Engaging CS Undergraduates through Inclusive Mentorship

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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

- **67%** of all new jobs in STEM are in computing
- **11%** of STEM bachelor’s degrees are in Computer Science

Infographic from code.org
Representation Challenge

**PERCENTAGE OF TECH ROLES, BY GENDER**

- Uber: 15.4% Women, 84.6% Men
- Facebook: 17% Women, 83% Men
- Apple: 23% Women, 77% Men
- Google: 19% Women, 81% Men
- Twitter: 15% Women, 85% Men
- Microsoft: 17.5% Women, 82.5% Men

**PERCENTAGE OF TECH ROLES, BY RACE**

- Uber: 80% White, 10% Asian, 0% Black, 2% Hispanic, 2% Other
- Facebook: 75% White, 15% Asian, 5% Black, 2% Hispanic, 3% Other
- Apple: 75% White, 15% Asian, 5% Black, 2% Hispanic, 3% Other
- Google: 70% White, 15% Asian, 5% Black, 10% Hispanic, 0% Other
- Twitter: 70% White, 20% Asian, 5% Black, 5% Hispanic, 0% Other
- Microsoft: 70% White, 15% Asian, 5% Black, 5% Hispanic, 5% Other

*SOURCE: Company data*
Capacity Challenge
Capacity Challenge

CS Majors at Mount Holyoke College
Capacity Challenge

CS Majors at Mount Holyoke College

MaGE launches
Mentoring programs

To do what?
Mentoring programs

engage and support CS undergrads

To do what?
Mentoring programs

To do what?

engage and support CS undergrads

Using which framework?
Mentoring programs

- engage and support CS undergrads
- socio-cognitive (effective pedagogy)

To do what?  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.

Our curriculum: a glimpse

Can I do it?
Our curriculum: a glimpse

Can I do it?
Our curriculum: a glimpse

Can I do it?

I can do it!!
Why use a socio-cognitive framework?

Can I do it?

Will I do it?
Why use a socio-cognitive framework?

Will I do it?
Sense of belonging

Our curriculum: a glimpse

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

Will I do it?
Our curriculum: a glimpse

- Are you lost?
- You need to fit in
- How well can you code?
- Will I do it?
Our curriculum: a glimpse

ARE YOU LOST?
YOU NEED TO FIT IN
HOW WELL CAN YOU CODE?

Will I do it?
Our curriculum: a glimpse
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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socio-cognitive (effective pedagogy)
Peer mentor (GEM) responsibilities

- Assigned ~8 mentees (PEBLs)
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- **Provide feedback** on *submitted assignments*
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- Provide feedback on submitted assignments

**Written:** code review
**Spoken:** weekly one-on-one 10-minute meetings
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- Lead active learning lessons (1 hour)

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- Assist in lab (2 hours)

*Written:* code review
*Spoken:* weekly one-on-one 10-minute meetings
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)

**Written:** code review

**Spoken:** weekly one-on-one 10-minute meetings
Impact

72 mentors → 532 mentees

Mentees

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

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“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
Impact

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Mentors

- 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
Impact

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Instructors
- Reduced workload
- Professional growth as teachers/mentors
Impact

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Instructors
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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 pedagogy)

How can you build your tech resilience?
Impact

- Microsoft pilot
- Summer 2020 - Spring 2021

- ~1300 Students
- 75% PoC
- 39% 1st 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
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
Impact

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

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- 52% Female
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“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
Resources

- **MaGE Academic Peer Mentorship**
- **Educator Toolkit for Preparing Peer Mentors**
- **Tech Resilience** Mentoring Toolkit
  - **Mentor Guide**
  - **Mentee slides**
  - **Video pack**

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