



Bridging the Gap Between Industry and Academia

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What is the Skill Gap?



Skill Gap is the difference in the **skills** required on the job and the actual **skills** possessed by the employees (students). **Skill gap** presents an opportunity for the company and the employee to identify the missing **skills** and try to gain them.

Is there a Skill Gap between the Industry and Academia??



How Employers View the Scope and Impact of Workforce Skills Gaps

Believe Their Organization Has a Skills Gap

64%

Believe Skills Gaps Cause Recruiting Challenges

43%

Believe Skills Gaps Make Companies Less Efficient

42%

2019 Survey by WES and Future Workplace for 600 human resource leaders about barriers to identifying qualified candidates,...etc (64% above is increase from 52% in 2018).



60 MINUTES

EPISODES

OVERTIME

TOPICS

THE TEAM

SUBSCRIBE

unicef 

THREE MILLION OPEN JOBS IN U.S., BUT WHO'S QUALIFIED?

Millions of jobs are waiting to be filled, but employers say they can't find qualified workers because of "the skills gap"

2012
NOV 11

FACEBOOK


TWITTER

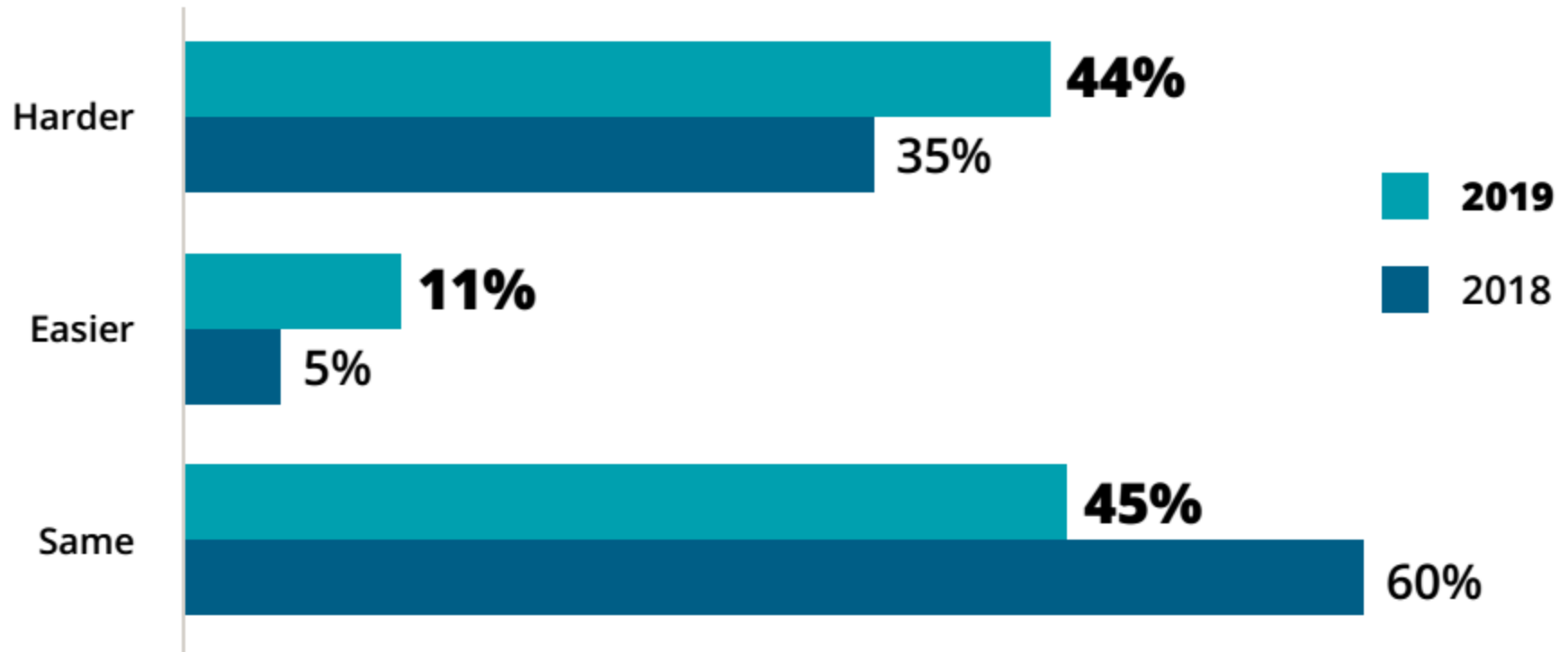

REDDIT


CLIPBOARD


Has filling open positions to close your skills gap been harder this year compared to 2018?	Harder	The same	Easier
Fewer than 1,000 employees (N=120)	34%	51%	15%
1,000 to 2,499 (N=125)	48%	42%	10%
2,500 to 9,999 (N=122)	48%	45%	7%
10,000 to 29,999 (N=80)	54%	38%	8%
30,000 to 49,999 (N=46)	50%	37%	13%
50,000 or more (N=107)	37%	50%	13%

Is the Skill Gap Widening?

Has filling open positions to close your skills gap been harder this year compared to last?



WHY IS IT WIDENING?



75% of surveyed employers said that their organization had up to 500 *UNFILLED* roles during the past year.

Top 3 Barriers to Filling Open Positions

Pace of change in technology

37%

Not enough skilled talent capable of moving into positions of greater responsibility

31%

When hiring for certain jobs, there aren't enough qualified candidates in the workforce

30%

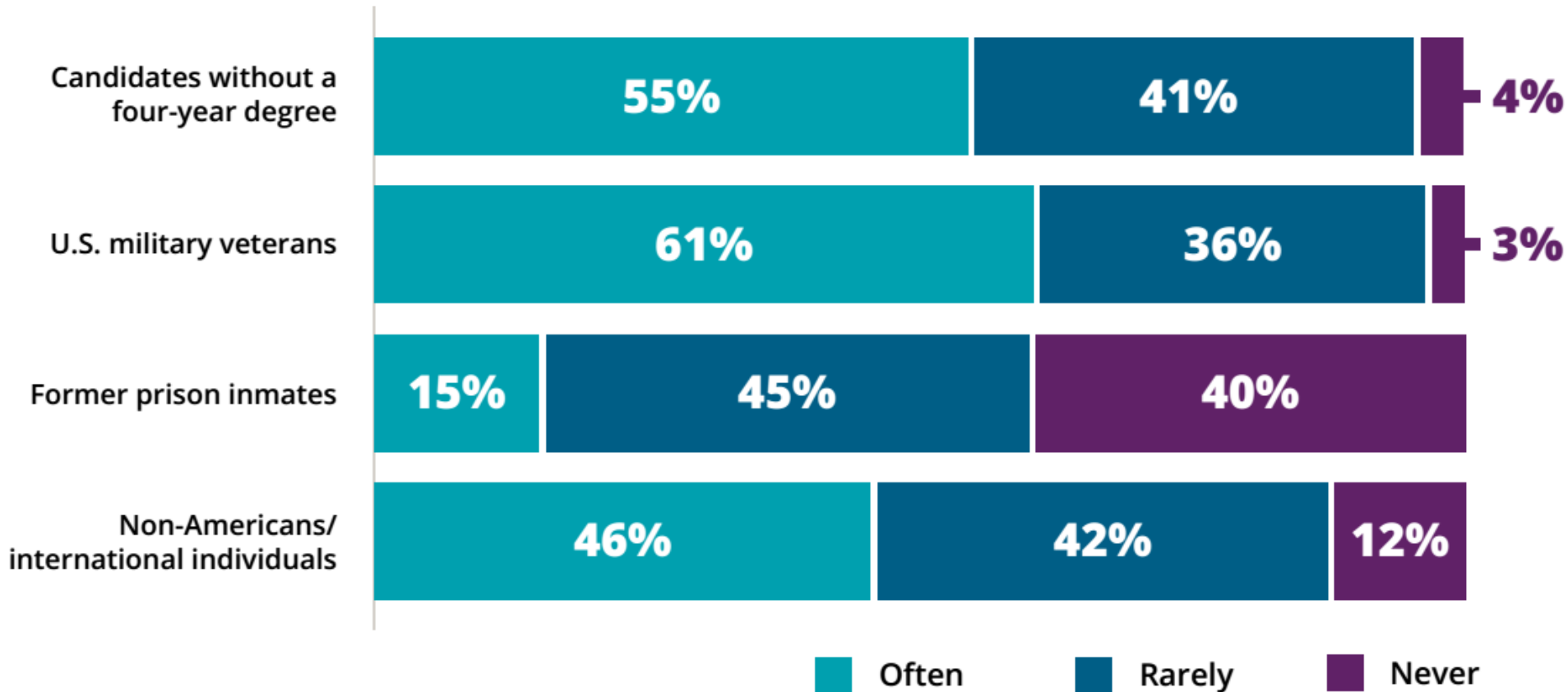
Retirement of Baby Boomers

- 34% of employers believe that it widens the skills gap.
- More than 60% of NASA employees are eligible for retirements.
- 64% of employers have hired an individual who was considered retired and not currently employed.



Is four-year Degree Important?

How often do you extend job offers to:



GAP Causes (Industry View)

- ❑ Academic Curriculum should focus on job preparation
- ❑ Employers are complaining from recent graduates' skills in teamwork, business and social science (social education)
- ❑ Schools should abandon liberal arts curricular in favor of teaching more job skills.
- ❑ College Admins are not investing enough in updating laboratories with latest technologies

GAP Causes (Academia View)

- ❑ industry isn't ready to accept degreed students, even when they get the appropriate job-centric education (3 decades of DOE data showed no drop in students number but half of them only get jobs in STEM field) ¹.
- ❑ It is difficult for schools to walk the line between broad education and in-depth technological training, especially if employers are not ready to provide that training.
- ❑ Foreign workers on temporary visas employed by the industry.

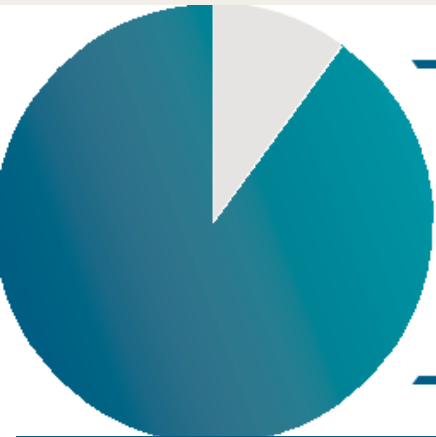
¹ *The Chronicle*, Hal Salzman and B. Lindsay Lowell

Thoughts to Close the Gap

- **Industry should expand their R&D Dept. to allow more collaboration with academia.**
- **The government can provide tax or similar incentives to encourage the industry, and more charges for importing workforce from overseas.**
- **Funding agencies should make it priority to fund joint research by Industry and Academia (internships, seminars,...etc) in a way that will make the industry comfortable in working with the academia.**
- **College Admins should invest more in its technical infra-structure (labs, equipment,...etc)**

Proposed Solutions

Academic Institutions can Offer Certification courses in specific skills in addition to academic degree



90%

Share of employers who would hire candidates who validate their knowledge using a certification, digital badge, or coursework instead of a college degree.

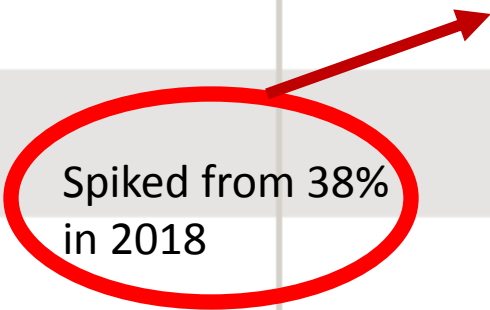
How open are you to hiring a candidate who has one of the following in place of a college degree? [Respondents selected top 3]	Top 3 inclusions
Higher education coursework but no degree	53%
Industry certification	52%
Higher education certificate	39%
Non-higher education certificate	22%
Digital badge	20%
Would not hire without a college degree	10%

Cont.

Industry should invest more in upskilling employees and improve current practices.

40% of HR leaders struggle to secure funds for upskilling programs, and 35% lack in-house training resources or find it difficult to identify training options.

Your company prefers to:	Somewhat or strongly agree
Rely on AI to close skills gaps	55%
Hire employees instead of upskilling/reskilling current employees	50%
Hire gig workers instead of full-time employees	47%
Outsource to vendors instead of hiring/upskilling employees	46%
Invest in AI to perform work instead of hiring/upskilling employees	40%



Spiked from 38% in 2018

Cont.

Academia should try to address hard and soft skills. through these partnerships, employers can help a school identify hard skills and soft skills to teach during short courses and programs.

Five Most In-Demand Hard Skills

48%

Strategic
Thinking &
Analytical Skills

46%

Computer
Skills

32%

Project
Management

24%

Language
Skills

23%

Engineering

Five Most In-Demand Soft Skills

39%

Leadership
Ability

36%

Ability to
Adapt
to Change

36%

Communication

27%

Positive
Attitude

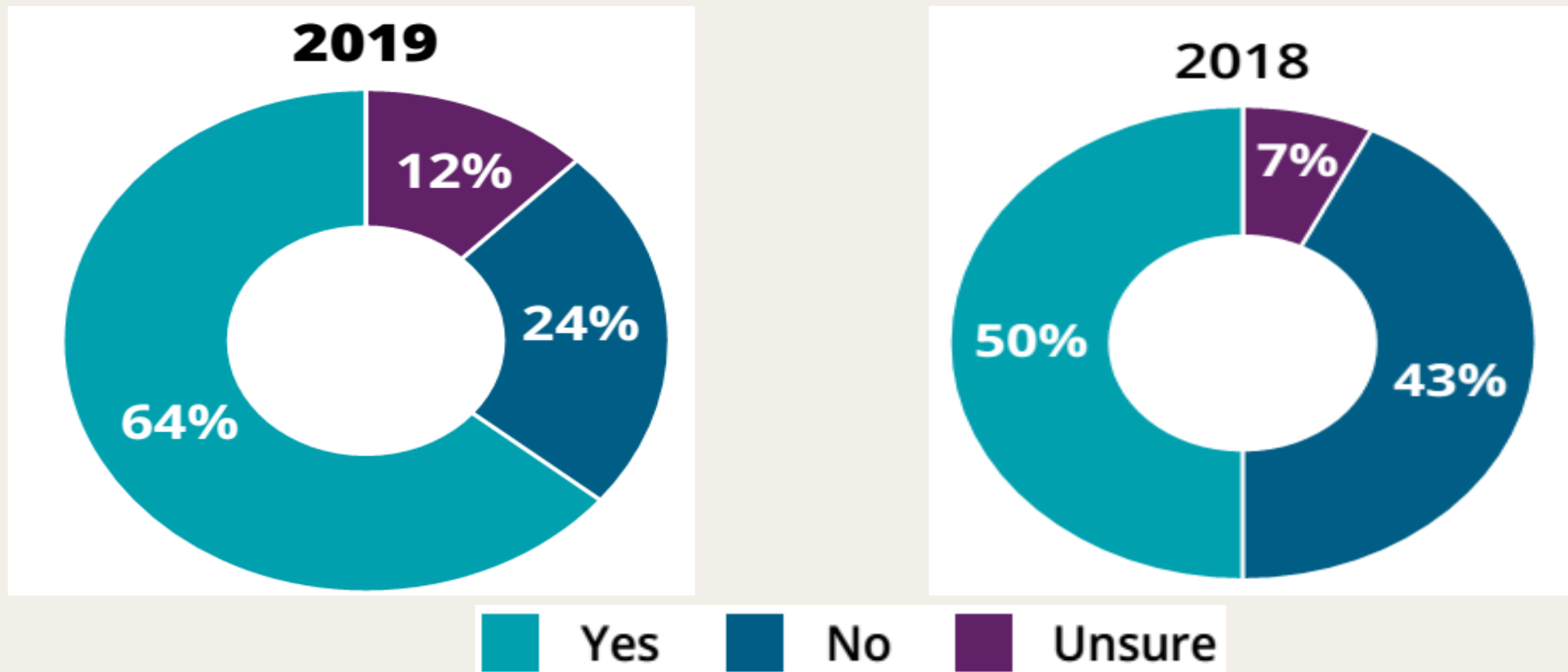
20%

Teamwork

Cont.

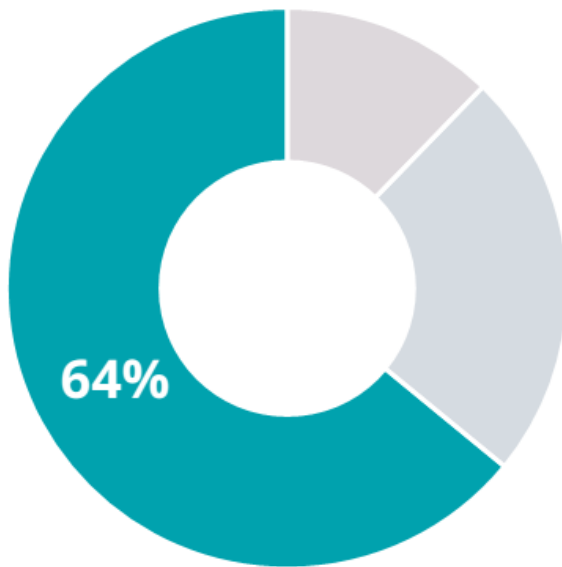
Strong Partnership between Industry and Academia

In the past three years has your organization collaborated with colleges, universities and vocational schools?.



Type of Institutions Partnered with:

2019



[Respondents selected all that applied]

Four-year college or university	79%
Community college	53%
Vocational school	30%
For-profit institution	23%
Technical program	0%
None of the above	1%

45% Out of the 24% who have not partnered with academic institutions said **that they haven't tried.**

Our Experience with the Skill Gap

**Advanced Design and Fabrication of
Prosthetic and Medical Devices**

NSF-ATE 1601522

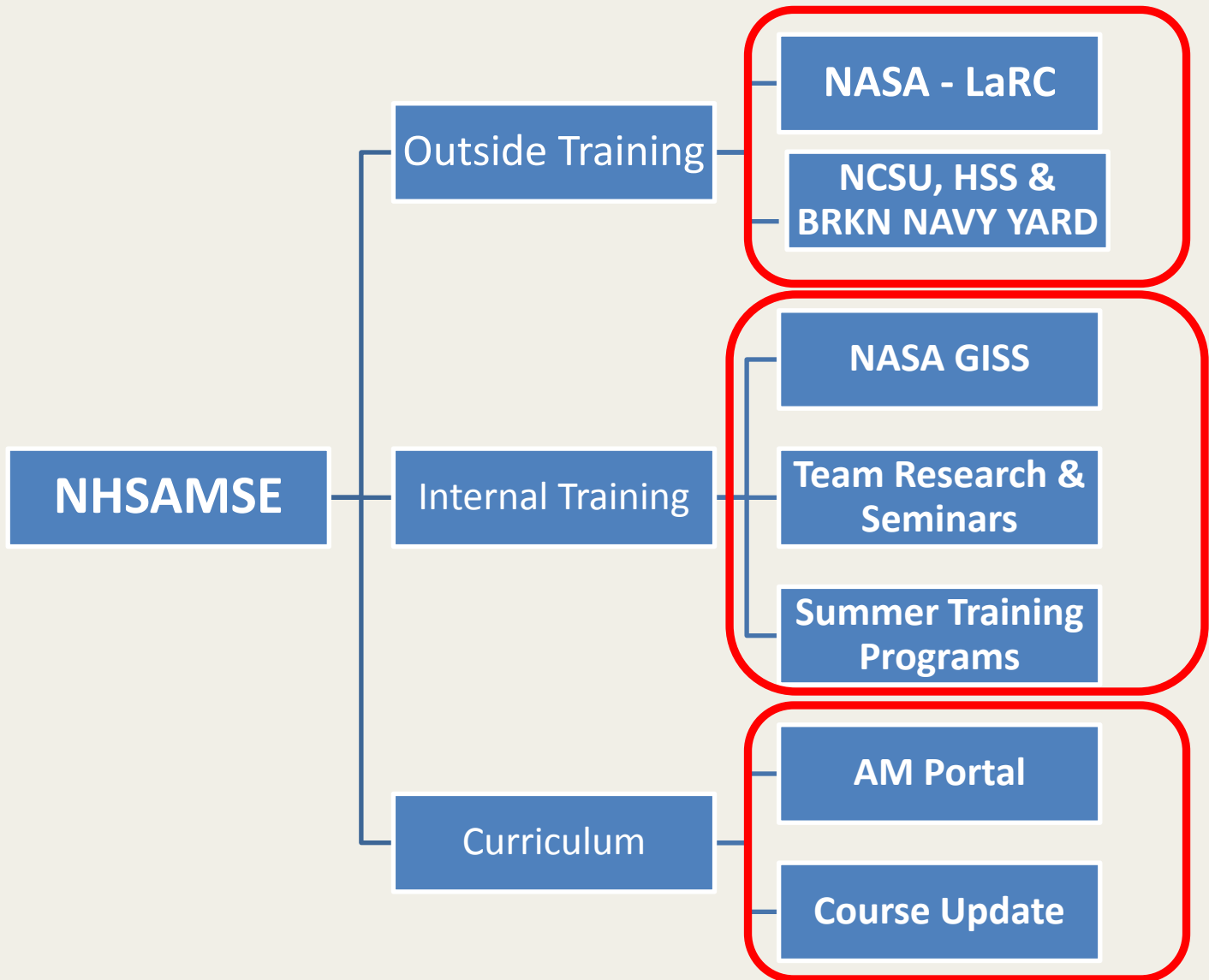
Advanced Design and Fabrication of Prosthetic and Medical Devices

- A. Improve STEM curriculum for undergraduate education**
- B. Improve the technical skills of students by providing them with real life experience in design and manufacturing**
- C. Develop and sustain partnership with the Industry and other academic institutions.**
- D. Provide opportunities for faculty and students from underrepresented groups in STEM to engage in Industry related research**

Partners and Collaborators

- A. NASA Langley Research Center (LaR, VA – Eng. Karen Taminger**
- B. NASA Goddard Institute for Space Studies, NY- Mr. Matthew Pearce**
- C. North Carolina State University (NCSU) – Dr. Ola Harrysson.**
- D. Center of Advanced Studies GC-CUNY (Dr. Deborah Hecht)**
- E. Hospital for Special Surgery (HSS)**
- G. Dr. Michael Grieves (Florida IT and Center of Advanced Manufacturing)**
- H. Jeffry Tabon (Co-founder of DDS Laboratory Corporation)**
- I. Brooklyn Navy Yard Industrial Complex**

Project Elements

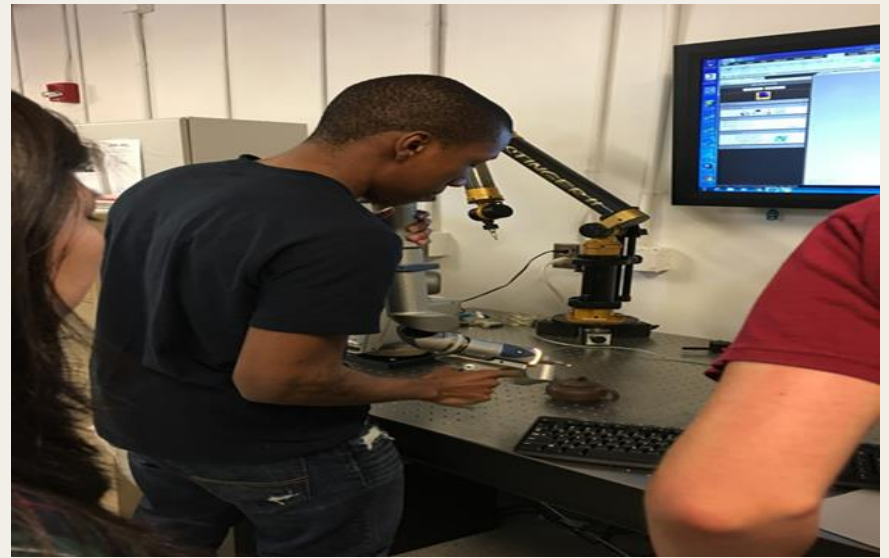


Project Based Learning

Faculty – Student Research Teams (Fall-Spring)



External Training: Internships



Faculty – Student Seminars About their Industry Experience and New Technologies







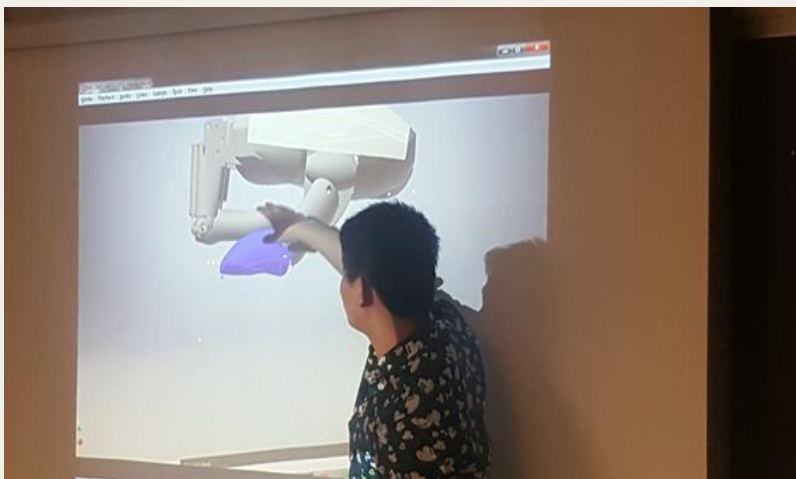
Dept. of Mechanical Engineering and
Industrial Design Technology



Center of Medical Devices and Additive Manufacturing

Additive Manufacturing-AM- (3D PRINTING) SEMINARS

Date & Time	Topic	Speakers
10/4/2018 12:45- 1:30PM Room V507	Introduction to Additive Manufacturing (AM) and Applications. NASA Summer Research Experience in NASA LaRC	 Dr. Gailani and students Giovanni and Diego
10/11/2018 12:45- 1:30PM Room V507	Some AM Technologies (SLA, SLS, and SLM) NASA Summer Research Experience in NASA GISS	 Drs. Berri, Gailani, and Brahimi
10/18/2018 12:45- 1:30PM Room V507	Design for AM & New Filament Materials with Improved Properties	 Dr. Gailani and Student Cesar Camacho
10/24/2018 12:45- 1:30PM Room V507	Lattice and Cellular Structures in AM – Applications in Industry and Aerospace NASA Summer Research Experience in North Carolina and NASA GSFC	 Drs. Xiao, Gailani, and student Joyce Tam



Seminars

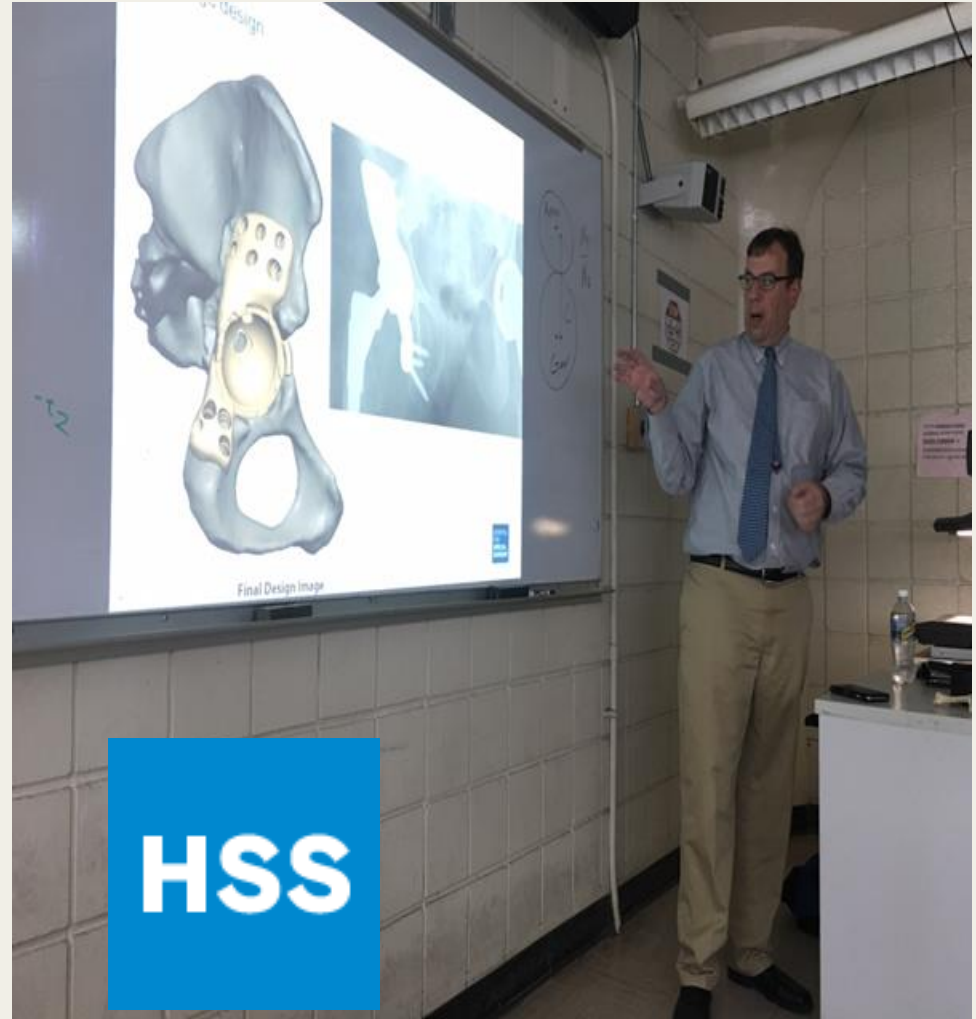


Seminars are led by invited speakers from outside City Tech as well as students and faculty

Field Visits & Invited Talks



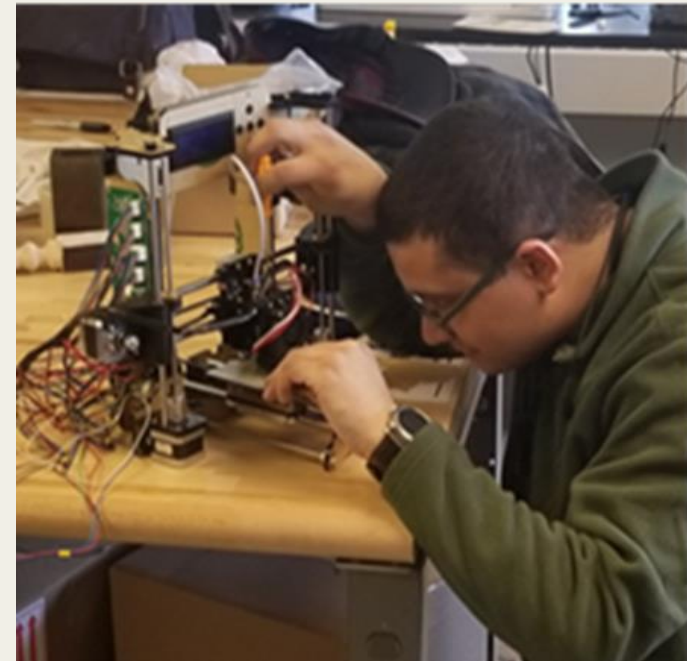
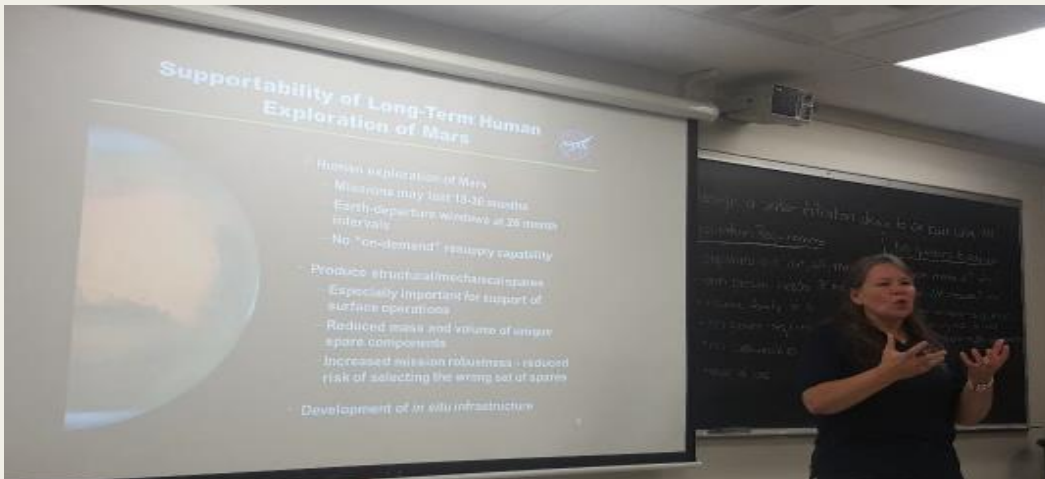
HSS



HSS

Internal Training: Summer Training Program

- Additive Manufacturing Training (2 Weeks)
- Medical Devices Training (3 Weeks)



Curriculum and Certification Training

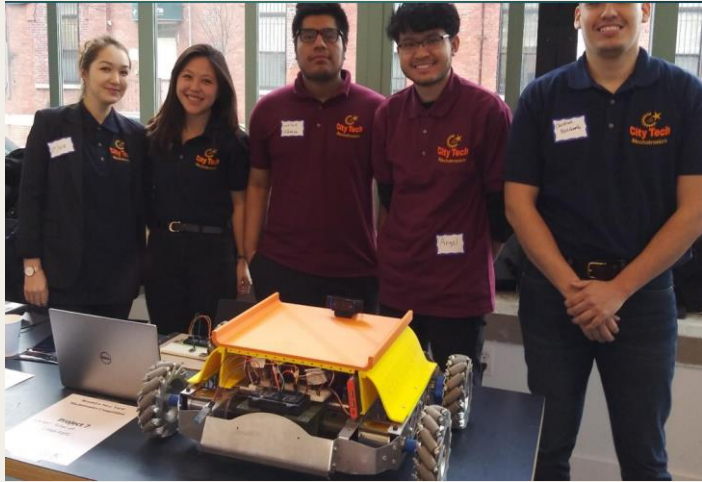
- **Updating some key courses to include latest technologies and other activities.**
- **Created two certification programs**
 - I. **CNC Certification Program (internal), 30 hours.**
 - II. **GD&T Certification Program (External), 24 – 28 hours.**

Also we encourage and motivate students to take CAD certification exams in any CAD software (Autodesk Inventor and Solidworks).

How To Build the BRIDG with the Industry

- 1. Understand the way the industry think and its strategies.**
- 2. Involve them in Event (BRING THEM IN!)**
- 3. Invite them to your college**
- 4. Take them in Lab and facility tour**
- 5. Give them some slight roles (judges,...etc) when the visit.**
- 6. Let them meet students and recruit them for internships.**

Building Bridges with Brooklyn Navy Yard (more than 100 small companies)



- Students project showcase
- Teams competition



BRING THEM IN

- Industry judges
- CEO of Bklyn Navy Yard is in
- College president is in

Channel Fox 5
Interviewing students



BIG RESULT- Everyone is Winning!

- THIRTY Students get recruited every year to work in the Navy Yard companies in summer internship.
- *All our NSF-ATE students got employed*



Feedback from some of our ATE Graduates

NSF/ATE student name	Year to graduate	Job duty	Which skill do your employer looked for?
M. Alborati	December, 2017	Full time Lead mobile development on new technologies team	Strong Mobile Background, Strong Leadership, Demonstrated Ability to deliver end to end projects, Web/Server Experience, DevOps and Agile, Understanding of OOP architecture and best practices, experience with emerging technologies
X.L. Chen	June, 2019	Full time Working as automation engineer and processing engineer.	Strong technical background. Strong team collaboration skills, and customer service experience. Setup and troubleshoot SCADA system for client, Design and control PLCs using software and hardware programming.
G. Martinez	June, 2018	Full time Develop queries in SQL, write Python scripts and quality assurance on ArcMap	Ability to perform research on its own, work with little to none supervision, ability to program in python and SQL and strong communication skills.
H. Ahmed	2020	Summer full time Tested software and reported SW and HW issues, provided customer service, ensured safety, etc	Linux, typing, technical background (sensors, Robotics ...), strong communication skills, customer service, clean driving record, demonstrated team work

Recommendations for NSF-ATE

To give Priority to proposals that:

- a. Involves industry partner**
- b. Provide some sort of incentives to industry partners**
- c. Encourage certification training and new courses focusing on industry skills**

Dissemination

www.citycmdam.com

<https://ate.is/cmdam>

<https://openlab.citytech.cuny.edu/cmdam/>



<https://www.youtube.com/watch?v=aeuZfZF-zW8&t=182s>

Acknowledgement

- *NSF-ATE 1601522*
- *NASA-MOO-NNH14ZHA001N-*

Thank you for your Attention