

# Engaging CS Undergraduates through Inclusive Mentorship

*Joint work with: Heather Pon-Barry (Computer Science) &  
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Computer Science  
Mount Holyoke College

UMass NEXT Summit  
June 29, 2021

Develop an app...



Develop an app...

To do what?



Using which  
framework?

Develop a program...

To do what?

Using which  
framework?



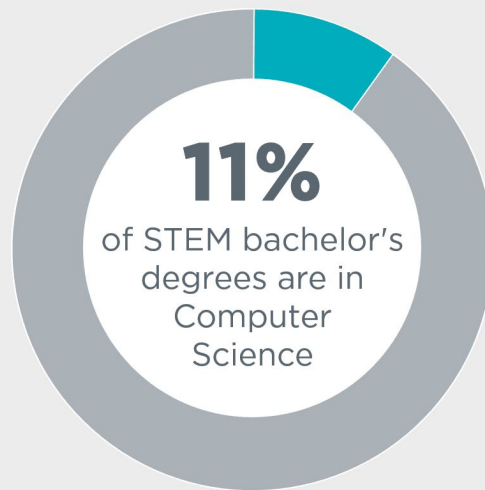
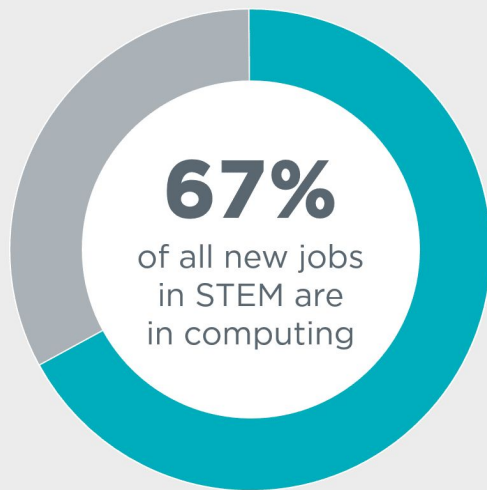
Develop a program...

To do what?



# Workforce Challenge

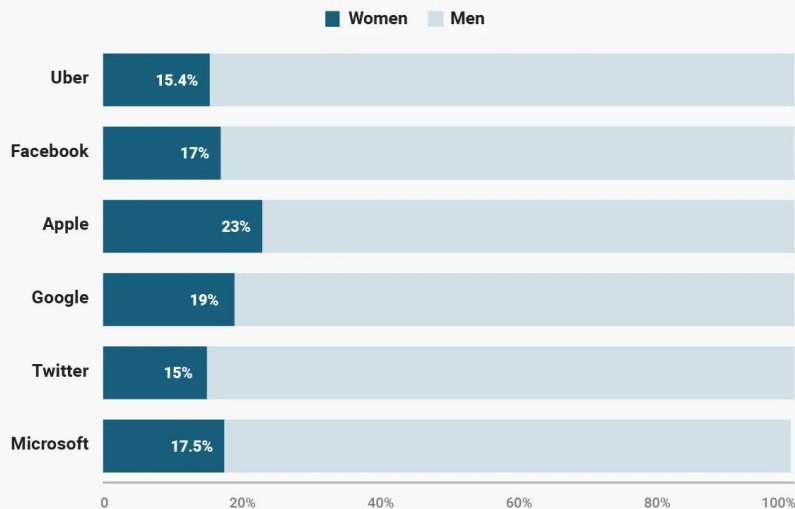
## The “STEM” problem is in computer science



Infographic from [code.org](https://code.org)

# Representation Challenge

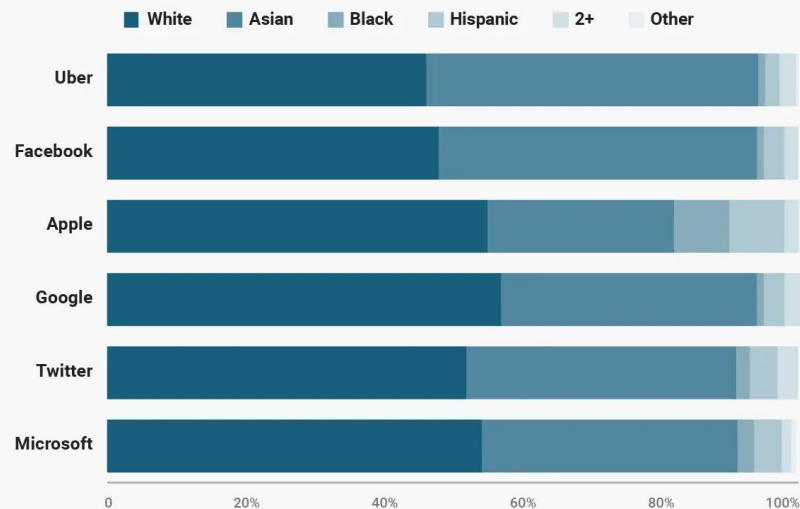
PERCENTAGE OF TECH ROLES, BY GENDER



SOURCE: Company data

BUSINESS INSIDER

PERCENTAGE OF TECH ROLES, BY RACE

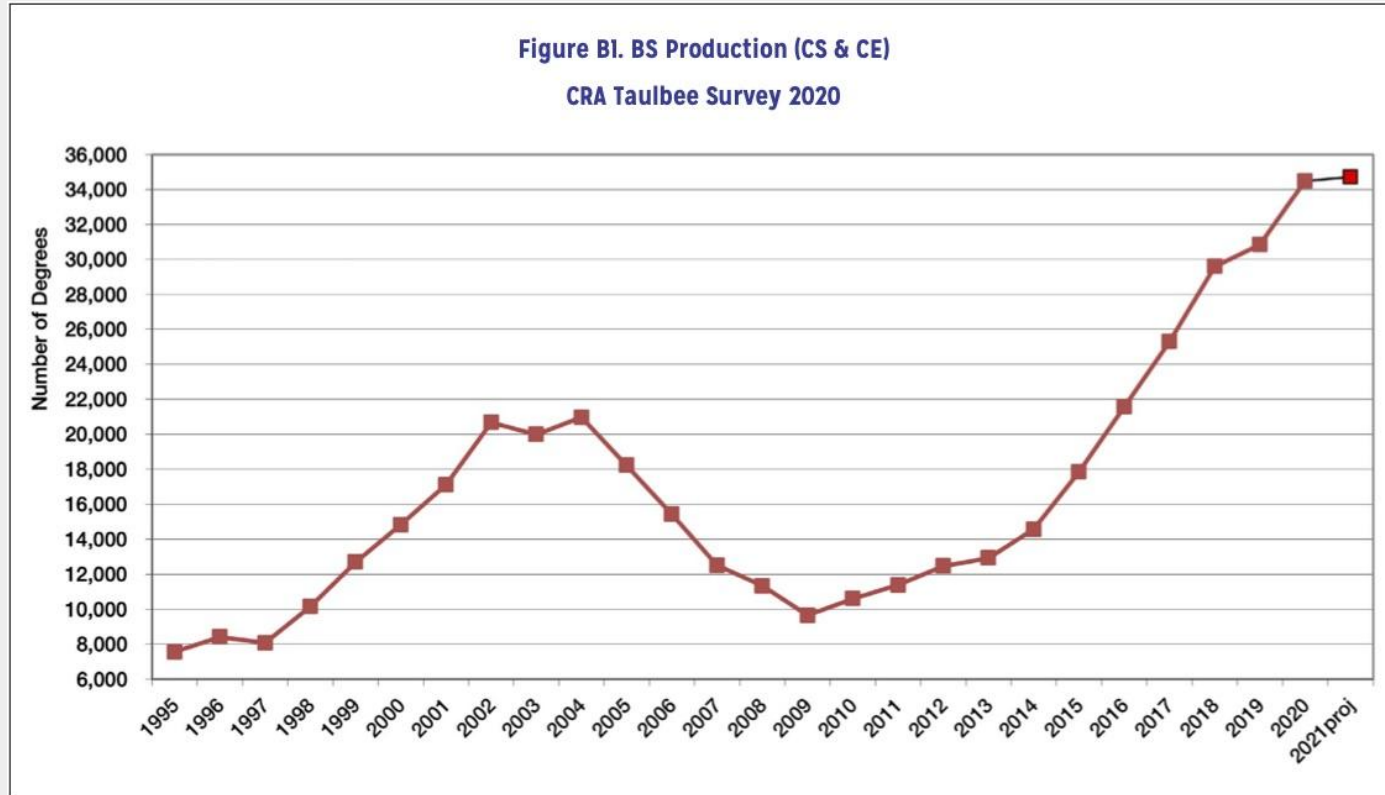


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BUSINESS INSIDER

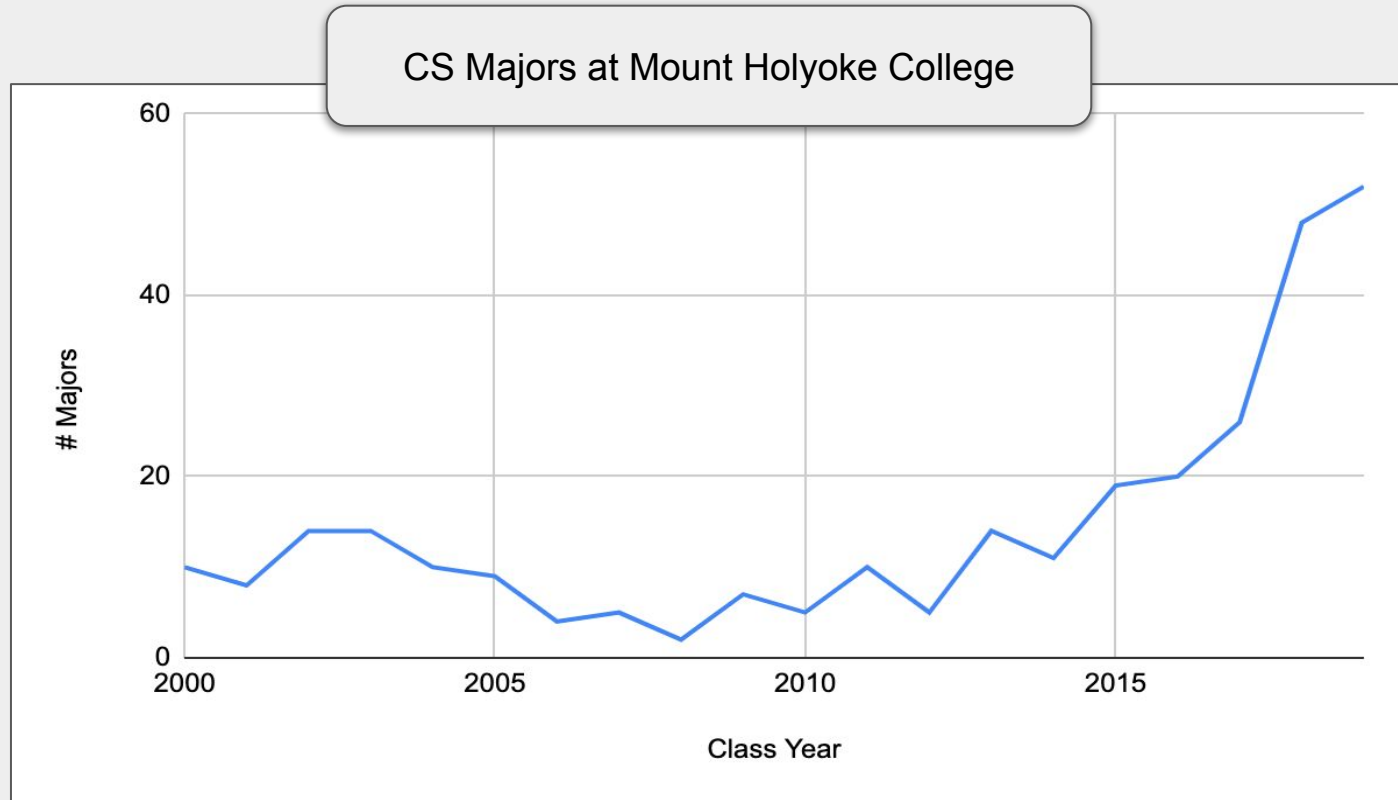
Infographics from Business Insider, 2017.  
Only binary gender data reported.

# Capacity Challenge

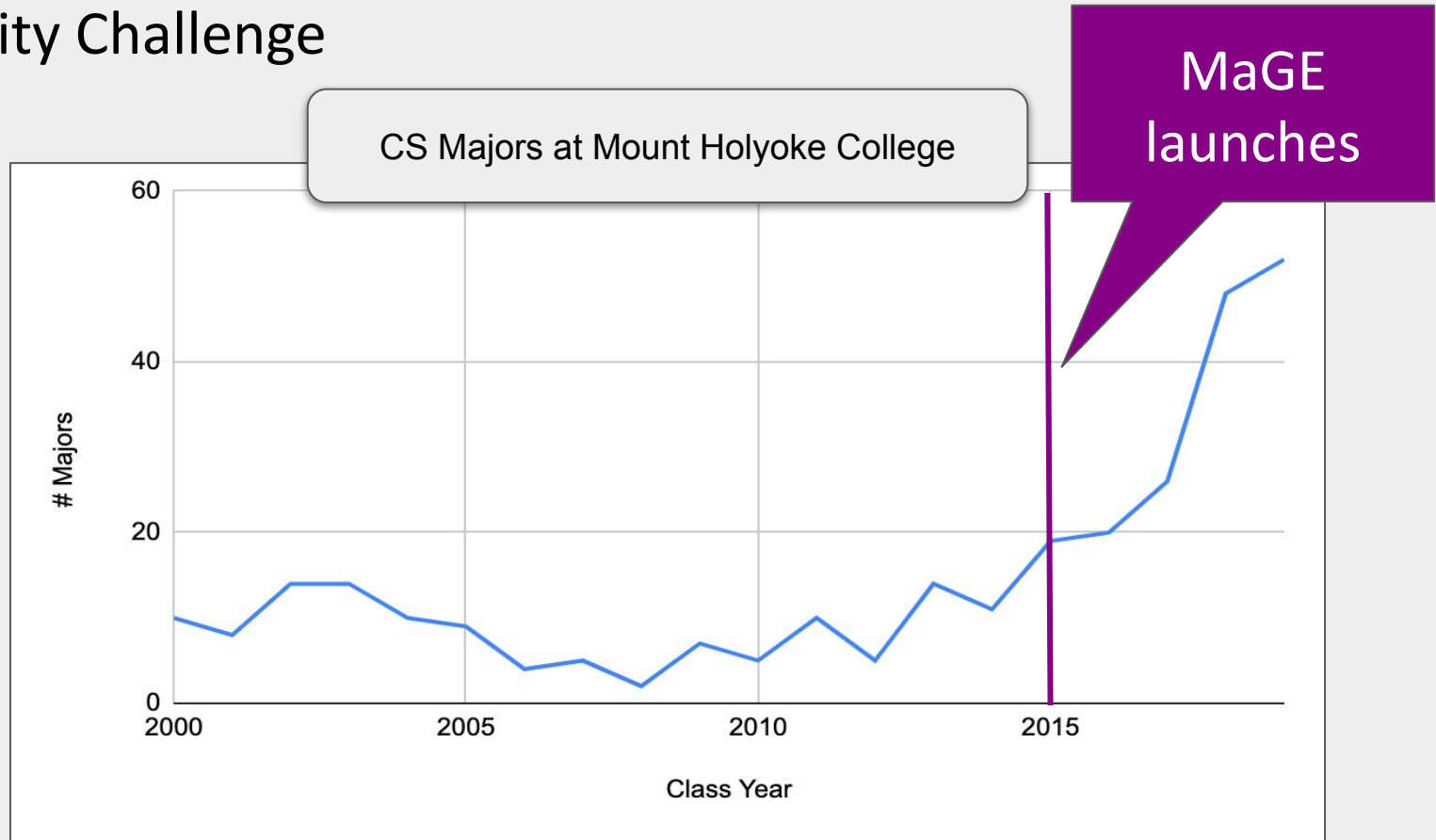




# Capacity Challenge



# Capacity Challenge



# Mentoring programs

To do what?



# Mentoring programs

engage and  
support CS  
undergrads

To do what?



# Mentoring programs

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To do what?

Using which  
framework?



# Mentoring programs

To do what?

engage and  
support CS  
undergrads

socio-cognitive  
(effective  
pedagogy)

Using which  
framework?



# Why use a socio-cognitive framework?

Can I do it?

Will I do it?



## Our curriculum: a glimpse

Can I do it?





Our curriculum: a glimpse



Can I do it?



Self - efficacy

Our curriculum: a glimpse



Can I do it?

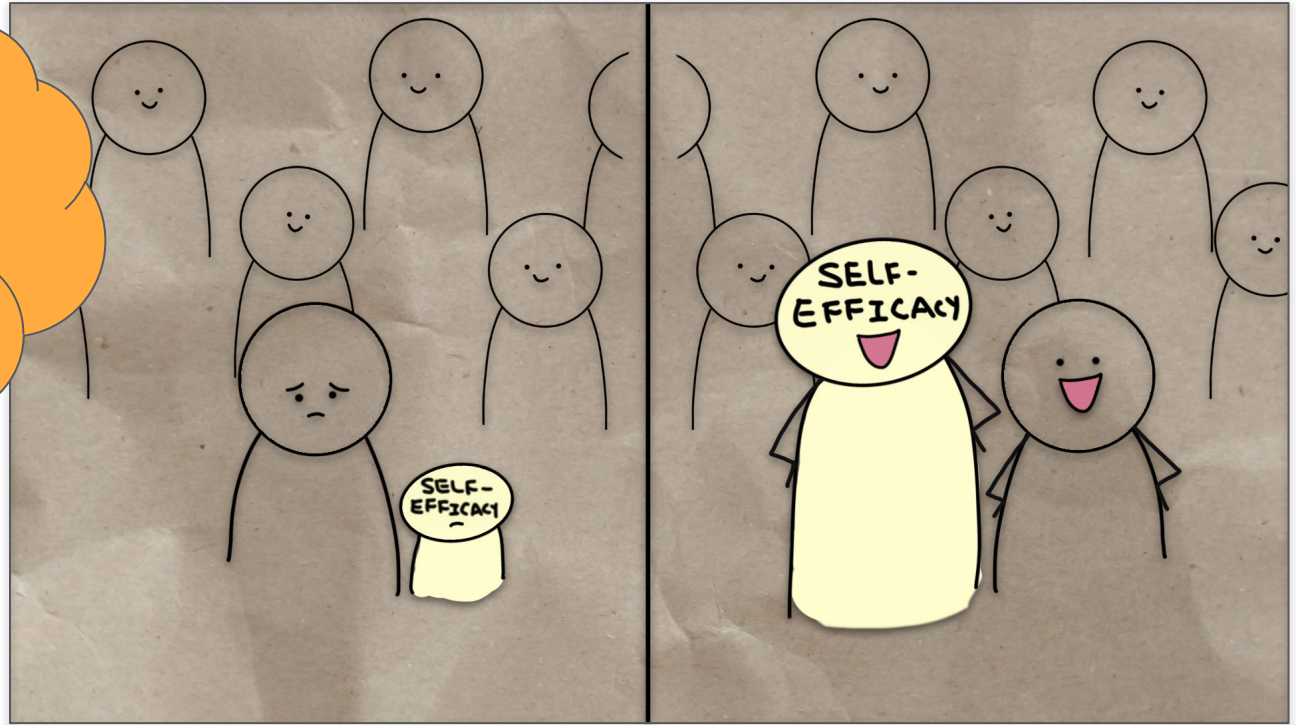
# Self - efficacy

the belief in your own ability  
to succeed in a particular  
task, subject, or area.

Bandura, A. (1997). Self-efficacy: The exercise of control.

## Our curriculum: a glimpse

Can I do it?



## Our curriculum: a glimpse

Can I do it?



## Our curriculum: a glimpse

Can I do it?





# Why use a socio-cognitive framework?

Can I do it?

Will I do it?



# Why use a socio-cognitive framework?



Our curriculum: a glimpse

Sense of belonging

Will I do it?



Our curriculum: a glimpse

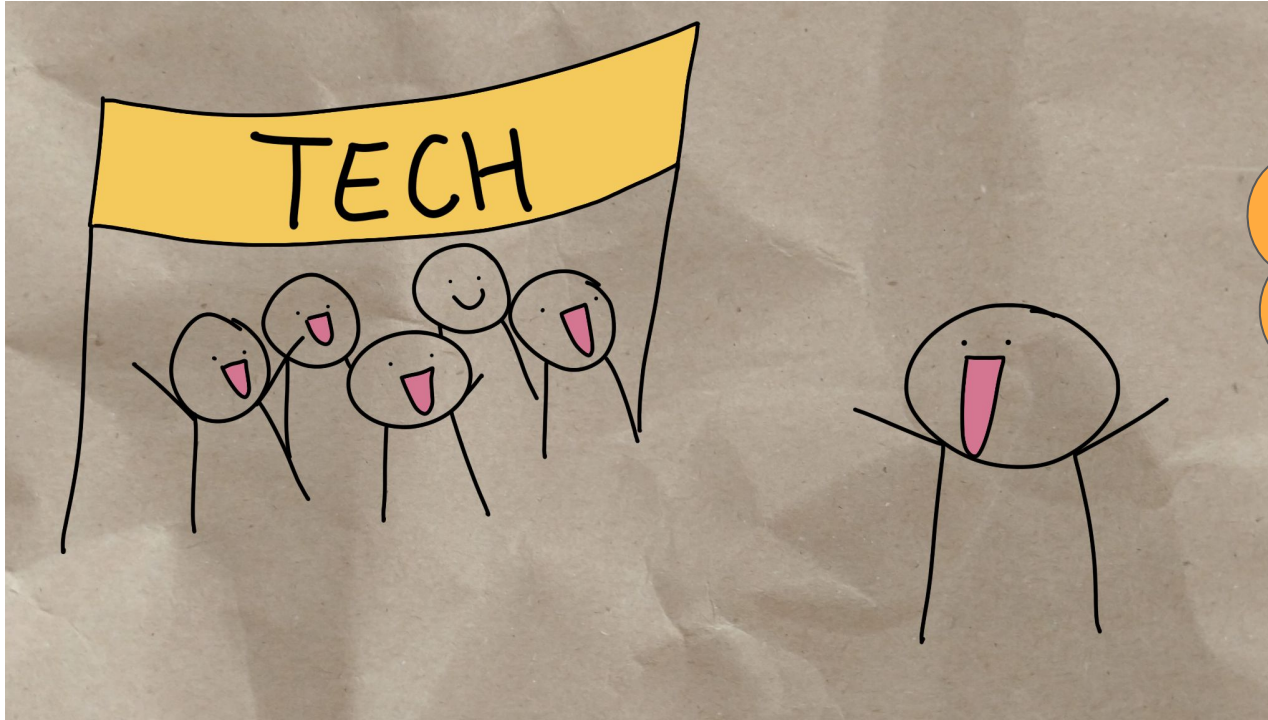
# Sense of belonging

Feeling of whether you are  
being respected and valued.



Will I do it?

## Our curriculum: a glimpse

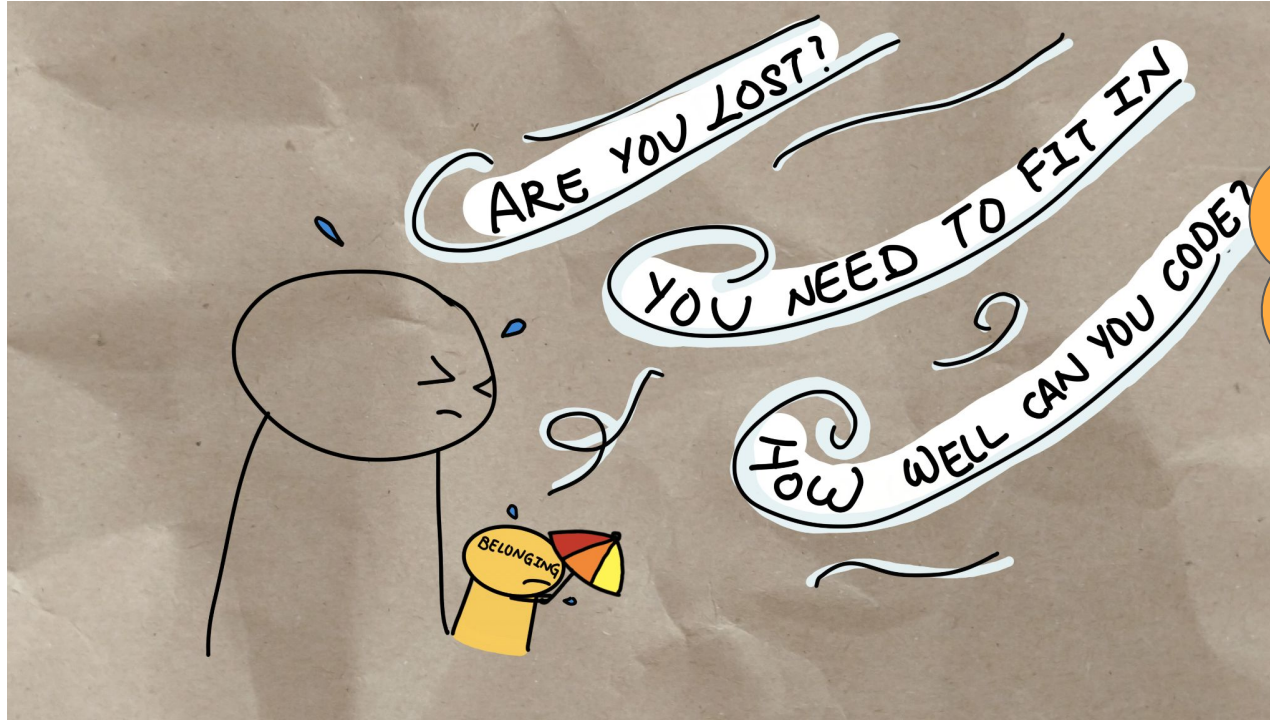


## Our curriculum: a glimpse



Will I do it?

## Our curriculum: a glimpse



Will I do it?



## Our curriculum: a glimpse



Will I do it?

# Curriculum: socio-cognitive framework + strategies

Can I do it?

Self-efficacy  
Mindset  
Self-regulated learning  
Cognitive flexibility

Will I do it?

Belongingness  
Active listening  
Emotional intelligence  
Effective feedback





# MaGE: academic peer mentorship

# MaGE: Megas and Gigas Educate - peer mentorship

- Launch: summer 2015
- Funded by a Google Capacity Award (3 years)
- Academic peer mentoring pathway

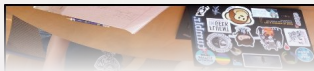
Prerequisite:  
take CS1 or CS2



MaGE Training



Mentor CS 1 or  
CS 2 learners





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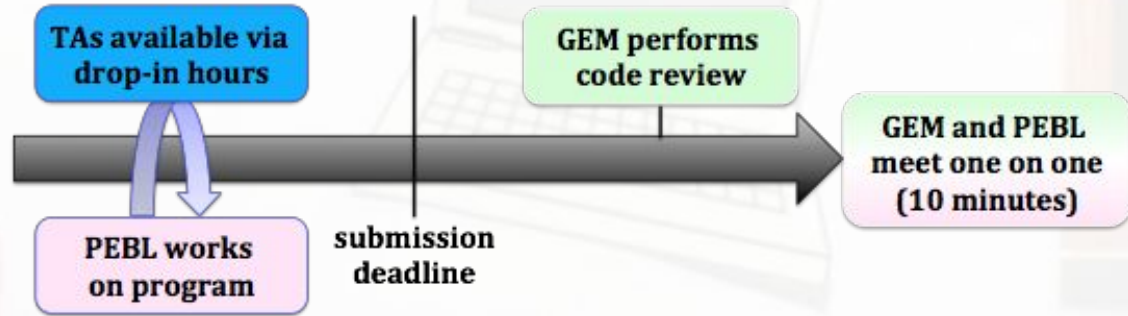
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socio-cognitive  
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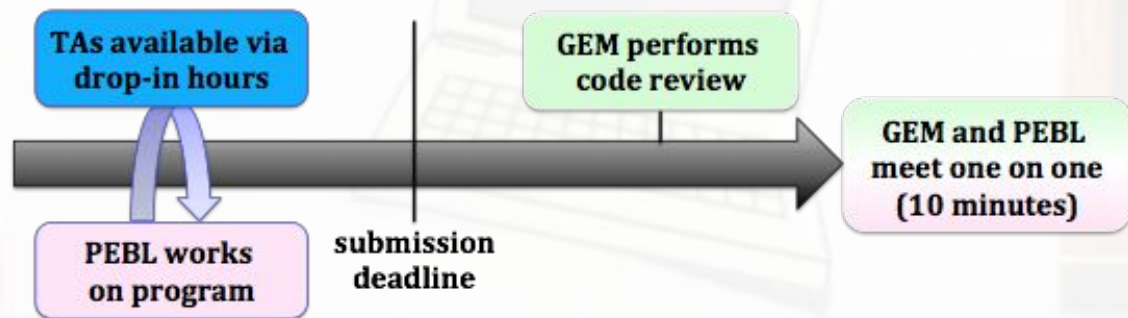


# Peer mentor (GEM) responsibilities



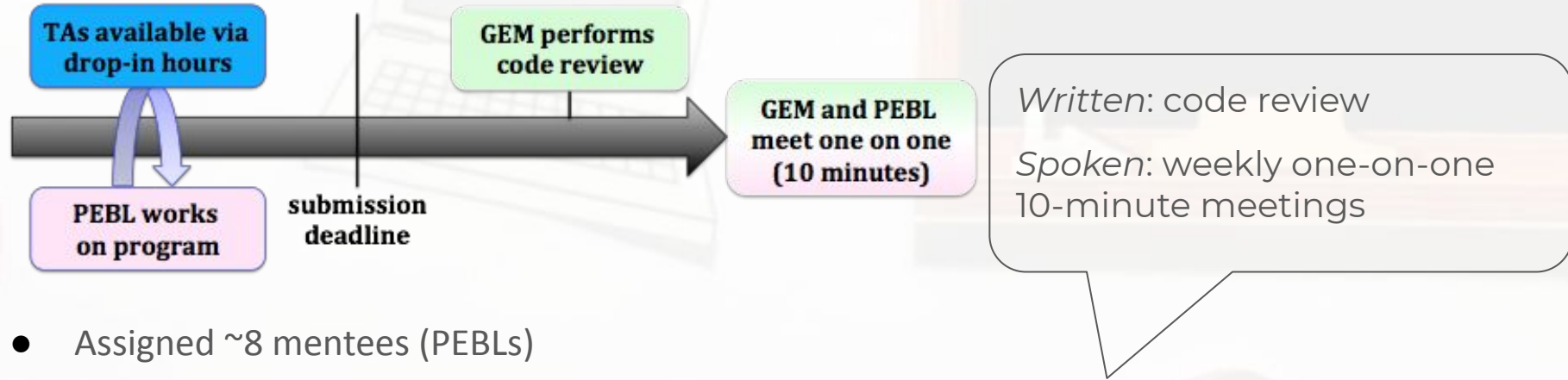
- Assigned ~8 mentees (PEBLs)

# Peer mentor (GEM) responsibilities



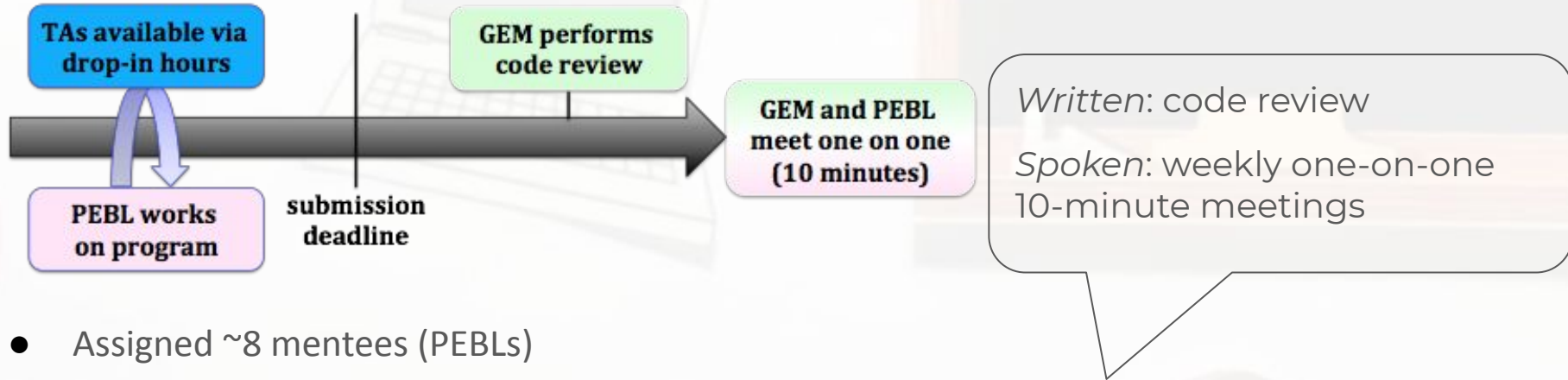
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- **Provide feedback** on *submitted assignments*

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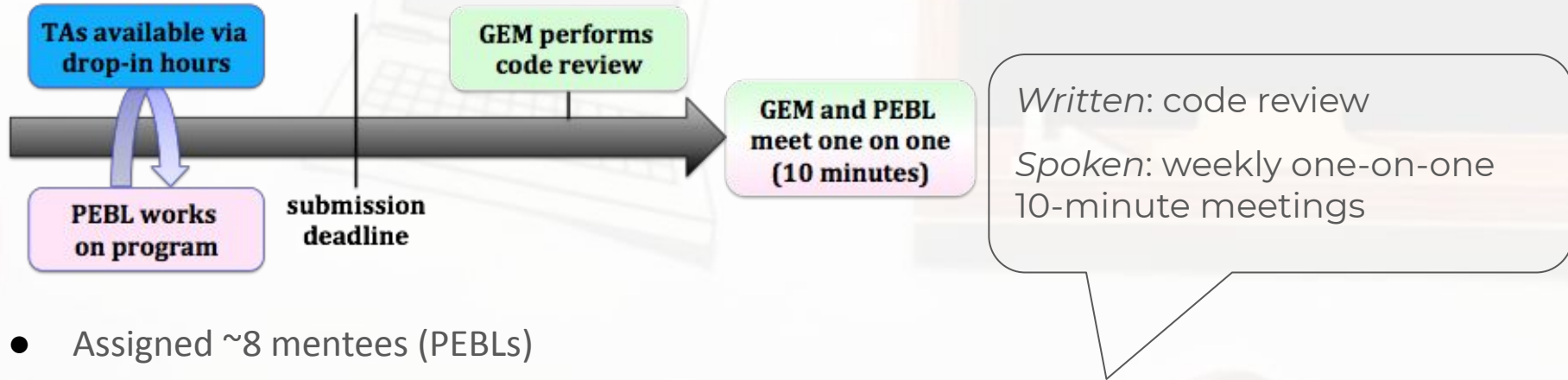
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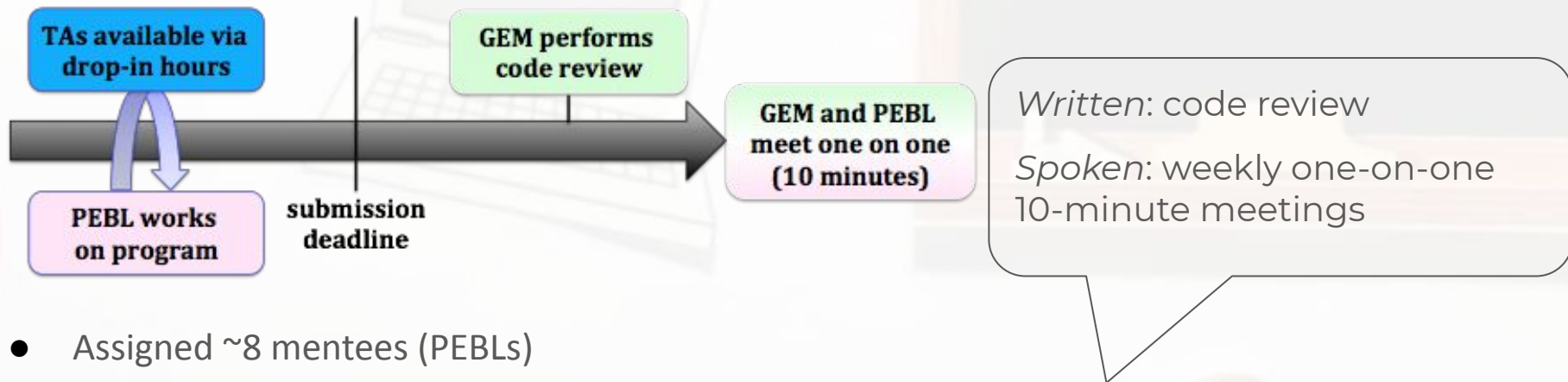
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- **Lead active learning lessons (1 hour)**

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# Peer mentor (GEM) responsibilities



- Assigned ~8 mentees (PEBLs)
- Provide feedback on *submitted assignments*
- Lead active learning lessons (1 hour)
- Assist in lab (2 hours)
- Meet weekly as a cohort (1 hour)

# Impact

**72** mentors → **532** mentees

## Mentees

- Increased retention (**20-30%**)
- Increased sense of belonging



# Impact

72 mentors → 532 mentees

## Mentees

- Increased retention (**20-30%**)
- Increased sense of belonging

*“My [mentor] played a major role in me **staying with CS** and having someone else **believe in you** is one of the **greatest motivations** one can have. I hope that I will be able to be that role model for someone else in the future.”*

~ Mentee

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- Increased self-efficacy (learning, teaching, technical)
- Transferable skills (communication, leadership, code review)

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*“MaGE training has given me a different perspective on my learning habits, and a new **vocabulary** to describe them.”*

~ MaGE mentor

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## Instructors

- Reduced workload
- Professional growth as teachers/mentors

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*“The MaGE training course had a **profound impact** on me, my relationships with my colleagues and students, and my teaching style.”*

~ MaGE training instructor

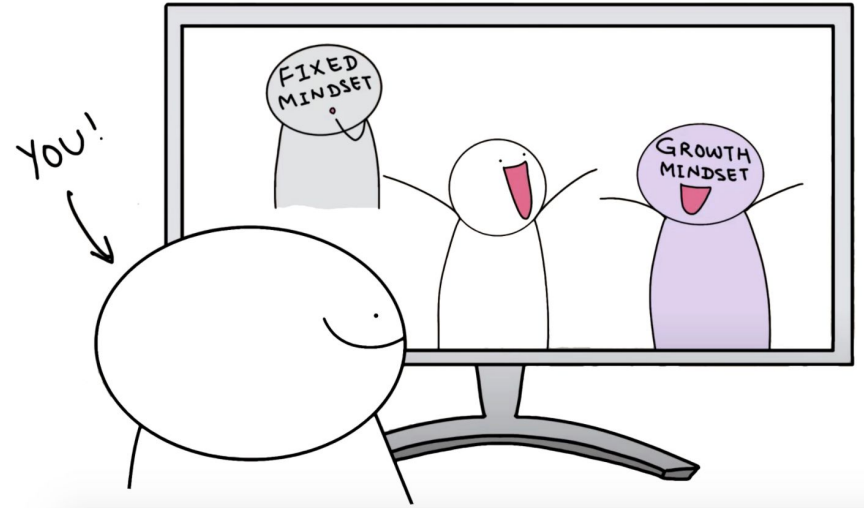
# Tech Resilience Program: industry-led mentorship



# Tech Resilience Program

- Launch: summer 2020
- Partnership with Microsoft
- Complement academic experience
- Discussions + activities relevant to tech journey

**How can you build your tech resilience?**

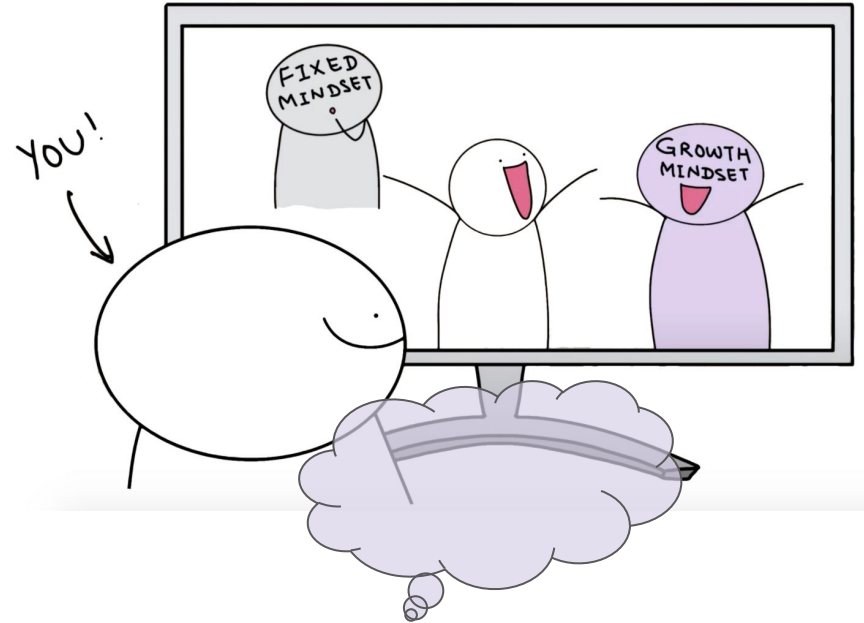


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socio-cognitive  
(effective  
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## How can you build your tech resilience?





# Impact

- Microsoft pilot
- Summer 2020 - Spring 2021

~1300  
Students

75%  
PoC

39%  
1<sup>st</sup> generation

52%  
Female

188  
MSFT Employees

↑ 276%  
Increase in employee  
engagement from  
Fall to Spring

98%  
Learned valuable skills to  
help with school and life

98%  
Students would  
recommend to a friend

190+  
Colleges/Universities



Stanford SOCIAL  
INNOVATION Review  
*Informing and inspiring leaders of social change*

# Impact

*"I was able to walk away ... with a community... to realize that despite all the obstacles, there IS a space for me in the field of CS and it is a field I belong in despite my feelings of alienation from the 'CS culture'. **The field of CS seems so much more inviting now.**"*

- Mentee from 2020-2021 pilot

~1300

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Corporate Social  
Responsibility

10

Co

WORLD  
CHANGING  
IDEAS

StanfordSOCIAL  
INNOVATION<sup>Review</sup>  
Informing and inspiring leaders of social change

# Impact

- Microsoft pilot
- Summer 2020 - Spring 2021
- Mentors underwent ~10 hours of training

~1300  
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# Impact

*"This is the highlight of my career at Microsoft so far... I now, as a white male better understand how to create a **culture of belongingness** for everyone..."*

*I've learned far more than I ever thought possible!"*  
-Microsoft mentor

~1300

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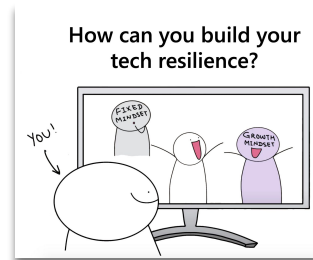
Co

WORLD CHANGING  
IDEAS

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# Resources

- [MaGE Academic Peer Mentorship](#)
- [Educator Toolkit for Preparing Peer Mentors](#)
- [Tech Resilience](#) Mentoring Toolkit
  - [Mentor Guide](#)
  - [Mentee slides](#)
  - [Video pack](#)



# Acknowledgements

- Barbara Dalton Rotundo, Student Learning Initiatives Manager, Computer Science Department at Mount Holyoke College
- Dr. Chris Stephenson, Head of Computer Science Education Strategy at Google
- Margaret Price, Principal, Strategist, Microsoft