitations prevented supply / demand projections at regional granularity- only considered in select analyses and using off-the-shelf tools



Wage Band[1]

Wage bands informed by household survival budgets, from MIT and UW ALICE projects

- Low Wage: < $25K
- Mid-Low : $25 – 45K
- Mid-High: $45-65K
- High Wage: > $65k

Job Families

Job codes defined by 6-digit SOC (job) and aggregated into 2-digit SOC (job family) codes

Industry Clusters

Standard Industry definition defined by 2-Digit NAICS codes or clustering at 4-digit NAICS codes for more meaningful industries

Note: supply / demand projections focused on job dimension, not industry; industry view considered for historical analysis only

Educational Attainment

Credentials by secondary or post-secondary

- High school or below
  - Below High School
  - High school diploma/equivalent
- Some College
- Associate's Degree
- Bachelor's Degree or higher
  - BA/BS Degree
  - MA/MS Degree
  - PhD/Professional Degree

1. Aggregated regions are: Greater Austin (Capital Area & Rural Capital WDAs); DFW (Greater Dallas, Tarrant County, & North Central WDAs), and RGV (Lower Rio Grande Valley & Cameron WDAs);
2. Wage bands triangulated against UW's ALICE Index and MIT's Living Wage calculator, for various family sizes and structures

Wages by Industry Cluster:

Bus. & technical industry clusters have highest average wage and highest wage mobility

All Jobs, Texas

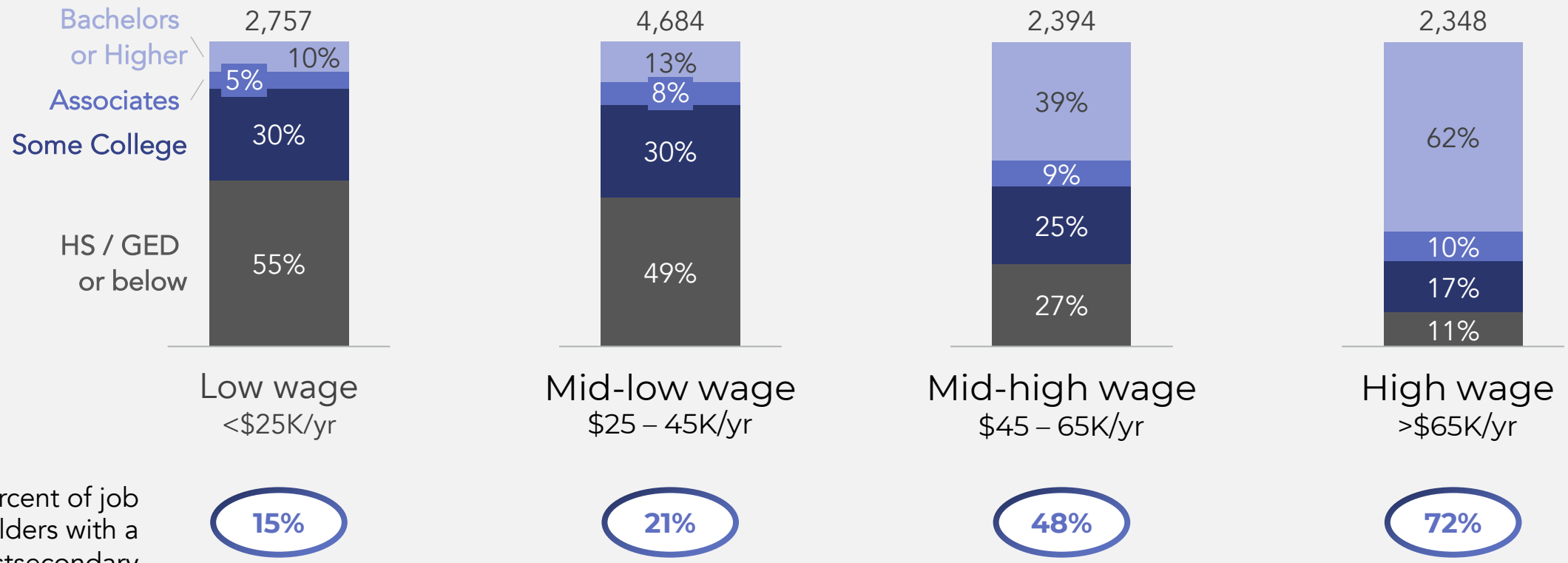
Industry Cluster		Jobs (K)	Average Salary ($ K, 2019)			Salary Mobility (Δ Exp – Entry)
			Entry level	Overall Avg	Experienced	
High Wage (Avg > $65K)	IT & Telecom	267	$41.80	$89.20	$113.00	$71
	Legal	89	$31.90	$82.60	$108.00	$76
	Scientific & Technical Services	193	$37.40	$82.10	$104.50	$67
	Utilities	52	$38.90	$73.00	$90.10	$51
	Energy & mining	251	$35.00	$71.30	$89.50	$55
Mid-High Wage (Avg: $45-$65K)	Finance & Insurance	464	$29.80	$61.40	$77.20	$47
	Mgmt, Financial, & Admin Services	960	$27.40	$58.80	$74.50	$47
	Wholesale Trade	602	$27.20	$57.90	$73.20	$46
	Government	683	$32.10	$57.40	$70.00	$38
	Manufacturing	857	$29.30	$57.20	$71.20	$42
	Health Services	1,362	$25.90	$54.60	$68.90	$43
	Construction	759	$29.90	$52.30	$63.50	$34
	Education	1,240	$23.30	$51.20	$65.10	$42
	Real Estate	70	$24.70	$49.80	$62.30	$38
	Transportation & Logistics	353	$28.10	$49.30	$59.90	$32
	Publishing & Information	59	$20.80	$47.60	$60.90	$40
Mid-Low or Low Wage (Avg: <$45K)	Waste Services	37	$26.80	$45.10	$54.30	$27
	Job Services	301	$21.40	$41.50	$51.50	$30
	Other	318	$21.50	$41.00	$50.70	$29
	Recreation & Entertainment	148	$18.60	$36.10	$44.90	$26
	Agribusiness	13	$19.60	$35.40	$43.20	$24
	Retail	1,051	$20.40	$34.90	$42.20	$22
	Social Assistance & Support	228	$18.60	$29.90	$35.50	$17
	Accommodation	131	$18.00	$29.40	$35.10	$17
	Food Services	1,101	$17.40	$24.60	$28.20	$11

Note: Cluster definitions balanced for differences in employer needs, vs. complexity of aggregating- directionally align to other industry clusterings; 1. Estimates do not sum to the totals because some 4-digit codes not provided due to small sample size; Estimates do not include self-employed workers.; Source: TWC OES report (2019)

Higher wage jobs typically held by those with greater educational attainment

All jobs, Texas

Current educational attainment of workers 25+ in jobs, by wage band



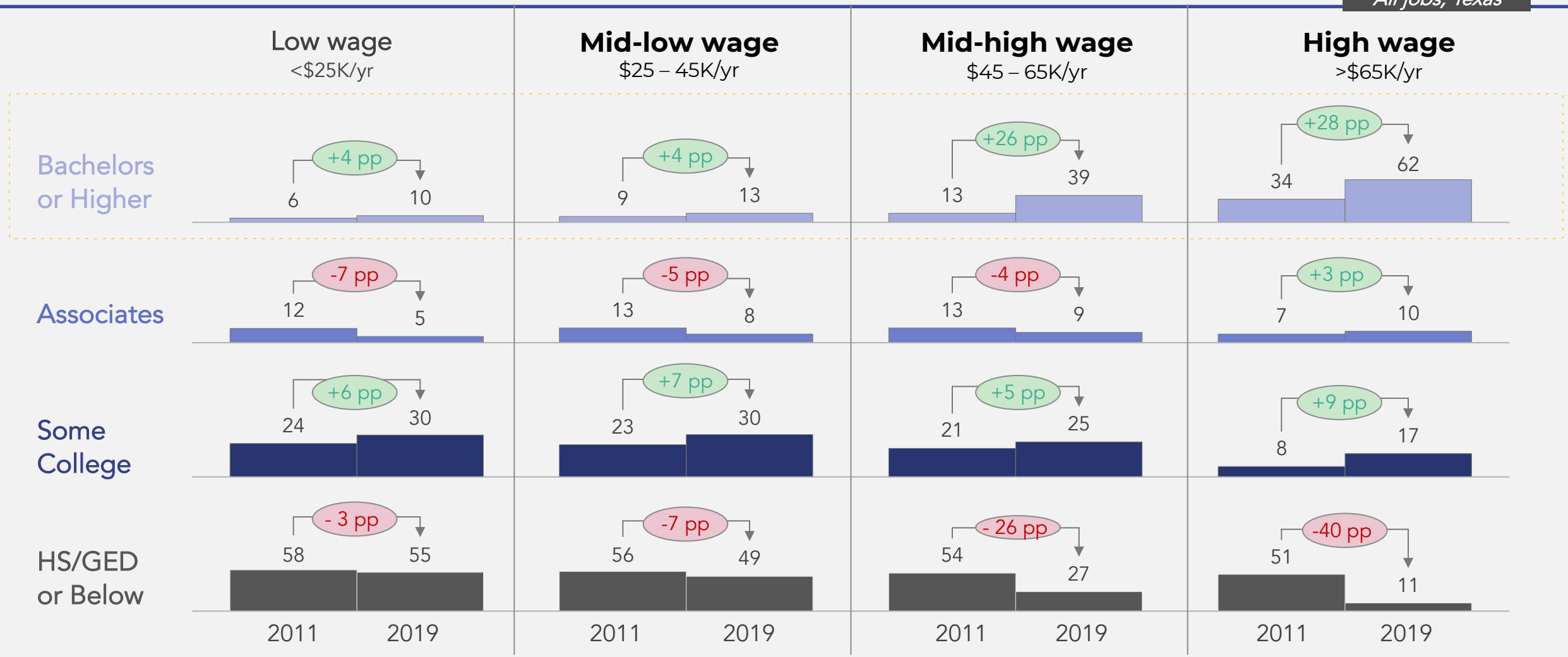
Educational attainment correlated with wage, especially at the highest and lowest bands

Note: Jobs distributed into wage bands based on median wage. Census data applied for actual educational attainment composition by job (6-digit SOC) for each job within wage band. Used 2018 samples because latest available data at time of analysis

Source: Census American Community Survey (ACS) Public Use Microdata Sample (PUMS database, 2018) pull for educational attainment and TWC OES report (2019)

Workforce attainment has shifted higher since 2011

All jobs, Texas



Note: Jobs distributed into wage bands based upon previously discussed alignment on definition. Census data applied for educational attainment composition by job (6-digit SOC) for each job within wage band using 2011 and 2019 data. For 2019, used 2018 samples because latest available data at time of analysis

Source: Census ACS PUMS database for educational attainment in both 2011 and 2018, TWC OES report and BLS OES database for Texas (2011)

Mix by degree of study relatively unchanged

Discipline/Field of Study[1]	Bachelors and Above				Associates			
	Total Conferrals (K), 2019	Δ 2011 to 2019			Total Conferrals (K), 2019	Δ 2011 to 2019		
		Added Conferrals (K)	Split of total (pp)[1]	CAGR		Added Conferrals (K)	Split of total (pp)[1]	CAGR
English/letters	3.4	(0.4)	-0.8%	-2%	0.3	0.1	0.0%	7%
Interdisciplinary studies	12.3	1.5	-1.0%	2%	1.1	0.8	0.5%	17%
Social sciences and history	20.0	2.1	-1.9%	1%	1.3	0.2	-0.7%	2%
Visual and performing arts	5.9	0.5	-0.6%	1%	1.4	0.5	-0.3%	6%
Natural sciences and mathematics	16.2	5.1	0.6%	5%	1.7	0.6	-0.3%	6%
Humanities and general studies[2]	5.6	0.3	-0.7%	1%	49.8	25.8	6.3%	10%
Agriculture and natural resources	4.2	1.1	0.0%	4%	0.3	0.2	0.0%	9%
Communication and communications technologies	7.3	0.9	-0.6%	2%	0.7	0.4	0.0%	8%
Public, legal, and social services	10.3	1.9	-0.5%	3%	1.1	0.2	-0.6%	2%
Consumer services	8.7	2.3	0.1%	4%	1.9	0.6	-0.5%	5%
Computer and information sciences	8.5	5.1	1.9%	12%	2.4	1.1	0.1%	8%
Protective services	5.3	2.2	0.5%	7%	2.6	0.9	-0.5%	6%
Education	12.6	0.2	-1.9%	0%	3.0	0.9	-0.9%	4%
Manufacturing, construction, repair, and transportation	0.3	0.2	0.1%	18%	3.4	2.4	1.7%	17%
Engineering, architecture, and science technologies	18.4	6.8	1.3%	6%	4.7	2.5	0.8%	10%
Business and marketing	42.4	9.8	-0.6%	3%	7.7	2.9	-1.1%	6%
Health sciences	30.1	14.4	4.3%	8%	13.6	3.7	-4.5%	4%

1. 38 2-digit CIP codes further grouped into these 18 fields of study for display purposes. 2. Conferrals of general studies captured separately because general study programs for the Associate degree type modeled for a high propensity to continue on to a 4-year degree
Source: National Center for Education Statistics (NCES) Integrated Post-Secondary Education Data System (IPEDS)

Bachelor's degrees: Many "academic" fields of study end up in jobs that don't typically require post-secondary education

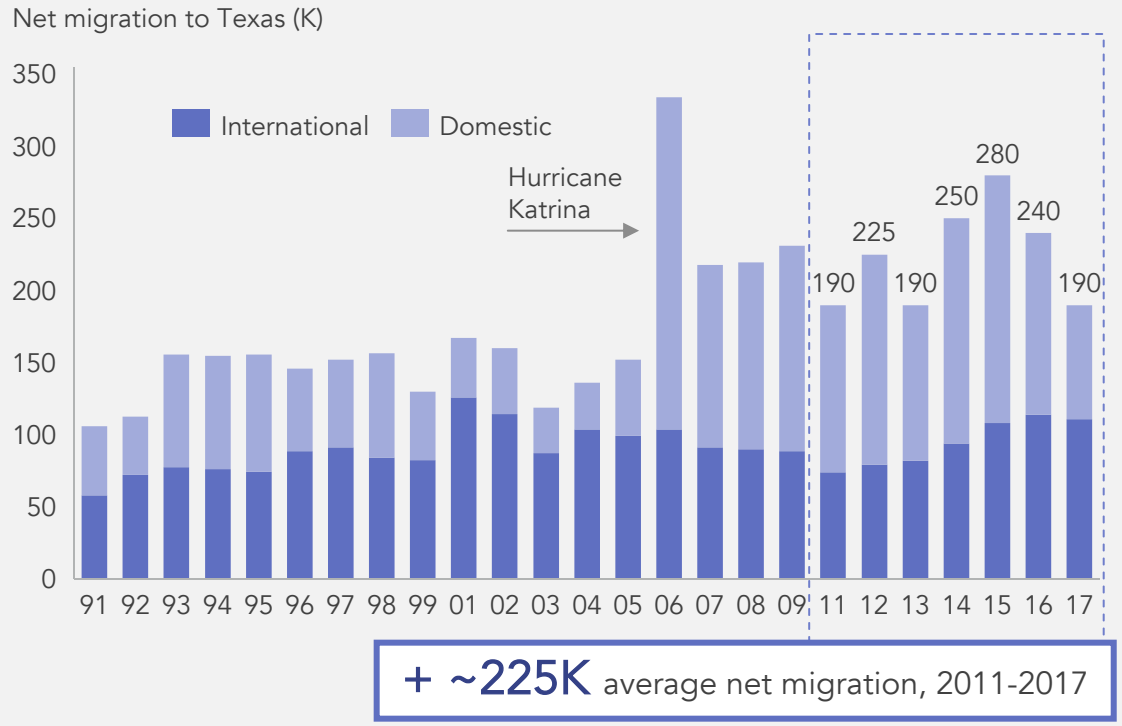
		Jobs Requiring Post-Secondary Education	Field of Study (CIP) English Language and Literature	Liberal Arts and General Studies	Philosophy and Religious Studies	Social Sciences	*... Rest of CIP codes*
35	Food Prep	0%	2.02%	2.11%	0.69%	1.18%	...
37	Building & Grounds Cleaning	0%	0.32%	0.65%	0.51%	0.49%	...
47	Construction	0%	0.41%	1.00%	0.59%	0.95%	...
51	Production	1%	0.87%	1.67%	0.88%	1.36%	...
45	Farming, Fishing, & Forestry	4%	0.08%	0.00%	0.08%	0.16%	...
41	Sales	6%	8.20%	12.28%	8.25%	10.11%	...
43	Office and Admin	8%	9.73%	11.34%	7.92%	9.07%	...
33	Protective Service	10%	0.66%	2.63%	1.85%	2.09%	...
39	Personal Care	20%	1.63%	1.80%	1.15%	1.31%	...
53	Transportation	20%	1.31%	3.14%	2.36%	2.30%	...
49	Install, Maint, & Repair	28%	0.42%	0.90%	1.08%	0.56%	...
31	Healthcare Support	38%	0.72%	0.85%	0.45%	0.67%	...
27	Arts & Entertainment	78%	6.55%	3.08%	3.27%	2.27%	...
21	Community & Social Svcs	81%	3.60%	3.03%	17.29%	8.63%	...
11	Management	92%	12.22%	14.74%	12.46%	16.70%	...
23	Legal	92%	5.64%	2.34%	8.06%	8.56%	...
29	Healthcare Practitioners	93%	3.53%	5.82%	3.25%	3.49%	...
13	Business & Financial Ops	96%	8.30%	8.71%	6.88%	11.52%	...
17	Architecture & Engineering	96%	0.62%	1.07%	1.92%	1.06%	...
19	Life, Physical, & Social Sci.	97%	0.87%	1.14%	1.28%	1.60%	...
25	Education	98%	29.29%	17.62%	15.03%	12.49%	...
15	Computer & Math	100%	2.99%	4.09%	4.78%	3.48%	...
	Total		**100%**	**100%**	**100%**	**100%**	**100%**

~20% of workers with Social Science degrees end up in Sales or Office & Admin roles, which do not typically require postsecondary education

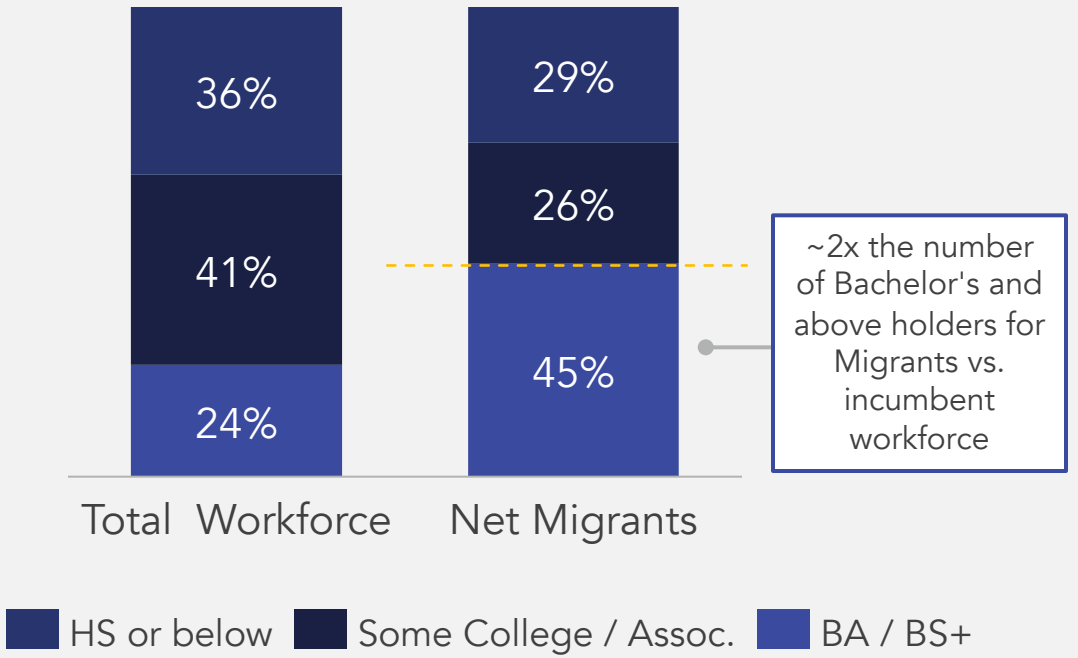
Note: Represent actual mix of how select instructional programs filter into job families (2-digit SOC). Showing a select group of instructional program to illustrate ones with a propensity for studiers to work in more general fields. 2018 ACS PUMS data used as the most recent data available at the time of analysis
Source: US Census ACS PUMS (2018)

Texas labor markets have been supported by the higher attainment of net migrants

Texas has relied on annual net migration of ~150-300K to buoy its workforce, on par with the amount of post-secondary degrees earned each year



In-Migrant educational attainment is substantially higher than the total workforce



Notes: Census Bureau population estimates approximate the population on July 1 of the year indicated and, thus, capture changes from the previous year. Data are not available for decennial census years, 2000 and 2010
Source: "Gone to Texas" from The Dallas Fed and "Geographic Mobility by Selected Characteristic in the United States" Subject Table from Census ACS

Projecting overall over supply of ~0.4-1.7M by 2036

Explanation

1 Calculate 2019 total supply and demand

- Supply: employed and unemployed workers by attainment and job family
- Demand: filled demand (employed workers) and unfilled (based on online job postings)

2 Project supply to estimate value to 2036

- Initial supply (2019), adding new entrants from school pipelines, adding net migrants and subtracting workforce exits

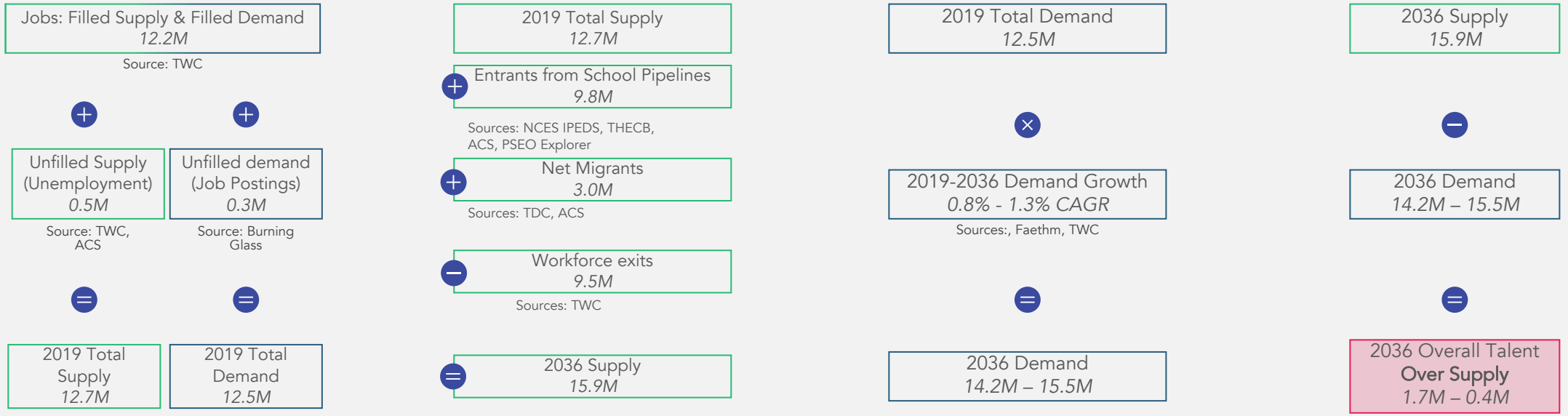
3 Project demand to estimate value to 2036

- Growing starting demand (2019) at estimated rates, across three time horizons to arrive at 2036 values

4 Calculate gap: supply minus demand

- Subtract supply minus demand
- Where negative, future labor shortage exists

Example



Note: Sources listed above are abbreviate examples, see Methodology Appendix details for specific sources
Source: Workforce Supply & Demand Projections Model

Supply projection:
By 2036, expect ~16M supply of workers in Texas

Today

12.7M
Supply in 2019

~63%
Labor force participation (% of population 16+)

Projected to 2036

	Near-term, '20-'22	Long-term, '25-'36
Exits: due to retirements, deaths, or exits of non-participation (caregivers, disability, etc.)	-0.58M per year	-0.56M per year
Entrants from school pipelines: high school or higher ed that remain in Texas and participate in workforce	+0.53M per year	+0.59M per year
Net migration: net entrants or exits due to migrations, internationally and domestic	+0.17M per year	

Future., 2036

~15.9M
Supply in 2036

~59%
Labor force participation (% of population 16+)

~1%
CAGR from 2019

Note: Numbers are aggregate across all jobs and job families; projections and gap analysis more meaningful when disaggregated into job and education-specific views- see appendix

Source: Workforce Supply & Demand Projections Model

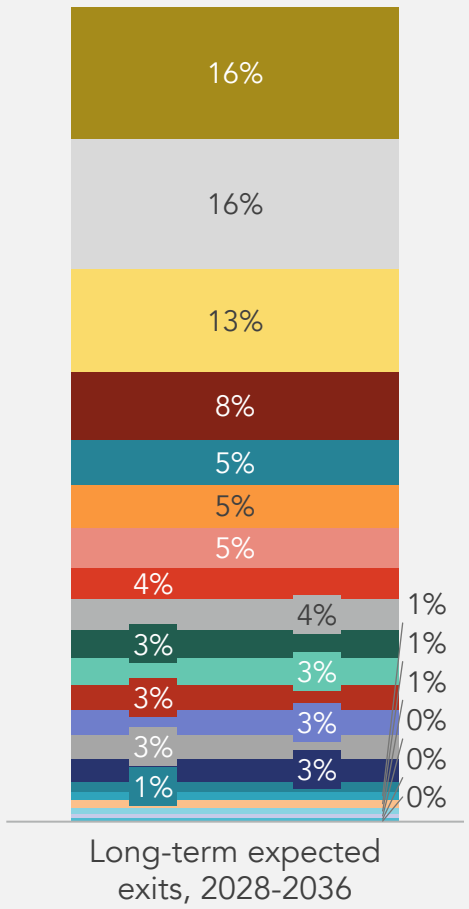
Supply growth a function of three key variables

	Job Family	Supply, 2019[1]	Annual Supply Changes as a % of 2019: Exits	Pipeline Entrants[2]	Net Migration	Supply, 2036	CAGR
45	Farming, Fishing, & Other	19K	-4%	4%	14%	61K	7.3%
19	Life, Physical, & Social Sci.	102K	-2%	9%	5%	301K	6.6%
27	Arts & Entertainment	139K	-4%	7%	9%	410K	6.6%
21	Community & Social Svcs	123K	-4%	8%	4%	293K	5.2%
17	Architecture & Engineering	246K	-3%	6%	4%	513K	4.4%
23	Legal	87K	-3%	8%	1%	179K	4.3%
29	Healthcare Practitioners	684K	-3%	7%	2%	1,358K	4.1%
11	Management	645K	-3%	7%	1%	1,211K	3.8%
15	Computer & Math	393K	-2%	5%	1%	678K	3.3%
25	Education	710K	-4%	8%	0%	1,221K	3.2%
13	Business & Financial Ops	652K	-3%	6%	1%	1,058K	2.9%
51	Production	716K	-4%	4%	3%	1,110K	2.6%
39	Personal Care	226K	-8%	7%	4%	336K	2.4%
49	Install, Maint, & Repair	528K	-3%	5%	2%	784K	2.4%
47	Construction	671K	-4%	4%	2%	917K	1.9%
53	Transportation	1,067K	-5%	4%	1%	1,095K	0.2%
43	Office and Admin	1,871K	-5%	4%	1%	1,746K	-0.4%
33	Protective Service	305K	-7%	4%	2%	270K	-0.7%
41	Sales	1,319K	-6%	4%	0%	1,107K	-1.0%
31	Healthcare Support	570K	-6%	4%	1%	451K	-1.4%
37	Building & Grounds Cleaning	355K	-6%	4%	1%	256K	-1.9%
35	Food Prep	1,251K	-8%	3%	0%	512K	-5.1%
~	Total	**12,677K**	**-5%**	**5%**	**1%**	**15,868K**	**1.3%**

1. Includes unemployment; 2. Retained and participating percentage of pipeline
Source: Workforce Supply & Demand Projections Model

Long-term exits: Expect 9.5M yearly exits to 2036

Food Prep seeing a lot of exits in aggregate and a % of 2019 Employment



	Job Family	Estimated yearly exits, K workers (% of Employment 2019)	Total Exits to 2036 (K)
43	Office and Admin	5.13%	1,535K
35	Food Prep	7.57%	1,516K
41	Sales	5.71%	1,206K
53	Transportation	4.69%	800K
31	Healthcare Support	5.68%	518K
25	Education	4.47%	508K
51	Production	4.01%	459K
47	Construction	3.50%	376K
37	Building & Grounds Cleaning	6.24%	354K
29	Healthcare Practitioners	3.02%	331K
33	Protective Service	6.52%	318K
49	Install, Maint, & Repair	3.46%	292K
13	Business & Financial Ops	2.77%	289K
39	Personal Care	7.67%	277K
11	Management	2.53%	261K
15	Computer & Math	1.90%	120K
17	Architecture & Engineering	2.59%	102K
27	Arts & Entertainment	4.07%	90K
21	Community & Social Svcs	3.80%	75K
23	Legal	3.02%	42K
19	Life, Physical, & Social Sci.	2.05%	33K
45	Farming, Fishing, & Other	3.92%	12K
	Total	**4.69%**	**9,514K**

Note: Total exits includes modeled multiplier impact from COVID, assuming 2028-2036 return to pre-COVID rates
Source: Workforce Supply & Demand Projections Model and TWC Projections report (2018-2028)

COVID impact: assume higher near-term losses of jobs with high proportions of impacted populations

	Job Family	%'age of workers ≥55 years old	%'age of workers, women[1]	Risk score of job[2]	Elevated COVID impact score & multiplier	
17	Architecture & Engineering	25%	16%	45	0	1
11	Management	30%	40%	50	1	1.1
23	Legal	32%	53%	45	1	1.1
15	Computer & Math	16%	26%	42	0	1
29	Healthcare Practitioners	22%	75%	85	1	1.1
13	Business & Financial Ops	24%	54%	48	0	1
19	Life, Physical, & Social Sci.	22%	49%	47	0	1
27	Arts & Entertainment	22%	49%	50	0	1
21	Community & Social Svcs	27%	68%	66	2	1.25
25	Education	23%	74%	55	1	1.1
49	Install, Maint, & Repair	23%	4%	52	0	1
47	Construction	19%	4%	54	0	1
33	Protective Service	18%	22%	69	1	1.1
51	Production	25%	29%	45	0	1
53	Transportation	25%	18%	54	0	1
41	Sales	25%	61%	53	0	1
43	Office and Admin	25%	71%	54	1	1.1
37	Building & Grounds Cleaning	28%	42%	51	1	1.1
31	Healthcare Support	20%	87%	84	2	1.25
35	Food Prep	13%	55%	58	0	1
39	Personal Care	24%	77%	65	2	1.25
	Factor qualification threshold	Job families with >25% seniors	Top 25% of families >70% women	Above med. risk job ≥65 risk score[3]		

Approach:

- Jobs that spike on all three impacted populations- ramp up near-term exits at multiplier x TWC base rates
- Jobs that score low on dimensions apply TWC base rate estimates
- Exit multipliers by impact score[4] :
  - 0: 1x
  - 1: 1.1x
  - 2: 1.25x

1. Includes women of all ages, BLS does not provide integrated data on occupation and sex and age; 2. Based on O'Net Work Context data, equal weighting of contact with other persons, physical proximity, and exposure to disease; 3. Medium risk job considered bus drivers with risk score of ~65; 4. Based on a US-wide study from the Schwartz Center for Economic Policy Analysis

Source: BLS Employment Status of Civilian Noninstitutional Population by Age, Sex and Race (Table 3), Census CPS Employed Persons by Detailed Occupation and Age (Table 11b) , U.S. Department of Labor's O*NET OnLine Work Context elements

By 2036, ~10M to enter workforce from school pipeline

	Job Family	Annual New Entrants (from school pipeline) Composition and as a % of 2019					Total Cumulative Entrants, to 2036
		Bachelors +	Associates	Some College[2]	High School or less[1]	Total	
	Total Overall	**32%**	**13%**	**27%**	**29%**	**4.5%**	**9,749K**
43	Office and Admin	21%	9%	38%	31%	3.5%	1,126K
41	Sales	30%	12%	28%	30%	4.0%	902K
35	Food Prep	5%	4%	32%	59%	3.3%	696K
53	Transportation	10%	4%	27%	59%	3.4%	620K
51	Production	8%	5%	34%	54%	4.0%	491K
25	Education	48%	31%	16%	5%	8.0%	962K
47	Construction	8%	3%	20%	70%	3.5%	396K
37	Building & Grounds Cleaning	8%	3%	15%	74%	3.4%	208K
29	Healthcare Practitioners	53%	18%	25%	4%	6.5%	756K
13	Business & Financial Ops	54%	18%	20%	8%	5.2%	576K
49	Install, Maint, & Repair	6%	10%	43%	41%	4.4%	395K
39	Personal Care	16%	8%	57%	19%	6.6%	255K
11	Management	69%	5%	16%	10%	6.2%	677K
31	Healthcare Support	10%	6%	34%	50%	3.5%	339K
33	Protective Service	27%	11%	36%	27%	4.0%	207K
15	Computer & Math	54%	18%	23%	5%	4.8%	322K
17	Architecture & Engineering	45%	19%	29%	7%	5.5%	229K
27	Arts & Entertainment	52%	21%	19%	8%	6.7%	158K
21	Community & Social Svcs	64%	20%	11%	4%	7.7%	161K
23	Legal	62%	22%	12%	3%	7.9%	116K
19	Life, Physical, & Social Sci.	29%	43%	23%	5%	8.3%	145K
45	Farming, Fishing, & Other	24%	2%	14%	59%	4.2%	13K

1. Secondary non-completer portion "Below High School" also calculated, based on high school graduates numbers and calculating dropouts using 8th grade cohort outcome data. 2. Post-secondary non completer potion of "Some College" calculated as Associate's and Bachelor's+ degree students and calculating non-completers based on the inverse of graduation rates for each institution type, respectively. 3. "High School or Less" and post-secondary non-completers pipeline mapped to job families at same distribution of incumbent "High School or Less" workforce
Source: Workforce Supply & Demand Projections Model

Demand projection:
By 2036, expect ~14-15M jobs in Texas

Today — Projected to 2036 — Future., 2036

12.5M
Total demand in 2019

New data source

Faethm projections
Assume COVID recovery to 2022, followed by return to "normal" long-term growth rates

+ 0.8% CAGR

~14.2M
Demand in 2036, per Faethm

TWC projections
2019-2029, no impact of COVID

+ 1.3% CAGR

~15.5M
Demand in 2036, per TWC

Note: Numbers are aggregate across all jobs and job families; projections and gap analysis more meaningful when disaggregated into job and education-specific views- see appendix

Sources: Workforce Supply & Demand Projections Model

Demand projections: TWC vs. Faethm similar, but Faethm expects greater demand for care workers

SOC	Job family	CAGR for net jobs: Faethm[1] (2020-2035)	CAGR for net jobs: TWC[2] (2018-2028)	Δ Faethm – TWC
15	Computer & Math	4.7%	2.0%	2.7 pp
17	Architecture & Engineering	2.1%	1.0%	1.1 pp
11	Management	2.4%	1.6%	0.8 pp
33	Protective Service	1.4%	1.0%	0.4 pp
45	Farming, Fishing, & Forestry	0.2%	-0.1%	0.3 pp
21	Community & Social Svcs	1.9%	1.6%	0.3 pp
19	Life, Physical, & Social Sci.	1.2%	1.2%	0 pp
31	Healthcare Support	1.8%	1.8%	0 pp
27	Arts & Entertainment	1.4%	1.4%	0 pp
25	Education	1.2%	1.2%	0 pp
29	Healthcare Practitioners	1.5%	1.7%	-0.1 pp
13	Business & Financial Ops	1.4%	1.6%	-0.2 pp
23	Legal	1.4%	1.8%	-0.4 pp
41	Sales	0.5%	1.0%	-0.6 pp
49	Install, Maint, & Repair	0.7%	1.3%	-0.6 pp
39	Personal Care	0.8%	1.5%	-0.6 pp
43	Office and Admin	-0.1%	0.6%	-0.7 pp
51	Production	-0.5%	0.4%	-0.9 pp
37	Building & Grounds Cleaning	0.2%	1.2%	-1.0 pp
47	Construction	0.4%	1.5%	-1.1 pp
53	Transportation	-0.7%	1.3%	-2.0 pp
35	Food Prep	-0.7%	1.8%	-2.5 pp

Faethm projections predict higher growth for Computer & Math, Agriculture & Engineering, and Management vs. TWC...

...and predict lower rates for Construction, Transportation, and Food Prep

1. Assumes COVID impact with recovery by year end 2021; 2. Excludes impact of COVID
Note: Analysis compares CAGRs over difference time periods to adjust for impact of COVID; no publicly available TWC projections that include COVID impact
Source: Faethm analysis; Texas Workforce Commission projections; BCG analysis

Texas industry growth: impact of COVID and following long-term growth projections used to drive growth estimates in Faethm's demand modeling

Sector	Industry name	COVID Recovery (to YE 2022)		Texas Long-term (2025-2036)
		Recovery Expectation	Recovery, to % of pre-COVID[1]	Growth, CAGR[2]
11	Agriculture, Forestry, Fishing and Hunting	Fast	75%	3.8%
21	Mining, Quarrying, and Oil and Gas Extraction	Slow	50%	4.8%
22	Utilities	Near perfect	100%	3.5%
23	Construction	Fast	75%	3.3%
31-33	Manufacturing	Fast	75%	3.5%
42	Wholesale Trade	Fast	75%	4.6%
44-45	Retail Trade	Fast	75%	4.4%
48-49	Transportation and Warehousing	Fast	75%	3.6%
51	Information	Accelerated	125%	4.7%
52	Finance and Insurance	Fast	75%	3.4%
53	Real Estate and Rental and Leasing	Slow	50%	3.8%
54	Professional, Scientific, and Technical Services	Near perfect	100%	4.3%
55	Management of Companies and Enterprises	Fast	75%	4.3%
56	Admin, Support and Waste Management Services	Fast	75%	4.2%
61	Educational Services	Fast	75%	3.7%
62	Health Care and Social Assistance	Accelerated	125%	4.9%
71	Arts, Entertainment, and Recreation	Slow	50%	4.2%
72	Accommodation and Food Services	Fast	75%	4.1%
81	Other Services (except Public Administration)	Fast	75%	3.7%
92	Public Administration	Fast	75%	3.1%
	Total		**95%**	**3.96%**

Approach to growth rates

COVID Recovery: Modeled with a recovery factor as economic activity is paused then rapidly recovered, rather than growing from a steady state

Long-term:
Based on BLS US-wide 10-year projections by industry, based on eventual return to normal after the impact of COVID; a Texas premium (+2 pp) is applied to BLS growth rates to reflect historically larger magnitude of growth & contraction in Texas relative to US[2]

1. Percentage of 2019 gross state output (GSP) estimated for 2022; 2. Note: given BLS only projects at national level, adjusted through historical comparison of Texas vs. US job growth- Texas consistently grew +2pp higher GDP vs. national; 3.Estimated as midpoint of implied growth rate during COVID recovery period and long-term growth rate; Source: BLS projections table 2.7 on employment and output by industry; BCG analysis

Faethm projects the relative impact of economic growth & technological change on job demand

			Net Change, as a % of 2019			
		Dec 2019 FTE	+ Δ FTEs due to Econ. Growth	− Δ FTEs due to Automation	+ Δ FTEs due to Augmentation	= Total Growth by 2036
43	Office and Admin	1,835K	31%	-33%	0%	-2%
41	Sales	1,283K	45%	-36%	0%	8%
35	Food Prep	1,183K	29%	-40%	0%	-11%
53	Transportation	1,027K	30%	-41%	0%	-11%
25	Education	702K	36%	-16%	1%	21%
29	Healthcare Practitioners	699K	54%	-25%	0%	29%
51	Production	691K	34%	-42%	0%	-8%
11	Management	667K	30%	-10%	14%	35%
13	Business & Financial Ops	658K	24%	-16%	8%	16%
47	Construction	649K	30%	-23%	0%	7%
31	Healthcare Support	546K	58%	-21%	0%	36%
49	Install, Maint, & Repair	524K	40%	-28%	0%	12%
15	Computer & Math	416K	19%	-8%	38%	49%
37	Building & Grounds Cleaning	342K	39%	-36%	0%	3%
33	Protective Service	298K	56%	-29%	0%	27%
17	Architecture & Engineering	248K	27%	-13%	14%	28%
39	Personal Care	221K	35%	-20%	0%	15%
27	Arts & Entertainment	140K	45%	-19%	0%	26%
21	Community & Social Svcs	123K	47%	-17%	4%	34%
19	Life, Physical, & Social Sci.	100K	33%	-16%	5%	22%
23	Legal	87K	50%	-24%	0%	26%
45	Farming, Fishing, & Other	18K	31%	-27%	0%	4%
	Total	**12,456K**	**30%**	**-23%**	**4%**	**10%**

Source: Faethm Job Demand Projection Model

Faethm's Job Demand Projection model breaks down **cumulative growth** to 2036 vs. 2019, into three levers:

- **Economic Growth:** Projected growth in FTEs, due to top-line macroeconomic (GDP) growth
- **Automation/Technology Adoption:** Job losses due to technological change
- **Augmentation/ New Technology Support:** New jobs demand (for new and existing job types), driven by technological change

Future gaps by educational attainment are sensitive to the contribution of net migration

Net Migration = 178K

	Faethm Demand Talent Gap (Supply – Demand)	TWC Demand Talent Gap (Supply – Demand)
HS / GED or below	-0.5M	-1.6M
Some College	0.3M	0.2M
Assoc.	0.5M	0.4M
BA / BS +	1.2M	1.4M
Total	**1.7M**	**0.4M**

Net Migration = 0

	Faethm Demand Talent Gap (Supply – Demand)	TWC Demand Talent Gap (Supply – Demand)
HS / GED or below	-1.3M	-2.4M
Some College	-0.3M	-0.4M
Assoc.	0.4M	0.3M
BA / BS +	-0.1M	0.1M
Total	**-1.3M**	**-2.5M**

If Texas can no longer rely on net migration, talent gaps switch to overall under supply and higher attainment levels (e.g., Associate's and Bachelor's degrees) become more constrained

Source: Workforce Supply & Demand Projections Model

Future undersupply gaps by job family anchored to the largest incumbent fields

	Job Families	Faethm Demand Scenario Talent Gap (Supply – Demand)	Rank	TWC Demand Scenario Talent Gap (Supply – Demand)	Rank
35	Food Prep	-0.5M	1	-1.1M	1
31	Healthcare Support	-0.3M	2	-0.3M	3
41	Sales	-0.3M	3	-0.4M	2
15	Protective Service	-0.2M	4	0.1M	12
33	Building & Grounds Cleaning	-0.1M	5	-0.1M	7
37	Office and Admin	-0.1M	6	-0.2M	6
43	Farming, Fishing, & Forestry	-0.1M	7	-0.3M	4
45	Computer & Math	0.0M	8	0.0M	8
23	Legal	0.1M	9	0.1M	10
39	Personal Care	0.1M	10	0.0M	9
21	Community & Social Svcs	0.1M	11	0.1M	14
17	Life, Physical, & Social Sci.	0.2M	12	0.2M	17
19	Transportation	0.2M	13	0.2M	15
53	Install, Maint, & Repair	0.2M	14	-0.2M	5
49	Architecture & Engineering	0.2M	15	0.1M	13
11	Construction	0.2M	16	0.3M	19
47	Arts & Entertainment	0.2M	17	0.1M	11
13	Business & Financial Ops	0.2M	18	0.2M	16
27	Management	0.2M	19	0.2M	18
25	Education	0.4M	20	0.4M	21
29	Healthcare Practitioners	0.5M	21	0.4M	22
51	Production	0.5M	22	0.4M	20

Top 10 gaps by job family largely align across TWC and Faethm projections...

Job families like "Food Prep" surface as biggest gap likely due to data limitations allowing to disaggregate employment by job mode

Source: Workforce Supply & Demand Projections Model

Methodology Overview

Explanation

1 Calculate 2019 total supply and demand

- Supply: employed and unemployed workers by attainment and job family
- Demand: filled demand (employed workers) and unfilled (based on online job postings)

2 Project supply to estimate value to 2036

- Initial supply (2019), adding new entrants from school pipelines, adding net migrants and subtracting workforce exits

3 Project demand to estimate value to 2036

- Growing starting demand (2019) at estimated rates, across three time horizons to arrive at 2036 values

4 Calculate gap: supply minus demand

- Subtract supply minus demand
- Where negative, future labor shortage exists

Example

Jobs: Filled Supply & Filled Demand
12.2M

Source: TWC

\+ Unfilled Supply (Unemployment) *0.5M*

Source: TWC, ACS

\+ Unfilled demand (Job Postings) *0.3M*

Source: Burning Glass

= 2019 Total Supply *12.7M*

= 2019 Total Demand *12.5M*

2019 Total Supply
12.7M

\+ Entrants from School Pipelines
9.8M

Sources: NCES IPEDS, THECB, ACS, PSEO Explorer

\+ Net Migrants
3.0M

Sources: TDC, ACS

\- Workforce exits
9.5M

Sources: TWC

= 2036 Supply
15.9M

2019 Total Demand
12.5M

× 2019-2036 Demand Growth
0.8% - 1.3% CAGR

Sources:, Faethm, TWC

= 2036 Demand
14.2M – 15.5M

2036 Supply
15.9M

\- 2036 Demand
14.2M – 15.5M

= 2036 Overall Talent **Over Supply**
1.7M – 0.4M

Note: Sources listed above are abbreviate examples, see Methodology Appendix details for specific sources
Source: Workforce Supply & Demand Projections Model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