CSET CENTER for SECURITY and EMERGING TECHNOLOGY | GEORGETOWN UNIVERSITY

Cyber & AI Talent, Education, and Workforce

June 29, 2023

Ali Crawford | *Research Analyst*
ac2213@georgetown.edu

Agenda

- Competitions as Educational Tools
- National Centers of Academic Excellence in Cyber
- Community Colleges & AI Talent

Competitions as Educational Tools

Why Competitions?

- Recent trends in federal strategy to uplift and support alternative educational pathways into the STEM workforce.
- Competitions are a great example of this because of their tangible impact.
- Air Force Association's CyberPatriot
  - 11,500 high school participants in 2022-2023
  - Same schools regularly dominate

Benefits and Opportunities

Students gain:

- Practical and industry-relevant skills outside of the traditional classroom.
- Exposure to job opportunities, scholarship opportunities, or monetary incentives.
- Access to cyber education, training materials, and safe practice spaces.

Challenges and Gaps

Student success depends on:

- Access to prepared and agile educators and mentors.
- Access to hardware, practice time and space, and reliable Internet.
- Support of school or district administration.

However:

- Shortages of K-12 Computer Science & STEM teachers remains a challenge.

Recommendations

Prioritize funding initiatives for teacher professional development:

- Cybersecurity Education and Training Assistance Program (CETAP)
    - *Funds teachers to support cybersecurity educational curricula, professional development opportunities and classroom technology.*
- Innovative Technology Experiences for Students and Teachers (ITEST)
    - *Funds R&D programs to support all students' foundational learning in STEM disciplines.*

National Centers of Academic Excellence in Cyber (NCAE-C)

What is it?

Consortium of ~400 institutions that receive designation from the NSA:

- CAE-Cyber Defense, Cyber Operations, or Research
- Committees aimed at professional development for faculty and K-12 outreach and curriculum development.
- Five national centers helps the NSA program office administer a specific feature of the program and work on curriculum standards development.

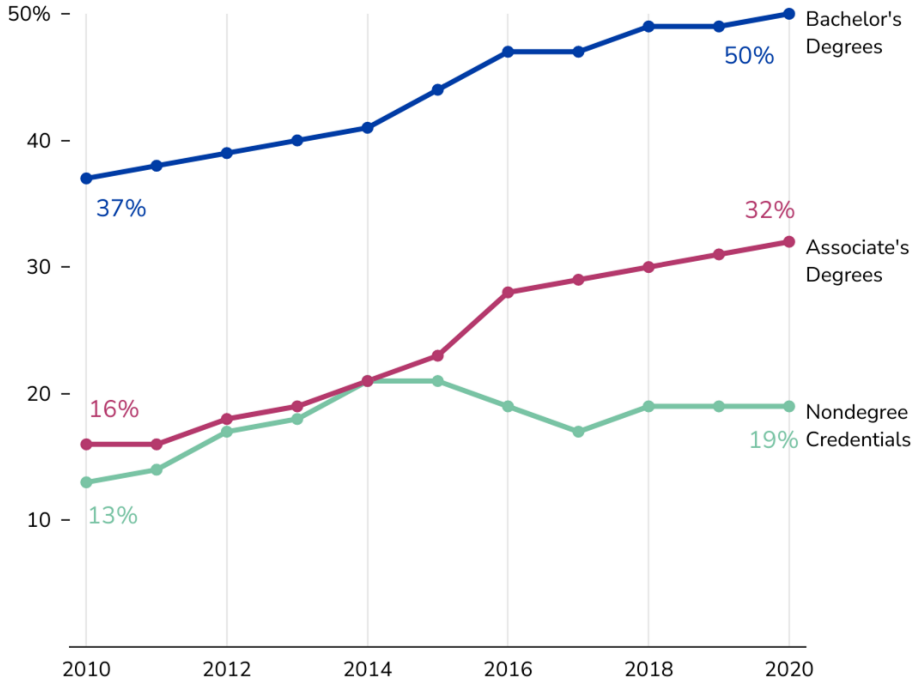
What are they doing?

Table A: NCAE-C-Designated Schools' Completions Have Grown at Much Higher Rates than All Schools over the Last 10 years, Especially in Cybersecurity-Relevant Fields

Percentage Change in Completions* from 2010 to 2020				
Award Type	NCAE-C Schools		All Other Schools	
	Cyber	All Fields	Cyber	All Fields
Nondegree Credentials	190%	110%	78%	-8%
Associate's Degrees	100%	46%	-22%	14%
Bachelor's Degrees	227%	42%	95%	14%

*The term "completions" refers to the number of students that earned a degree or nondegree credential.

Source: CSET analysis of IPEDS data.



Only cyber fields in 2020:

- **50% of all bachelor's degrees**
- **32% of all associate's degrees**

Across all fields of study in 2020:

- 40% of all bachelor's degrees
- 24% of associate's degrees in 2020

Outsized Impact

Dakota State University:

- 1,247 cyber bachelor's graduates
- 2,838 all bachelor's graduates

South Dakota:

- 2,479 cyber bachelor's graduates
- 63,040 all bachelor's graduates

South Dakota's only NCAE-C institution is producing 50% of the state's total cyber bachelor's graduates, but only 5% of the state's total bachelor's graduates.

Recommendation

Congress should officially authorize the NCAE-C program as a program of record and provide yearly appropriations:

- Unpredictable nature of funding makes short- and long-term planning difficult.

AI at Community Colleges

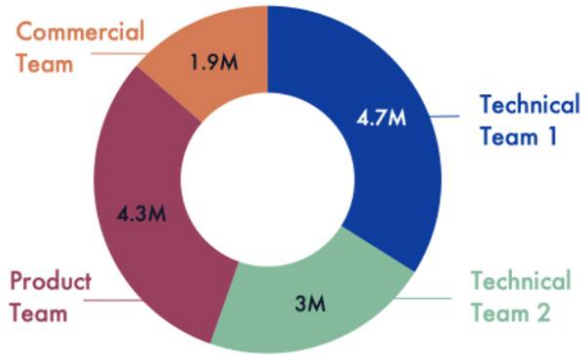
Luke Koslosky, *Research Analyst*

luke.koslosky@georgetown.edu

Defining the AI Workforce

Anyone with the knowledge, skills, and abilities to work in the design, development, and deployment of an AI system

In 2019, the U.S. AI workforce consisted of 14 million workers, or about 9% of total U.S. employed.



Technical Team 1

Research Scientists, Software Developers, Data Architects

Technical Team 2

Mechanical Engineers, Electrical Engineers, Electronics Engineers, Web Developers

***Active AI Workforce**

Commercial Team

Strategists, Marketing Acquisition & Procurement

Product Team

Product Managers, User Experience (UX), Compliance Officers, Designers

Not all occupations within each category are listed here.
Source: CSET

The Potential of Community and Technical Colleges

Community and technical colleges function as a critical part of the U.S. workforce development system:

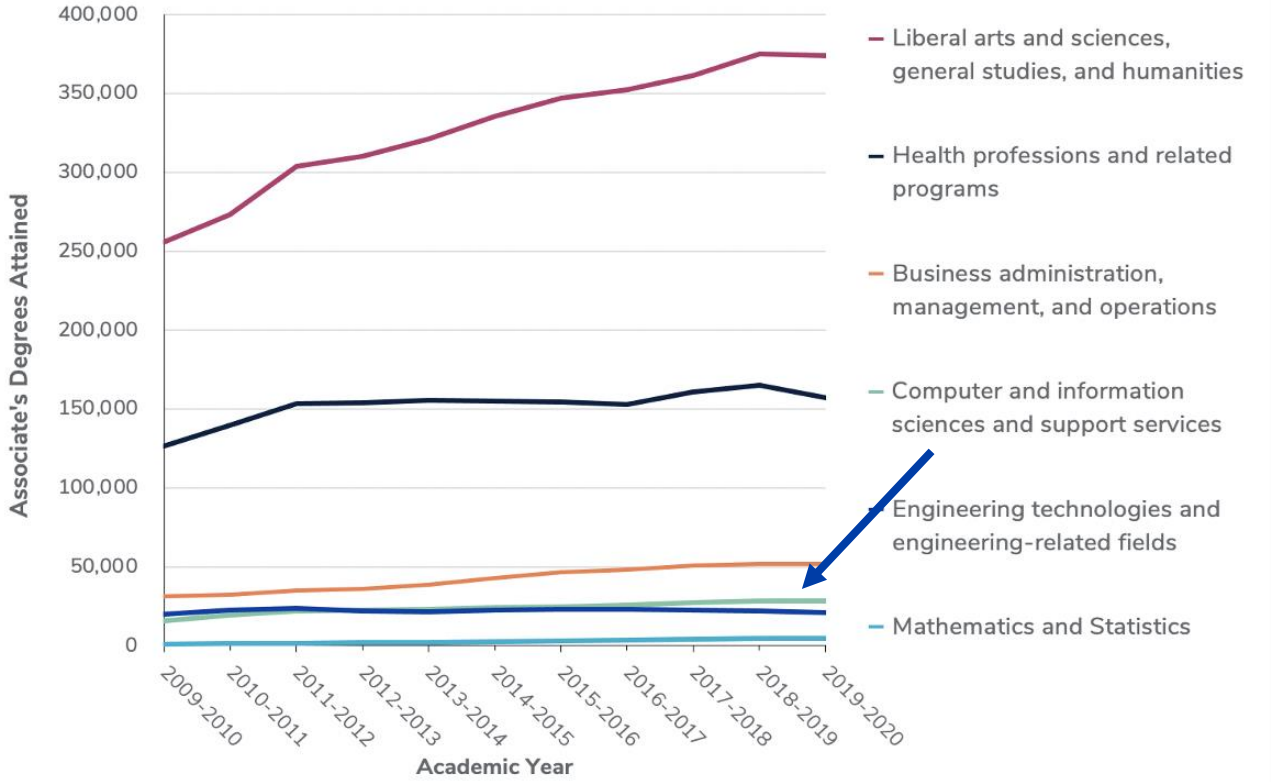
- Serve over ten million credit and noncredit students per year.
- Degree programs typically span two years but also include four-year programs.
- Nondegree award programs can range from a few weeks to a few years.
- Successful history of training workers in technical fields:
    - *CTE programs are a great example.*
- Student body that represents many segments of the population.
- Inexpensive and accessible.

AI at Community Colleges

- Few AI and AI-related degrees and certificates awarded in 2020:
  - Virtually none in AI-specific fields.
- The two most relevant fields saw flat or falling degree attainment over the last decade:
  - Computer and Information Science
  - Engineering Technologies

Completions Totals at Community Colleges

Few AI-related degrees



Source: NCES/IPEDS; CSET Calculations.

The predominant focus of U.S. policymakers and industry continues to be on four-year degrees:

- One-third of the AI workforce does not have a four-year degree.
    - *60% of the entire U.S. workforce does not have a four-year degree.*
- Creating AI and AI-related programs as a series of stackable credentials will transform how community and technical colleges prepare tomorrow's AI workforce.
- Growing number of industry partnerships specific to AI education and training.
- Growing number of companies and government organizations dropping four-year degree requirements.

AI and AI-related Certifications

The hype:

- Across all fields there are ~1 million unique credentials available, and they vary widely in quality.
- For AI and AI-related positions:
  - Little demand for AI certifications – just 2.4% of AI occupation job postings
  - Including the companies launching major initiatives
  - Most commonly used to advance or move internally
- Cybersecurity offers a useful example of how to address this through the NICE framework.

Recommendations:

Congress:

1. Establish a joint Dept. of Labor and National Science Foundation grant program for new AI non/degree programs.
2. Enact federal tax credits for companies that form AI education partnerships.
3. Fund NIST, or other federal entity, to develop a framework of technical and non-technical AI work roles and competencies, updated regularly, following the example of the NICE framework.

States:

1. Facilitate articulation agreements between public 2-year and 4-year institutions for transfer and reverse transfer for AI/related programs.

Thank you!

CSET CENTER for SECURITY and EMERGING TECHNOLOGY

- I would love to connect with you. Email me at (ac2213@georgetown.edu) or Luke Koslosky at (luke.koslosky@georgetown.edu)
- Find our Cyber Competitions, NCAE-C, and AI Workforce reports and more at (https://cset.georgetown.edu/publications)
- Subscribe to our biweekly newsletter and get invited to our events at (https://cset.georgetown.edu/sign-up/)
- To request briefings, contact Danny Hague at (danny.hague@georgetown.edu)
