

NCSES's SKILLED TECHNICAL WORKFORCE INITIATIVE

2020 WORKSHOPS

(For accessible version of this PDF please visit [NCSES](#))





*NCSES Webinar Series: Workshop #1 of
The Skilled Technical Workforce Initiative Workshops*

The Skilled Technical Workforce (STW) and Why It Matters

Friday, August 7 | 1:00 pm – 2:30 pm (Eastern)

National Center for Science and Engineering Statistics
Social, Behavioral & Economic Sciences
National Science Foundation

Let's talk about the STW

- NCSES invites you to discuss the Skilled Technical Workforce (STW)

Workers that use significant levels of science and engineering expertise and technical knowledge in their occupations and whose educational attainment is less than a bachelor's degree

- A focus on the STW expands not only the federal knowledge of the STEM Workforce but the total U.S. workforce



Let's talk about why we are here

- Many are contributing to measuring and understanding the workforce
- Effort is larger than one agency or organization
- We need increased coordination
- We need forums for interaction and discussion

The federal importance of measuring the STW

- A national strategy for training workers across high-demand industries
- The foundation of the S&E enterprise
- The coronavirus pandemic
- Limited data and inconsistent coordination

The NCSES STW Initiative

NCSES:

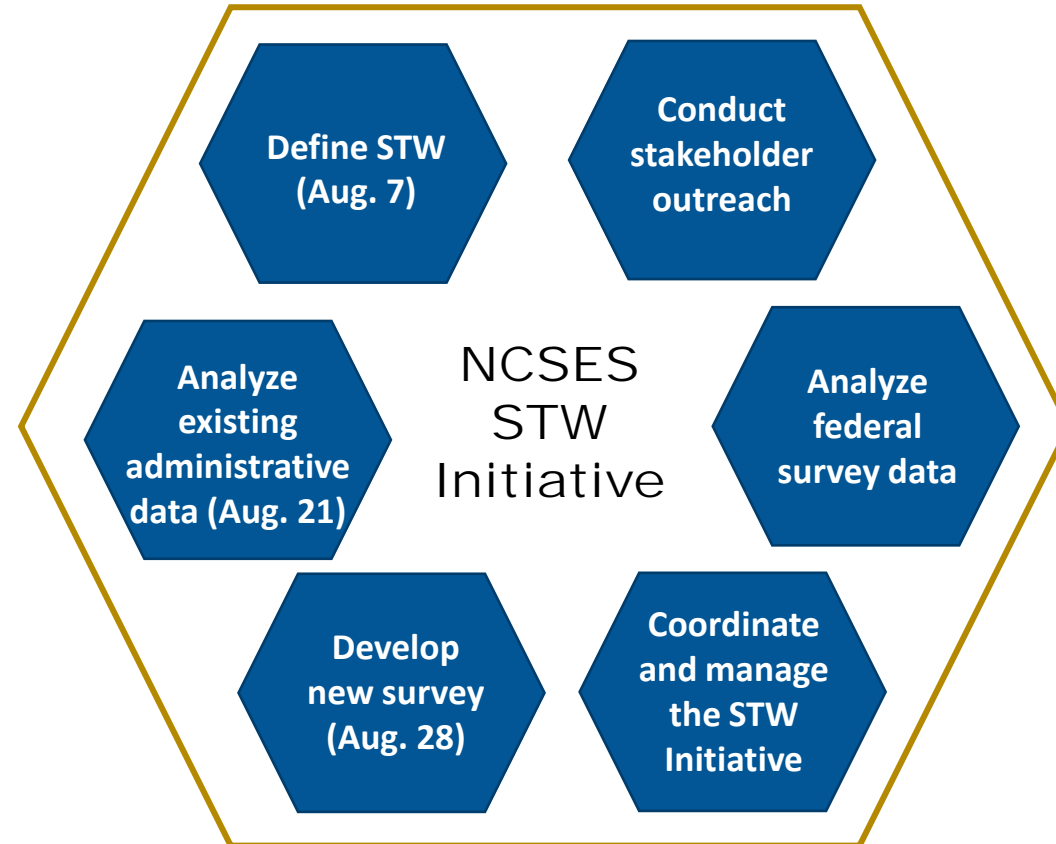
- 1 of 13 principal federal statistical agency
- Mandated to be a data clearinghouse on science and engineering enterprise
- Developed a framework to study and measure the STW



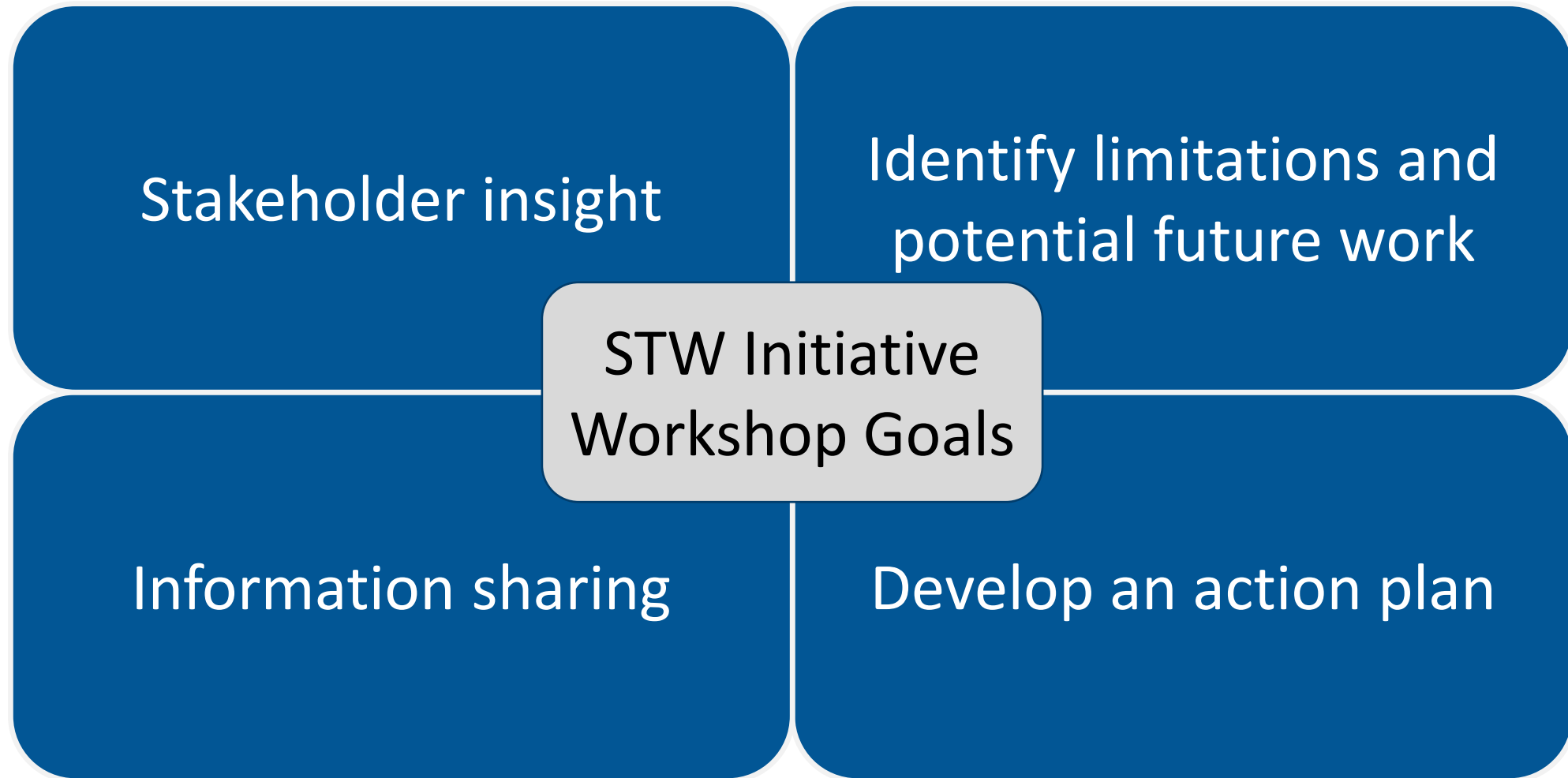
NCSES efforts to understanding the workforce



Community of STEM
Workforce Efforts



STW Initiative workshop goals



Agenda – The STW and Why it Matters

- Keynote speaker – Dr. Victor McCrary
“The Skilled Technical Workforce: Crafting America’s Science and Engineering Enterprise”
- NCSES presentation – Dr. Amy Burke
“Skilled Technical Workers: Who They Are and Their Role in the U.S. STEM Workforce”
- Chat and Q&A moderator – Dr. Josh Trapani
- Wrap-up – John Finamore



NATIONAL SCIENCE BOARD

THE SKILLED TECHNICAL WORKFORCE:

Crafting America's
Science & Engineering
Enterprise

3.4M

Why do the National Academies expect 3.4 million unfilled skilled technical jobs by 2022?

139

What did 139 stakeholders from across the country say the U.S. should do to improve opportunities for skilled technical workers?

4

What 4 recommendations do we offer for building the Skilled Technical Workforce of the future?



The Skilled Technical Workforce: Crafting America's Science & Engineering Enterprise



National Science Board

NSB and the STW

- **NSB has a long-standing interest in the STEM workforce**
- **Since 2015, we've been calling for a more holistic view of the workforce that moves beyond academic degrees and occupations and highlights the contributions of workers at all educational levels.**
 - *Revisiting the STEM Workforce (2015)*
 - *Our Nation's Future Competitiveness Relies on Building A STEM-Capable Workforce (2018)*
- **NSB has in recent years has looked at specific segments of the workforce.**
 - *SEH Doctorates in the Workforce (2017)*
 - *The Skilled Technical Workforce: Crafting America's Science & Engineering Enterprise (2019)*



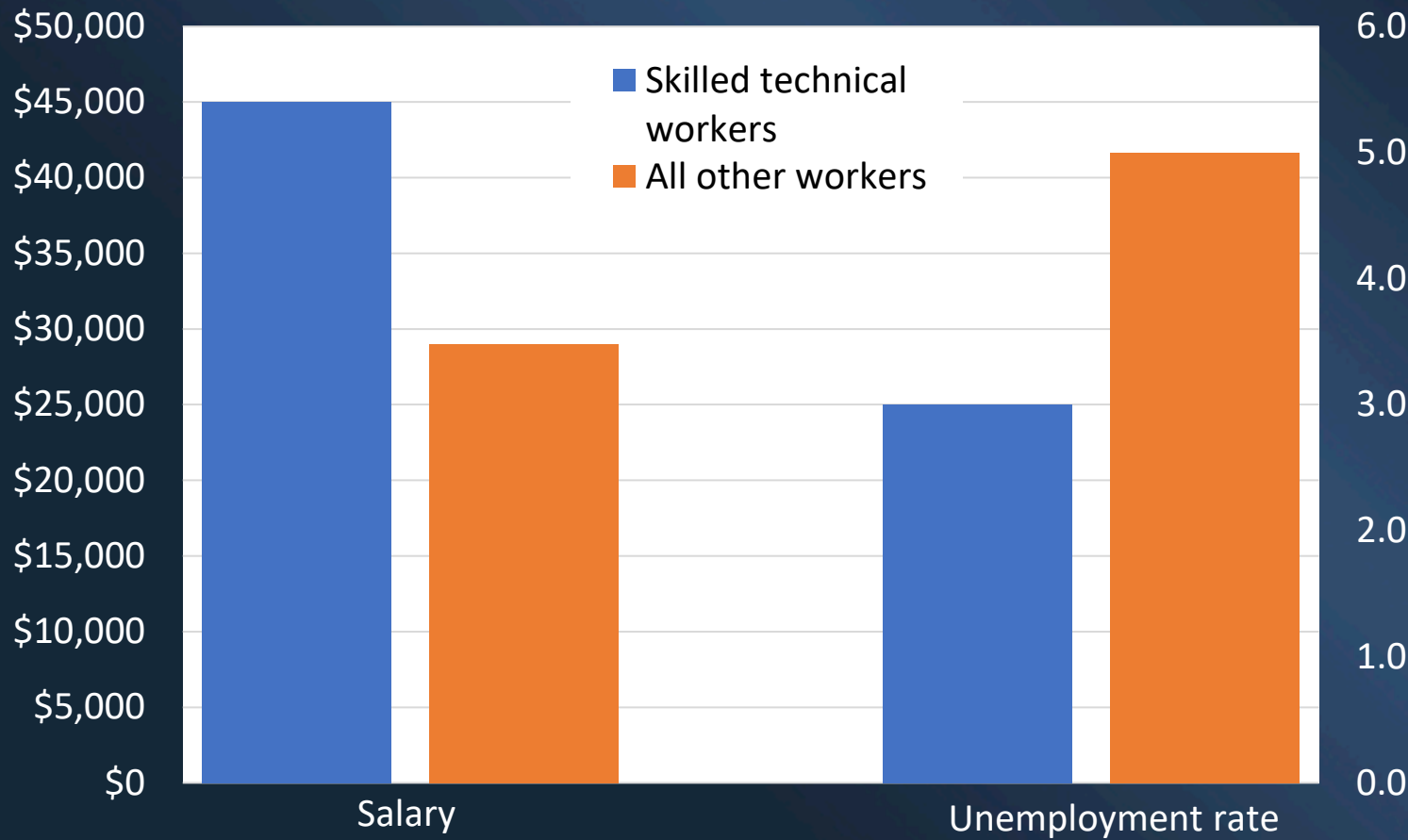
Why the STW Matters

- Increased need for S&T skills and knowledge across many sectors and at all educational levels
- National prosperity and security in a competitive, S&T-intensive world
- Long-term health of the U.S. S&E enterprise
- Near-term workforce needs
- Opportunities for all Americans

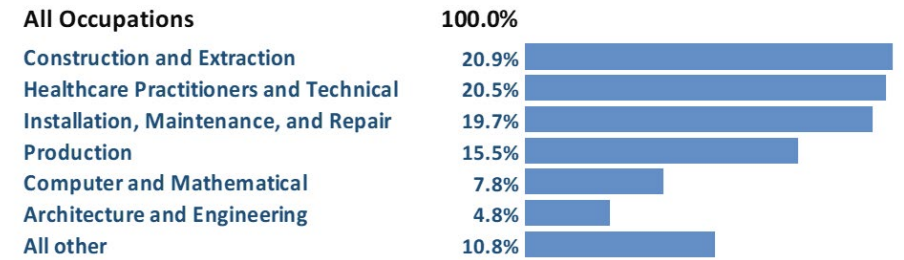


STW Data Portrait

Workers with high school or some post-secondary training: 2017



Skilled technical workers, by occupation: 2017



Source(s)

American Community Survey (ACS) (2017) public use microdata.

Science and Engineering Indicators

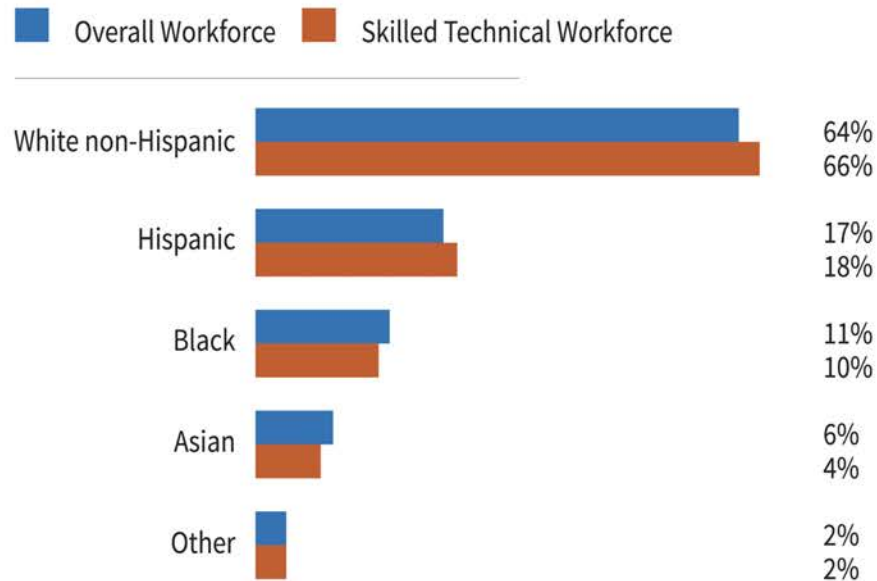
Science & Engineering Indicators 2020, "S&E Labor Force"



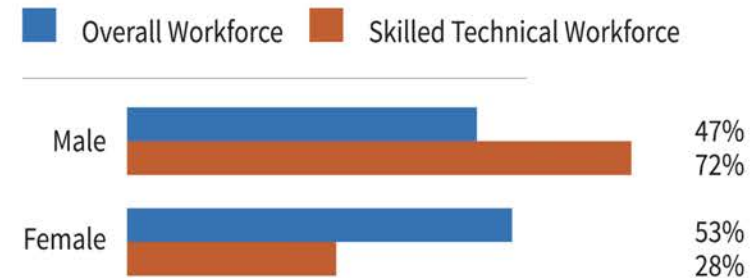
National Science Board

STW Data Portrait

The Skilled Technical Workforce By Race and Ethnicity: 2017



The Skilled Technical Workforce By Sex: 2017



National Science Board, "Science and Engineering Labor Force," *Science and Engineering Indicators 2020*
Data source: Census Bureau, American Community Survey 2017, public use microdata



Systemic Challenges and Opportunities

- **Designing STW education** to meet the needs of individuals
- **Building partnerships among** industry, government, and educational institutions to leverage resources and knowledge, and respond to local industry/community needs
- **Conveying accurate information** about the STW, including employment and career opportunities
- **Addressing data gaps and data silos** to maximize effectiveness of existing and new programs and initiatives



Developing the STW

- A systems-wide approach to S&E workforce development must include the education and preparation of the STW
- STW pathways *complement* rather than compete with other educational pathways.
 - Emphasis should be on the need for some post-secondary education
 - Avoid pitting 2-year and other non-bachelor's post-secondary educational options against 4-year degrees
 - **Data can help us better understand and support these crucial pathways into the STEM-capable workforce**



Recommendations

- **Change the Message:** The NSB and NSF, and other S&E leaders should communicate the importance of the STW to the nation's S&E enterprise, individual economic prosperity, national security, and U.S. global competitiveness.
- **Focus on the Data:** To understand and begin to address data gaps, NSF's NCSES, with additional federal resources and collaborating with other statistical agencies, should collect nationally representative data on the education, skills, and workforce characteristics of the STW. NSF should promote partnerships between governmental and non-governmental (industry, academia) stakeholders in the STW to share data and develop tools for public use and workforce planning.



Recommendations

- **Leverage the Portfolio of Federal Investments:** NSF should conduct a full portfolio analysis of its STW investments. The analysis could publicize and inform stakeholders about the breadth of NSF's contributions to the STW, build awareness of funding opportunities, and maximize and leverage the impact of these investments.
- **Build Partnerships:** Two-year colleges and four-year colleges and universities should work as partners, together with business, to grow the STEM-capable U.S. workforce via programs tailored to the needs of local communities. Policymakers can encourage this by developing federal programs that require partnership participation from stakeholders in multiple sectors.





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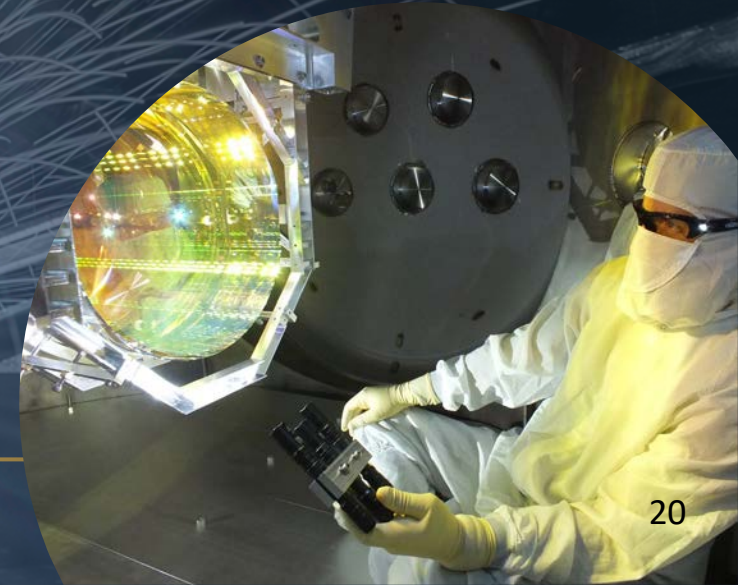


DEVELOP STEM
TALENT FOR AMERICA



Questions?

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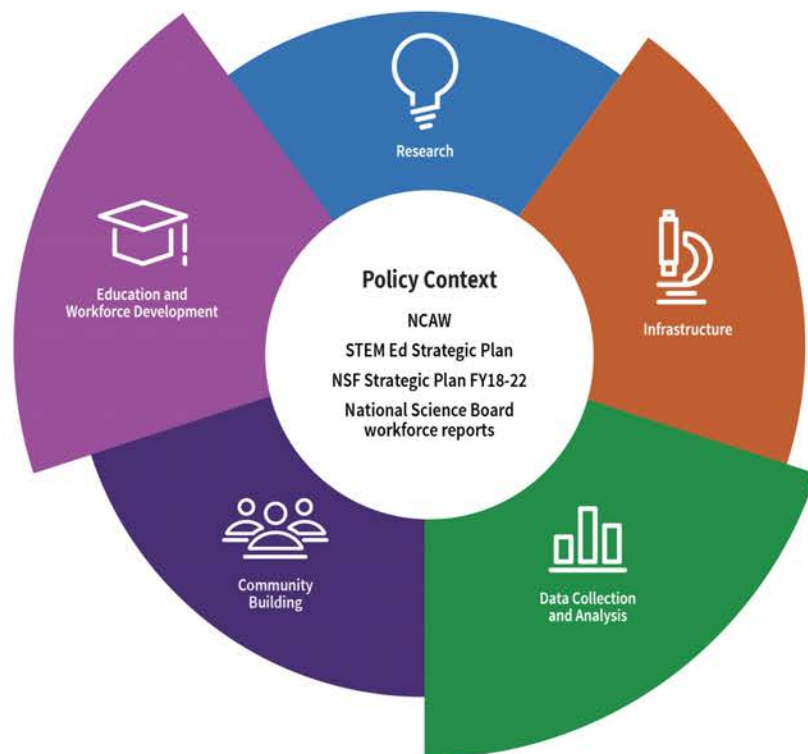
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Additional Slides



National Science Board

NSF INVESTMENTS IN SKILLED TECHNICAL WORKFORCE DEVELOPMENT



Research

Educational Research
NSF Convergence Accelerator Tracks:
AI and the Future of Jobs

Infrastructure

Advanced Technological Education
Science of Learning Data and Tools

Data Collection and Analysis

Stakeholder Outreach to Identify Data Gaps
New National Training, Education, and
Workforce Survey
Identification/Analysis of other Public and
Private Sector Data Sources

Community Building

Career Compass Challenge
Community College Innovation Challenge

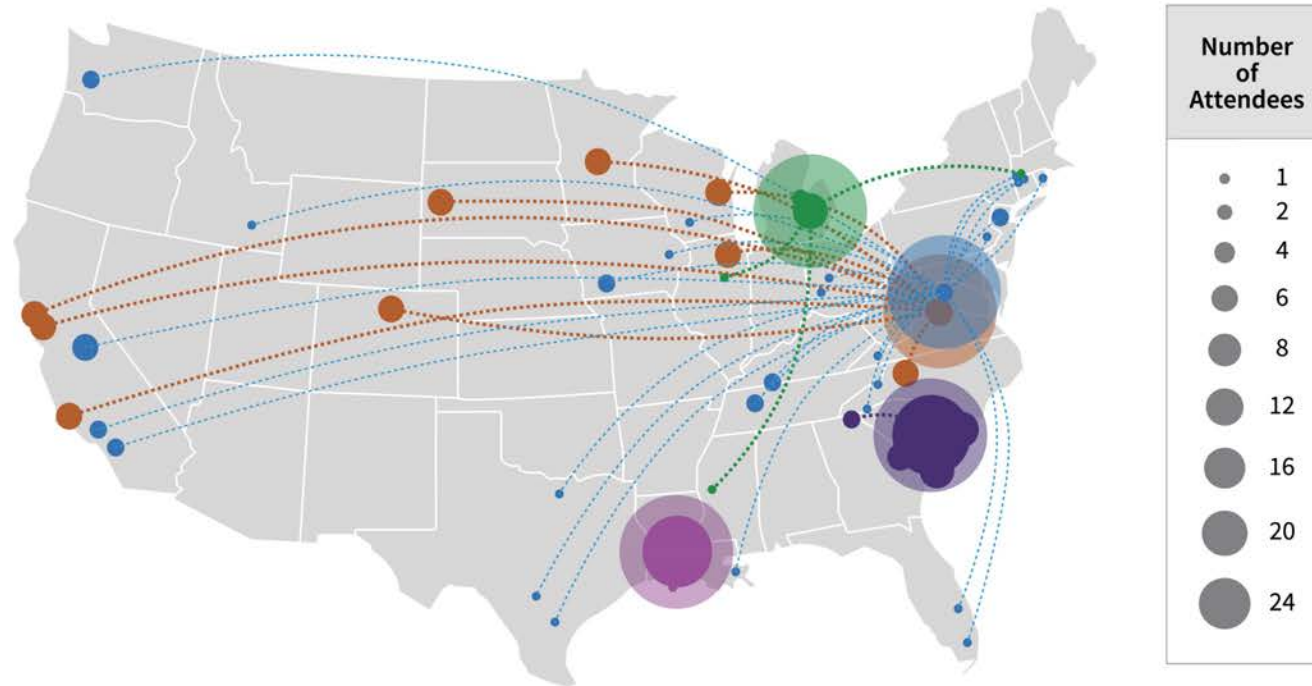
Education and Workforce Development

Advanced Technological Education
S-STEM
CS for All



National Science Board

LISTENING SESSION & PARTICIPANT LOCATIONS



* Translucent circles represent listening session locations
 * Solid circles represent attendee locations

Advanced Technological Education Conference
 Washington, D.C. - 45 Attendees, 31 Participant Locations

Academia - 45

Community College Innovation Challenge
 Alexandria, Virginia - 56 Attendees, 10 Participant Locations

Academia - 45
 Industry - 1

Florence Darlington Technical College
 Florence, South Carolina - 40 Attendees, 9 Participant Locations

Academia - 20
 Industry - 14
 Government - 2
 Non-Profit - 4

Macomb Community College
 Warren, Michigan - 22 Attendees, 10 Participant Locations

Academia - 10
 Industry - 8
 Government - 3
 Non-Profit - 1

Baton Rouge Community College
 Baton Rouge, Louisiana - 21 Attendees, 2 Participant Locations

Academia - 12
 Government - 5
 Non-Profit - 4



Skilled Technical Workers: Who They are and Their Role in the U.S. STEM Workforce

Amy Burke

August 7, 2020

National Center for Science and Engineering Statistics

Social, Behavioral and Economic Sciences

National Science Foundation

Which of these images do you consider part of the STEM workforce?

1



2



3



4

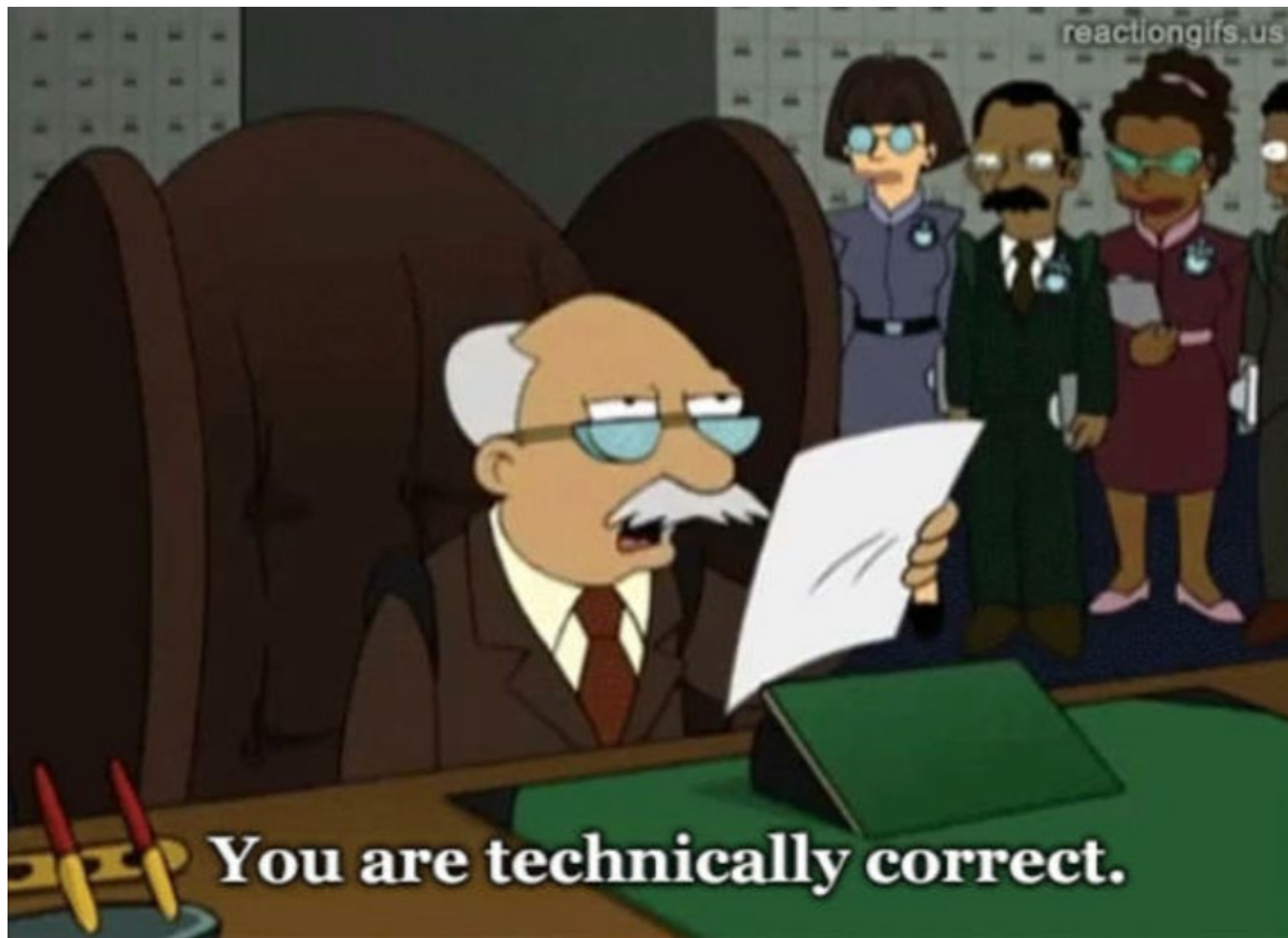


5



6





Objective:

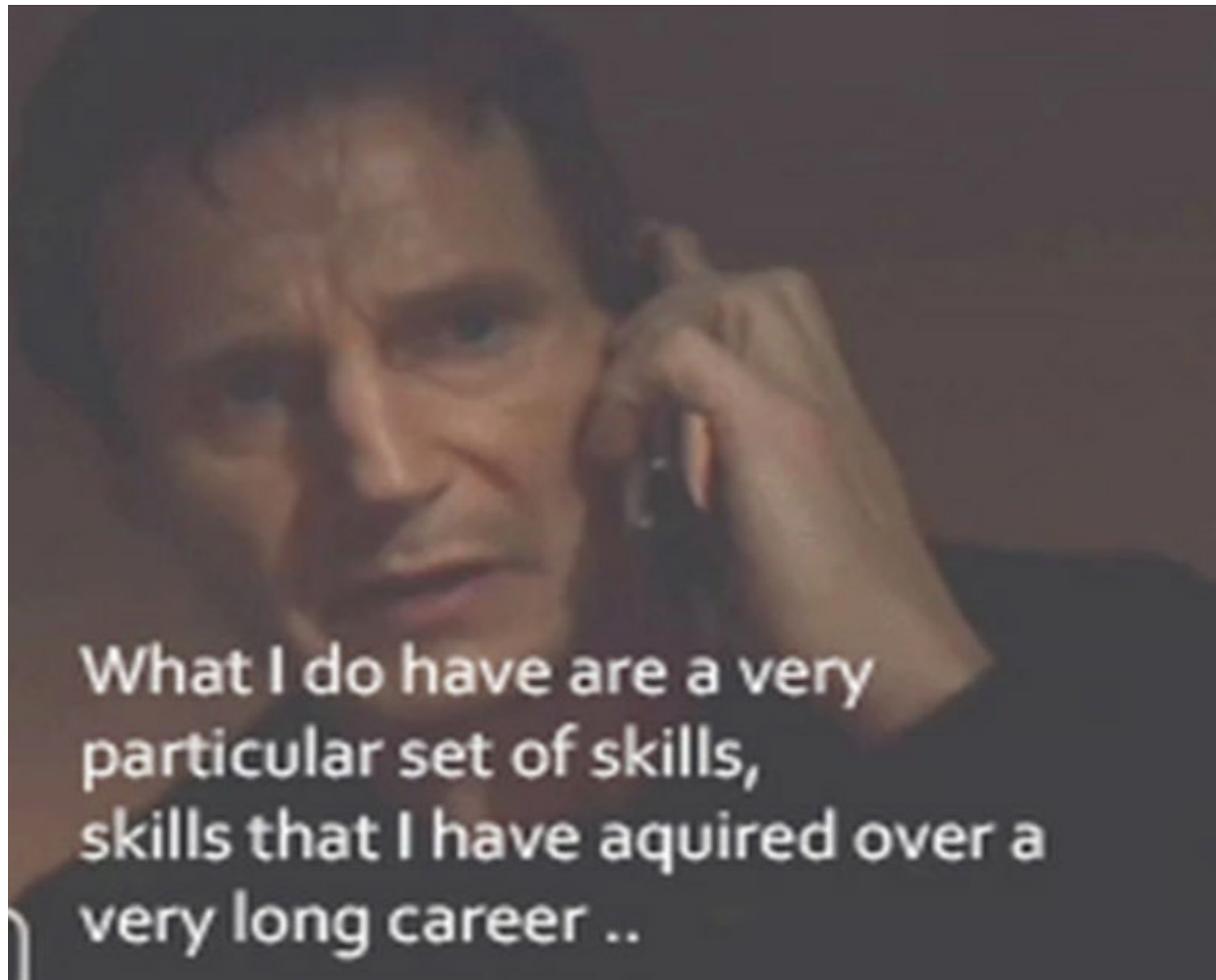
Understand how the STW is defined and measured and what we know about them based on currently available data.

- Definition: What is the STW?
- Measurement: A data framework for measuring the STW
- Here's what we know:
 - How the STW contributes to STEM: STW occupations and industries
 - STW pathways: Certifications, licenses, and education
 - STW opportunities: Earnings and unemployment rates
 - Who are the STW: Demographics of the STW

What is the Skilled Technical Workforce?

Workers in occupations that use significant levels of S&E expertise and technical knowledge and who do not have a bachelor's degree.





O*NET data used to identify skilled technical occupations

1. Score a 4.5 or higher in the following domains:

- Biology
- Building and Construction
- Chemistry
- Computers and Electronics
- Design
- Engineering and Technology
- Food Production
- Mathematics
- Mechanical
- Medicine and Dentistry
- Physics
- Production and Processing
- Telecommunications

2. Greater than 50% of workers without a bachelor's degree

STW workers are employed in a diverse set of occupations

Science & Engineering (S&E) occupations



Computer and mathematical scientists; biological, agricultural, and environmental life scientists; physical scientists; social scientists; engineers

S&E-related occupations



Health-related (e.g. health practitioners, health technologists), S&E managers, S&E teachers, S&E technologists, other S&E-related occupations

NEW: Skilled technical occupations



Construction and extraction; installation, maintenance, and repair; production; other skilled technical occupations

How are these similar to or different from occupations you use to identify the STEM workers or the STW?

Science & Engineering (S&E) occupations



Computer and mathematical scientists; biological, agricultural, and environmental life scientists; physical scientists; social scientists; engineers

S&E-related occupations



Health-related (e.g. health practitioners, health technologists), S&E managers, S&E teachers, S&E technologists, other S&E-related occupations

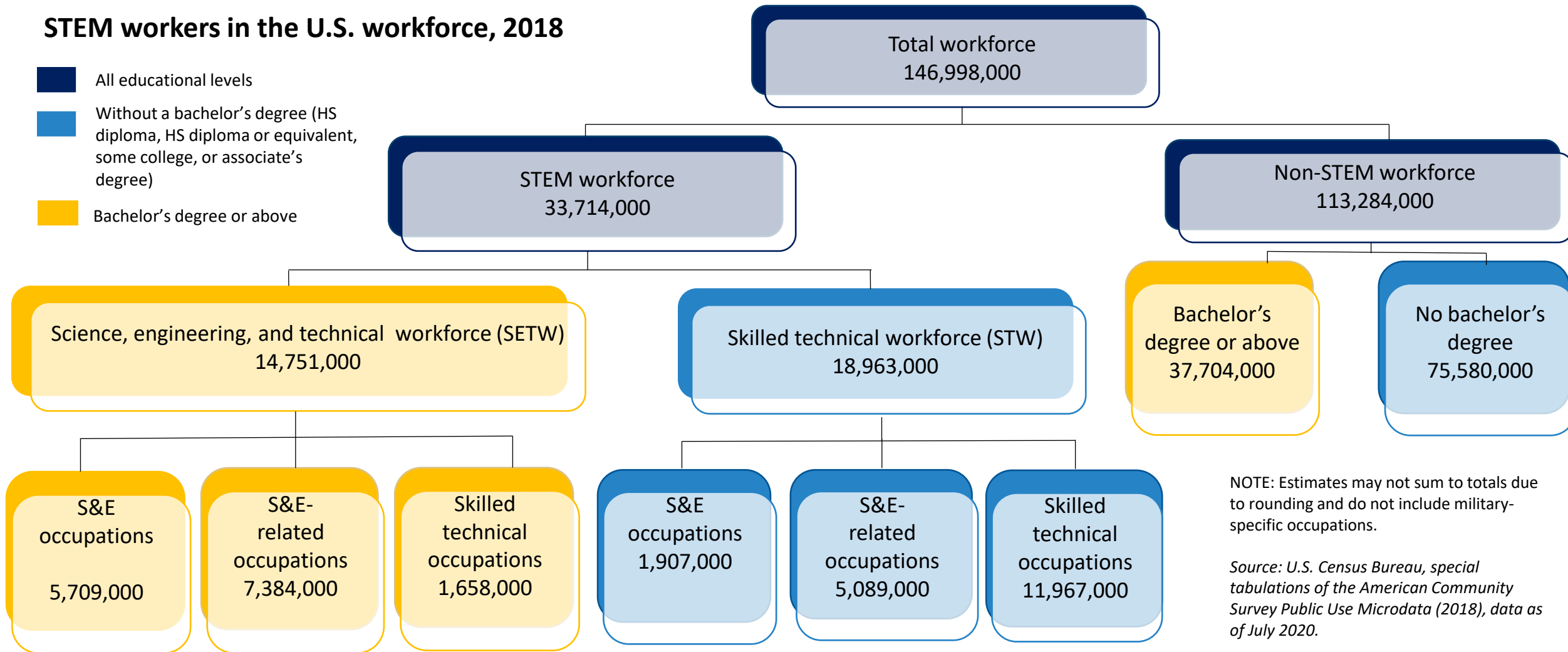
NEW: Skilled technical occupations



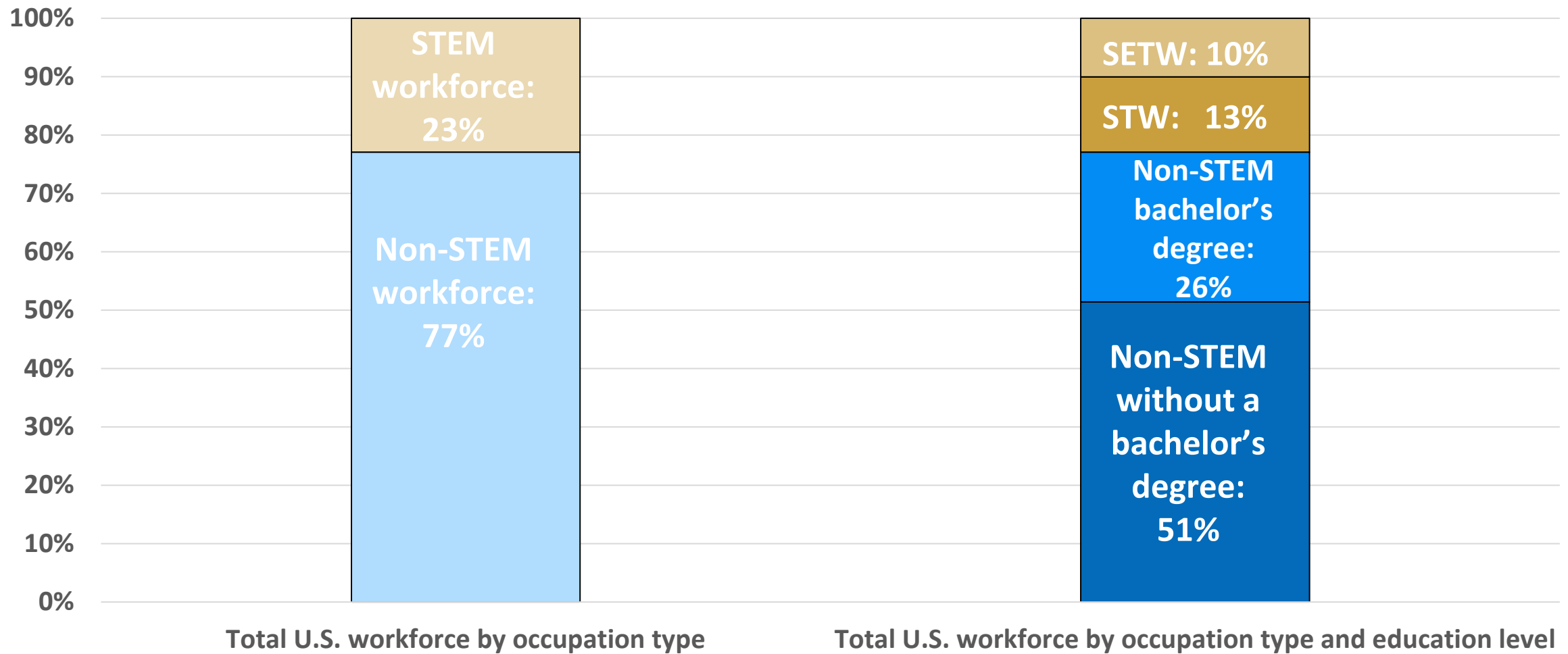
Construction and extraction; installation, maintenance, and repair; production; other skilled technical occupations

New model provides a more extensive view of the STEM workforce

STEM workers in the U.S. workforce, 2018



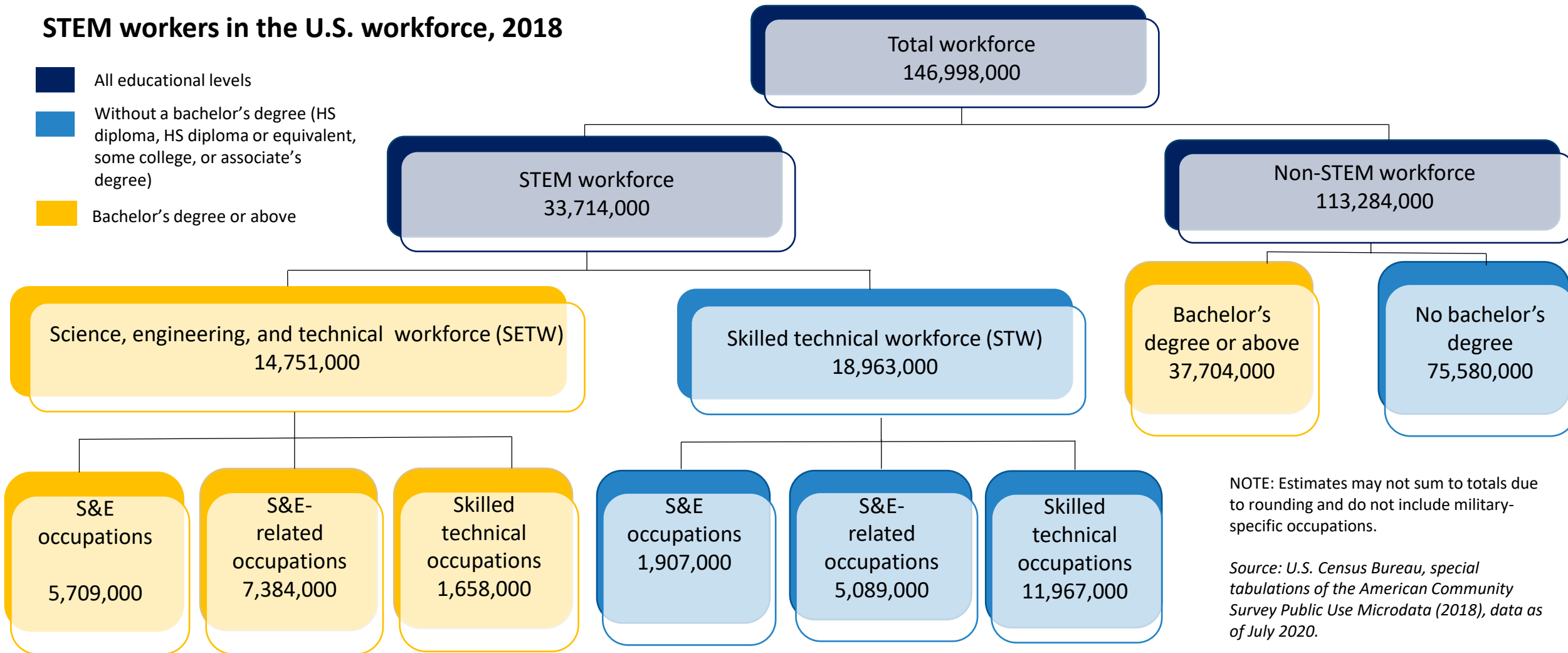
Skilled technical workers are 13% (19 M) of the 146 M workers in the U.S. workforce



Source: U.S. Census Bureau, special tabulations of the American Community Survey Public Use Microdata (2018), data as of July 2020.

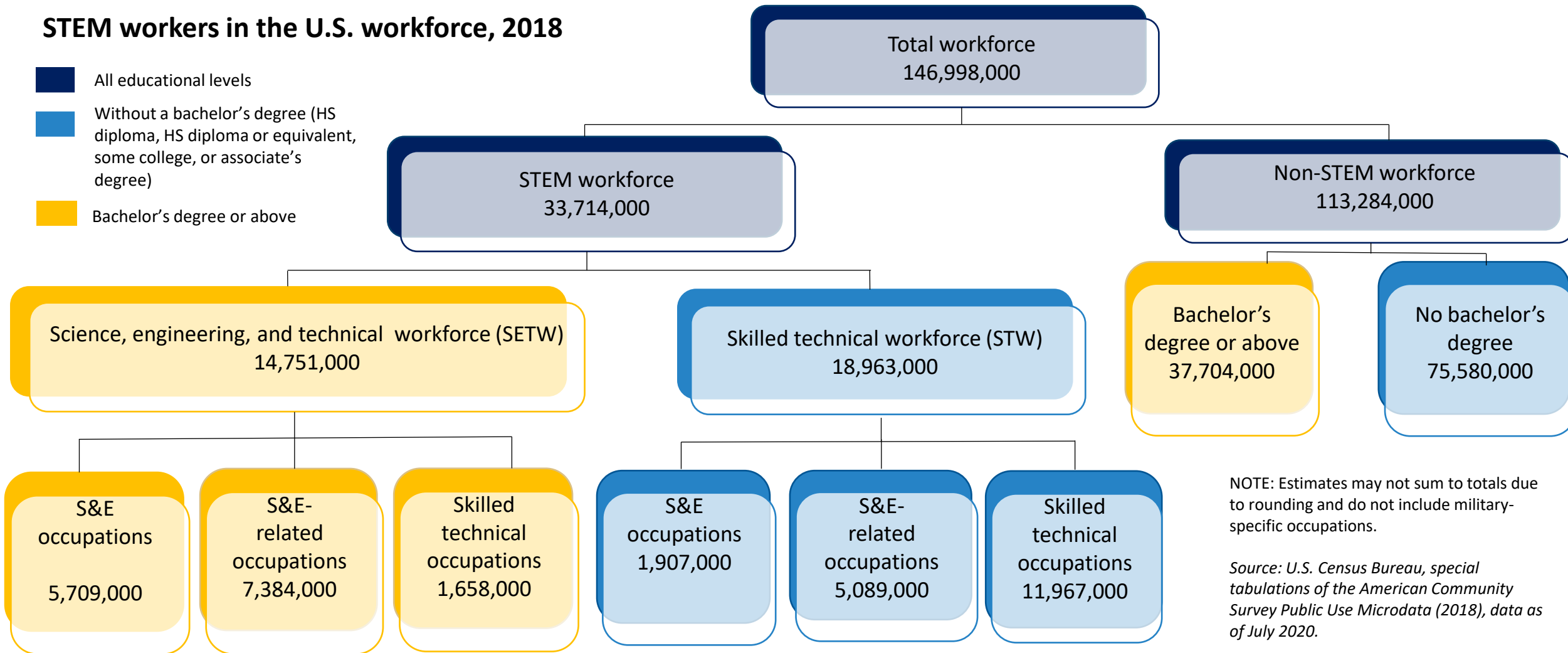
List what you see as **strengths** of this approach

STEM workers in the U.S. workforce, 2018



List what you see as **weaknesses** of this approach

STEM workers in the U.S. workforce, 2018

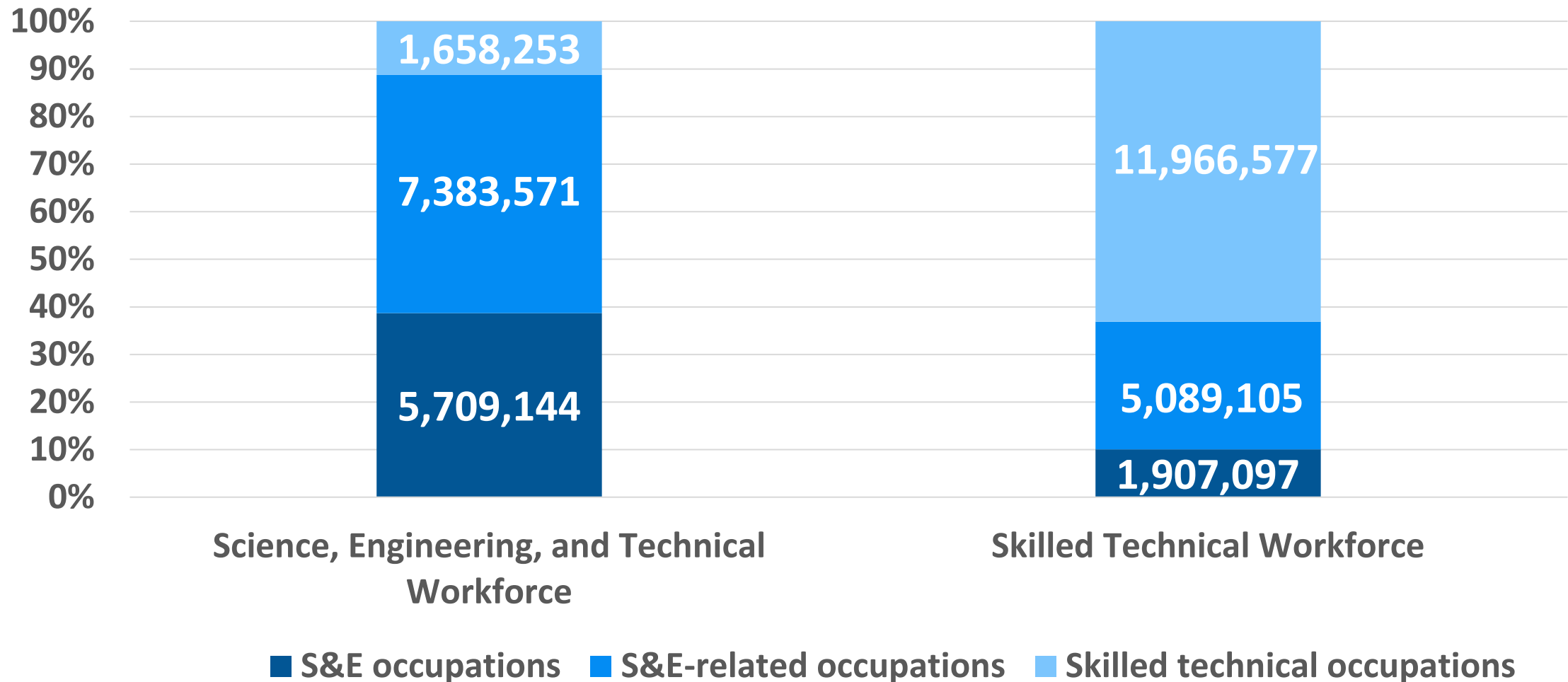




Skilled technical workers contribute their skills and innovative ideas in a variety of occupations

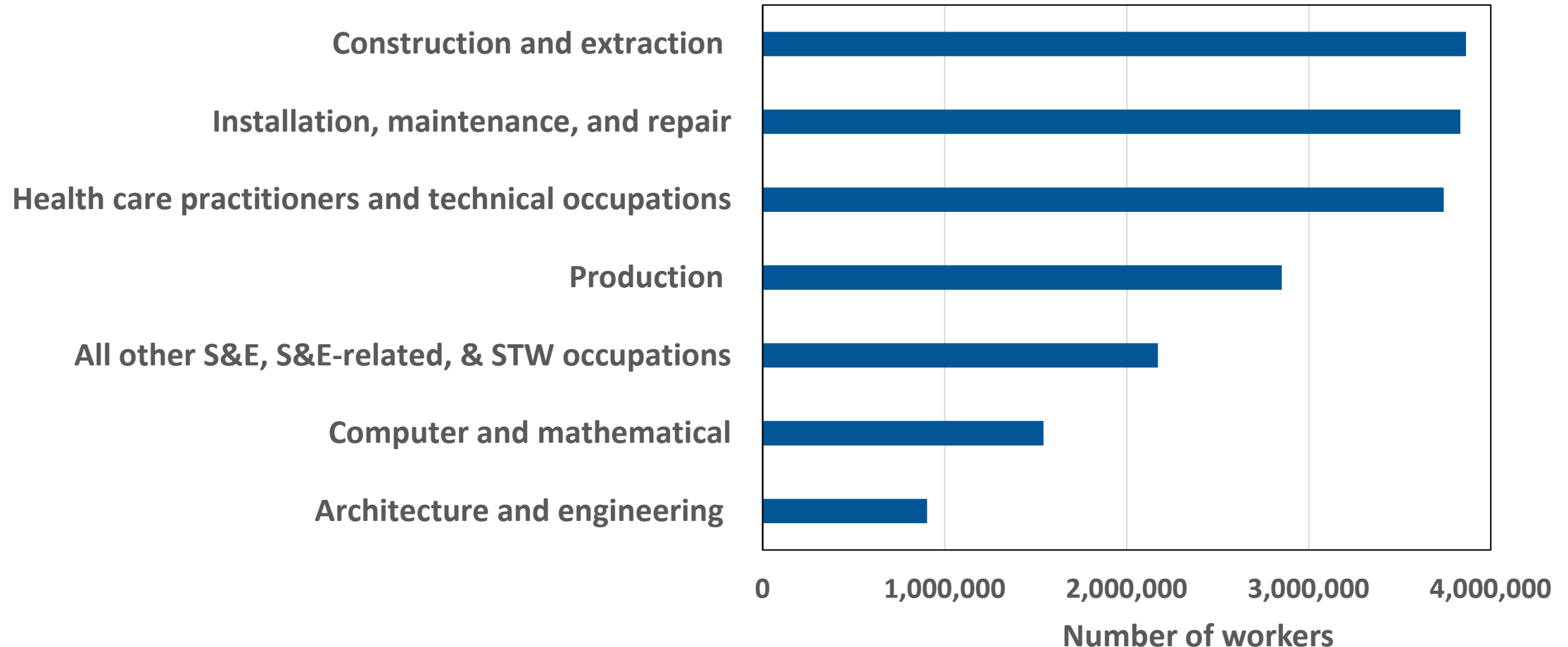


Over a third of skilled technical workers work in S&E and S&E-related occupations



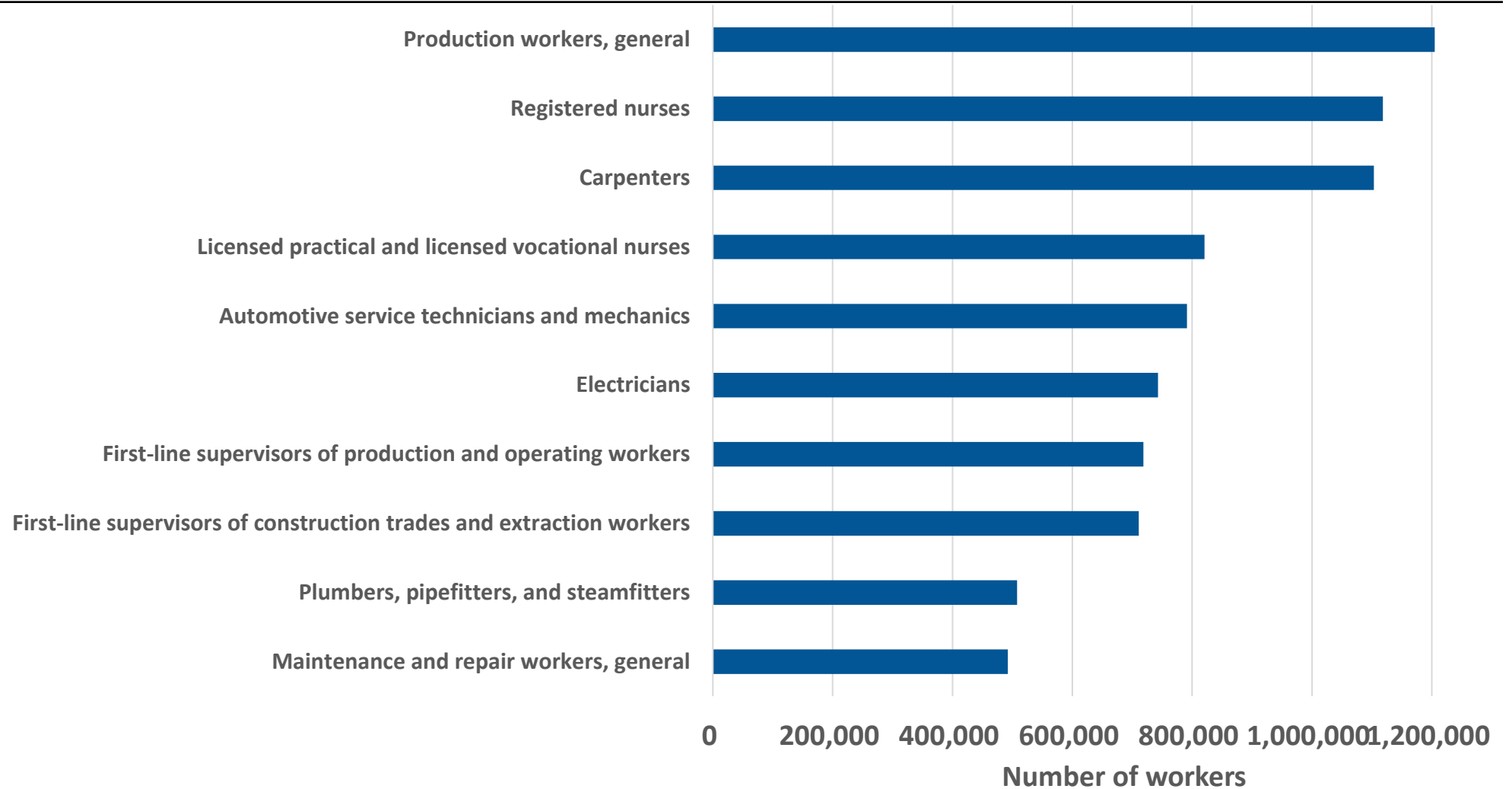
Source: U.S. Census Bureau, special tabulations of the American Community Survey Public Use Microdata (2018), data as of July 2020.

Three-quarters of the STW work in four main occupation groups



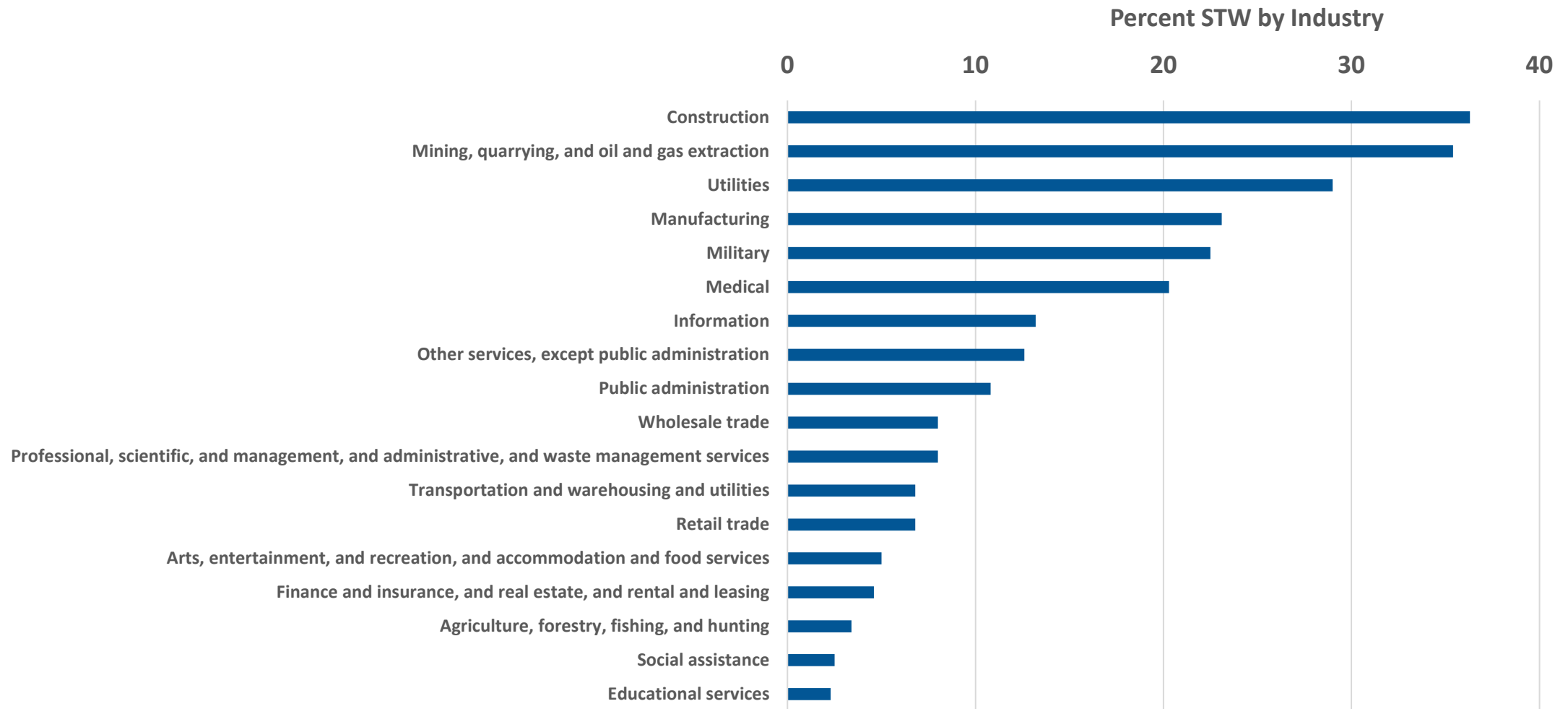
Source: U.S. Census Bureau, special tabulations of the American Community Survey Public Use Microdata (2018), data as of July 2020.

Ten occupations account for 43% of skilled technical workers



Source: U.S. Census Bureau, special tabulations of the American Community Survey Public Use Microdata (2018), data as of July 2020.

About a third of workers in construction, mining, and utilities are skilled technical workers

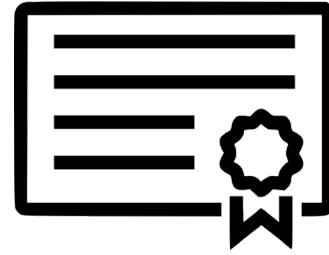


Source: U.S. Census Bureau, special tabulations of the American Community Survey Public Use Microdata (2017), data as of May 2019.

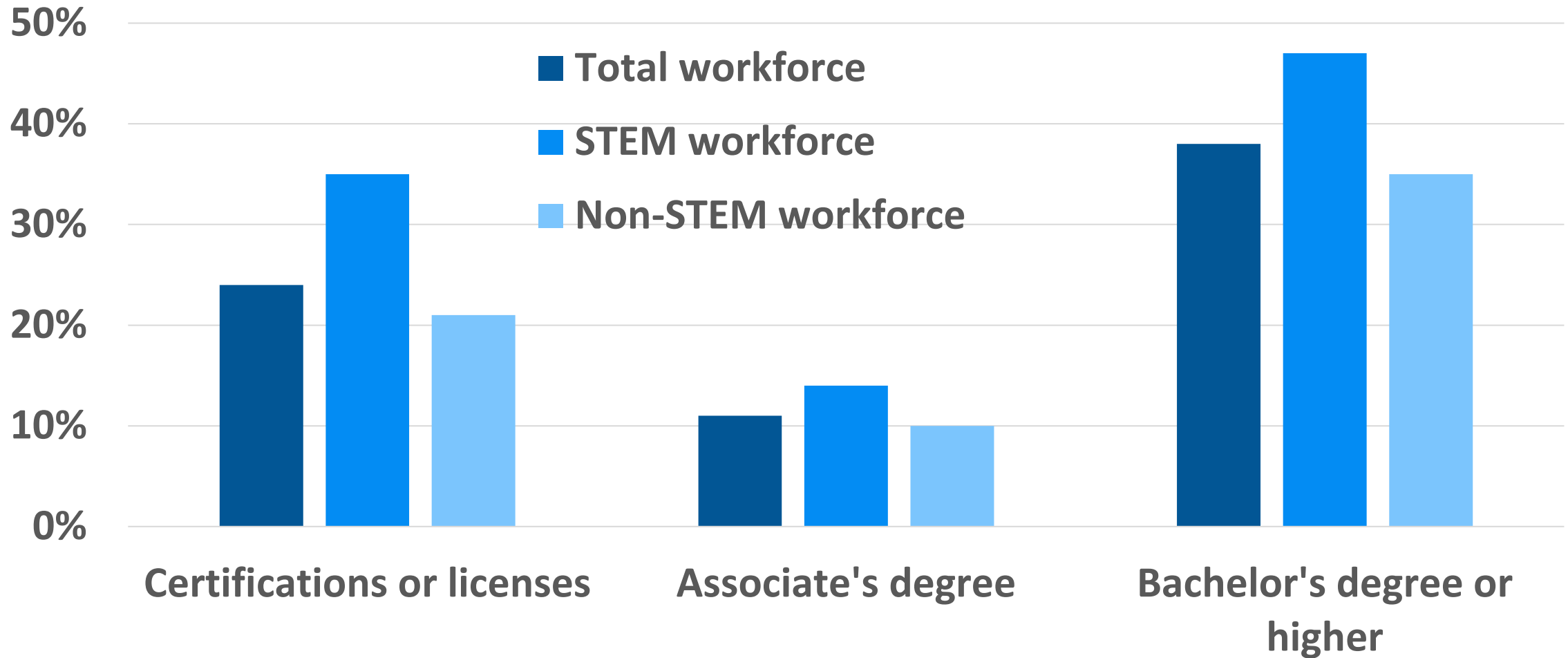
Tell us what you think...

What are the ways occupations and industry data related to the STW can be used in your own work?

There are multiple paths to the skilled technical workforce

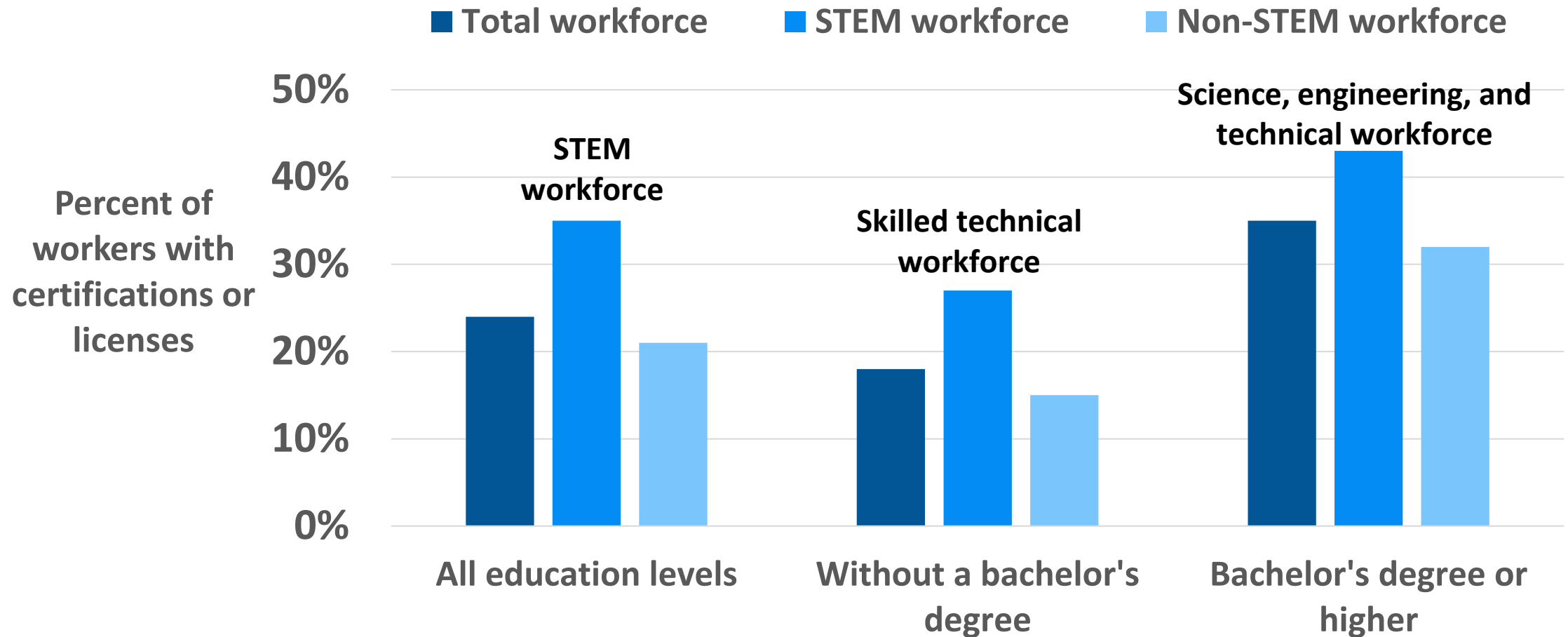


STEM workers are more likely than non-STEM workers to have training beyond high school



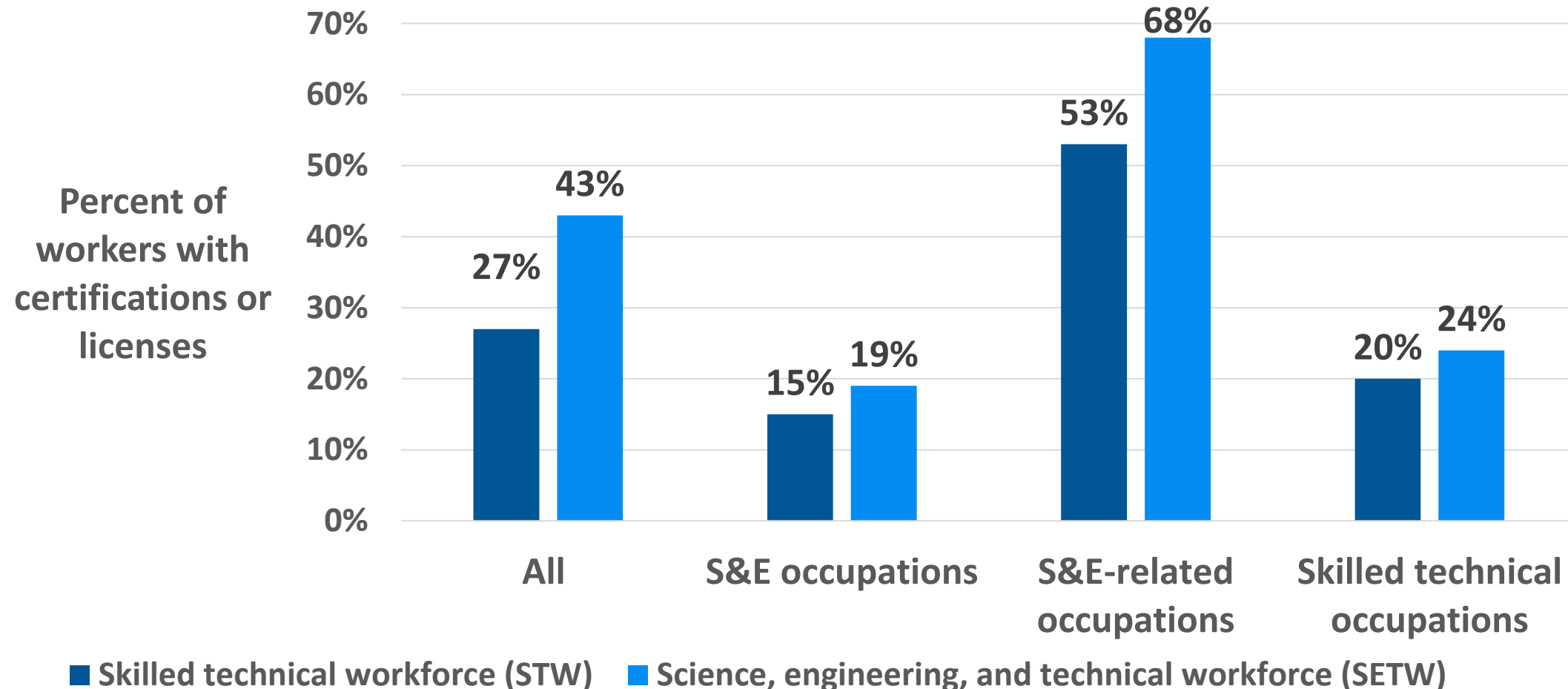
Source: Special tabulations of the Integrated Public Use Microdata Series (IPUMS), Current Population Survey: Version 7.0 [2018]. Minneapolis, MN: IPUMS, 2020. <https://doi.org/10.18128/D030.V7.0> Accessed 25 July 2020.

STEM workers are more likely than non-STEM workers to have certifications or licenses



Source: Special tabulations of the Integrated Public Use Microdata Series (IPUMS), Current Population Survey: Version 7.0 [2018]. Minneapolis, MN: IPUMS, 2020. <https://doi.org/10.18128/D030.V7.0> Accessed 25 July 2020.

Science, engineering, and technical workers are more likely than skilled technical workers to have a certification or license.



Source: Special tabulations of the Integrated Public Use Microdata Series (IPUMS), Current Population Survey: Version 7.0 [2018]. Minneapolis, MN: IPUMS, 2020. <https://doi.org/10.18128/D030.V7.0> Accessed 25 July 2020.



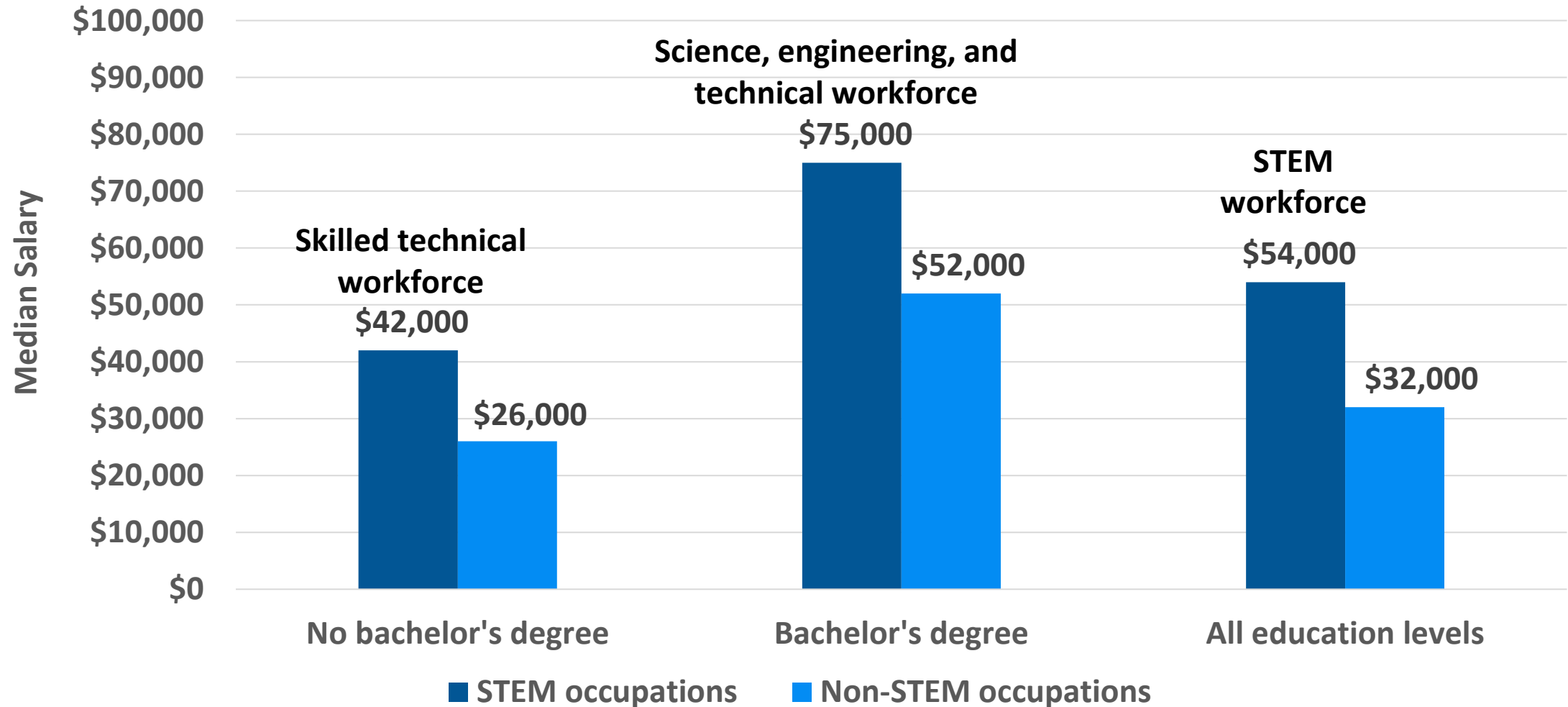
Tell us what you think...

What other information or additional details for the available information would you like to know about STW pathways and how to acquire the skills needed to be a part of the STEM workforce?

Skilled technical workers have better labor market outcomes than other workers without a bachelor's degree.

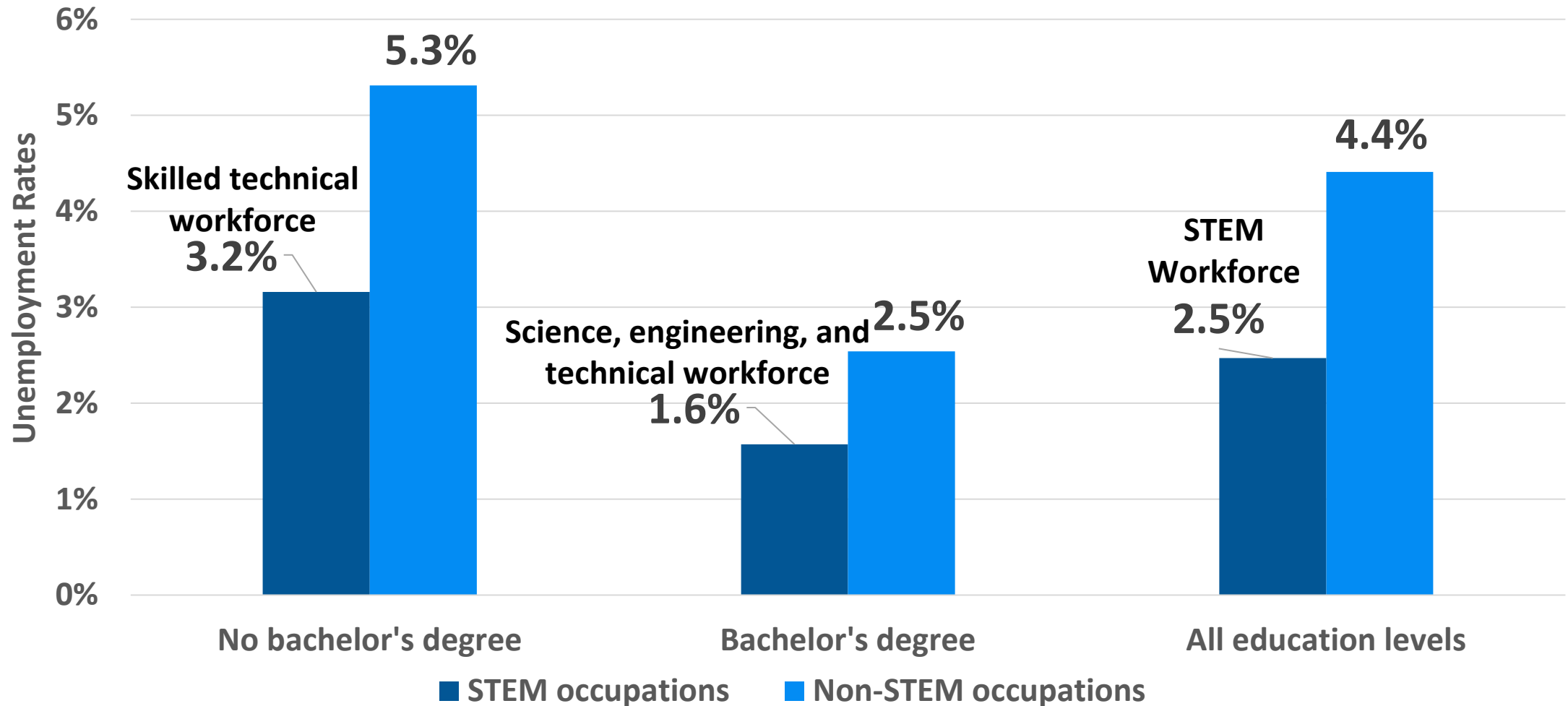


Median salaries are higher for the STW than other workers without a bachelor's degree, 2018 (pre-COVID-19)



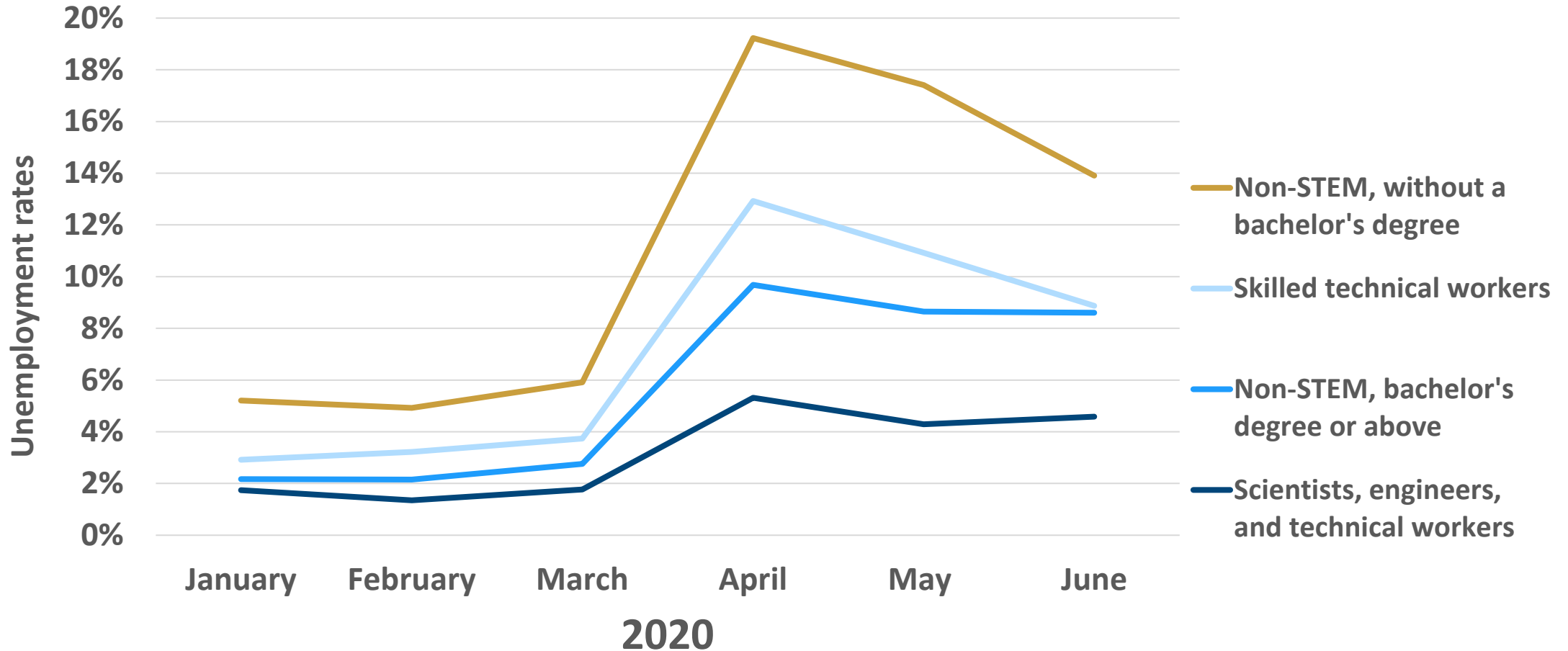
Source: U.S. Census Bureau, special tabulations of the American Community Survey Public Use Microdata (2018), data as of July 2020.

Unemployment rates are lower for the STW than other workers without a bachelor's degree, 2018 (pre-COVID-19)



Source: U.S. Census Bureau, special tabulations of the American Community Survey Public Use Microdata (2018), data as of July 2020.

STEM workers have had lower unemployment rates than their non-STEM counterparts during the COVID-19 crisis



Notes: Does not include those enrolled in high school. Does not include military occupations. Data not seasonally adjusted.

Source: Integrated Public Use Microdata Series (IPUMS), Current Population Survey: Version 7.0 [2018]. Minneapolis, MN: IPUMS, 2020.

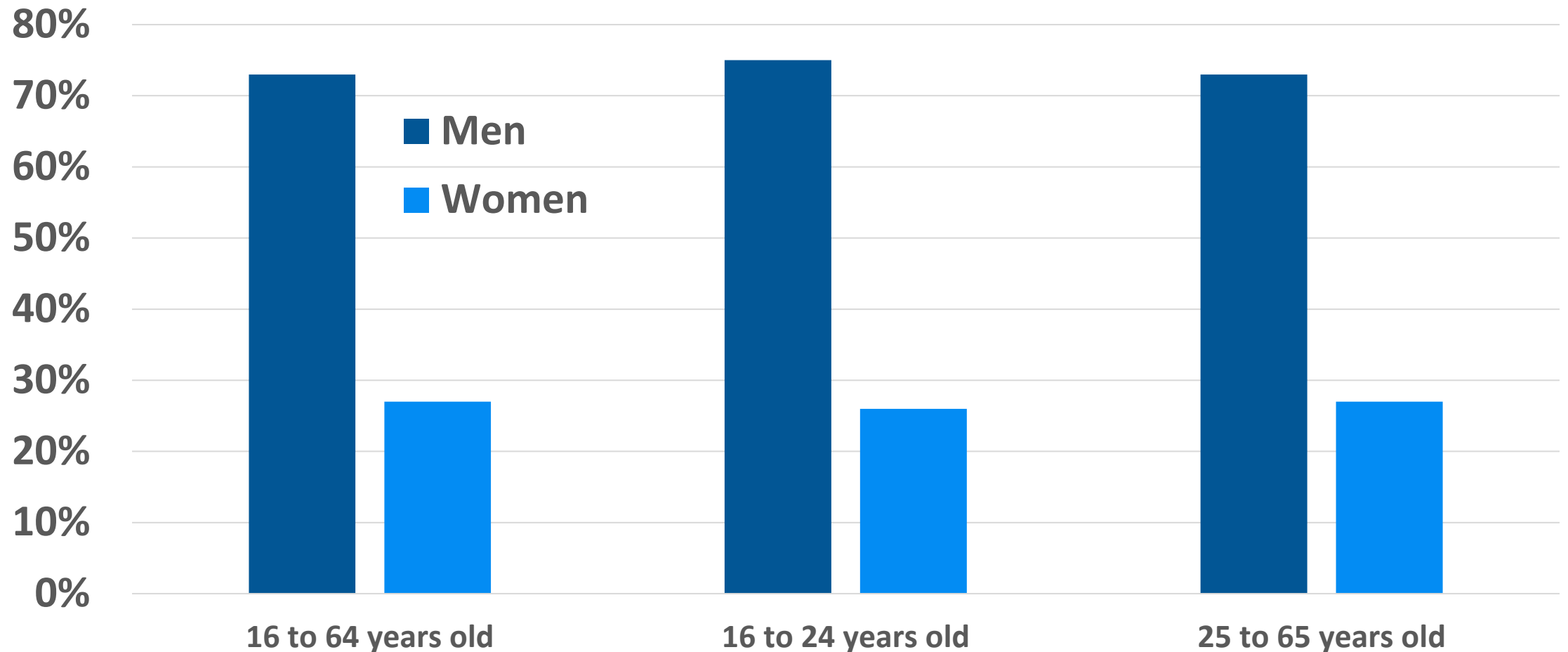
Tell us what you think...

What other labor market outcome information would you like to know about?

The skilled technical workforce provides opportunities for women and underrepresented minorities to work in STEM

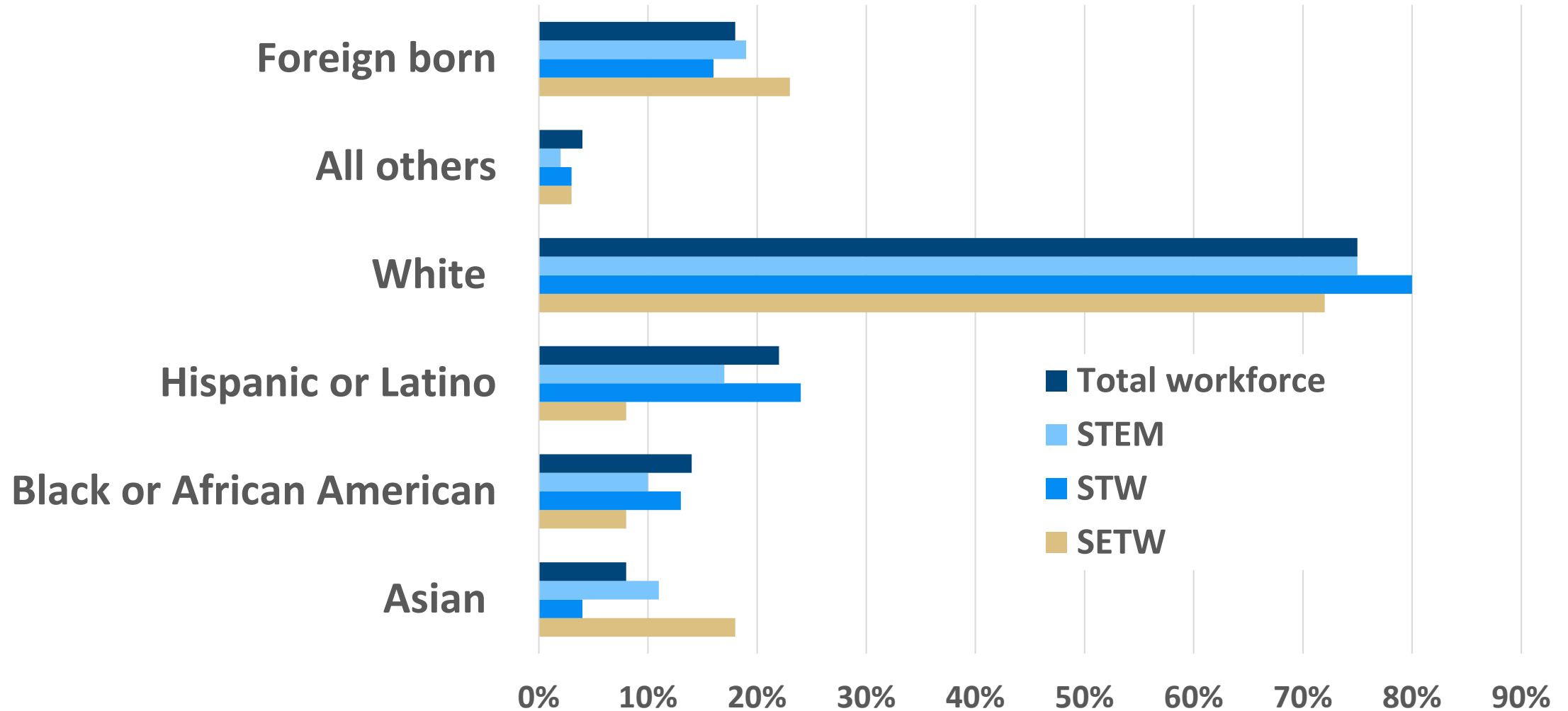


Most skilled technical workers are men regardless of age group



Source: U.S. Census Bureau, special tabulations of the American Community Survey Public Use Microdata (2018), data as of July 2020.

The racial and ethnic distribution of the STW is similar to the total U.S. workforce



Source: U.S. Census Bureau, special tabulations of the American Community Survey Public Use Microdata (2018), data as of July 2020

Tell us what you think...

What data would you like to see that would help your organization's understanding of the demographic makeup of the STW, SETW, or STEM workforces?

Defining and measuring the skilled technical workforce:

Key takeaways

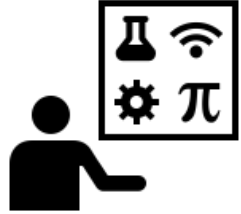


The STW is made up of workers who use significant levels of S&E expertise and technical knowledge and who do not have a bachelor's degree.

19 M The number of U.S. skilled technical workers (2018).

13% The share of the U.S. workforce who are skilled technical workers.

Defining and measuring the skilled technical workforce: Key takeaways (cont'd)



The STW is a SUB-WORKFORCE of the STEM workforce.

3% and 5%

Pre-COVID-19 unemployment rates (Jan 2020):
STW and non-STEM workers without a bachelor's degree.

9% and 14%

COVID-19 unemployment rates (June 2020):
STW and the non-STEM workers without a bachelor's degree.



Contact: Amy Burke aburke@nsf.gov

*What didn't we talk about today that you'd like
to see in future discussions and analyses of the STW?*

Workshop Wrap Up and Next Steps

- STW Initiative workshop #1 Takeaways
- Reminder: Two more STW workshops:
 - “Administrative and Other Supplemental Data Sources for the STW” [August 21 @ 1pm EDT](#)
 - “Surveying the STW to Answer Policy-Relevant STEM-Workforce Questions: The 2021 National, Training, Education, and Workforce Survey (NTEWS)” [August 28 @ 1pm EDT](#)
- Visit the NCSES STW Initiative website
<https://www.nsf.gov/statistics/stw/skilled-technical-workforce.cfm>

Reach Out for Additional Questions or Comments

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