



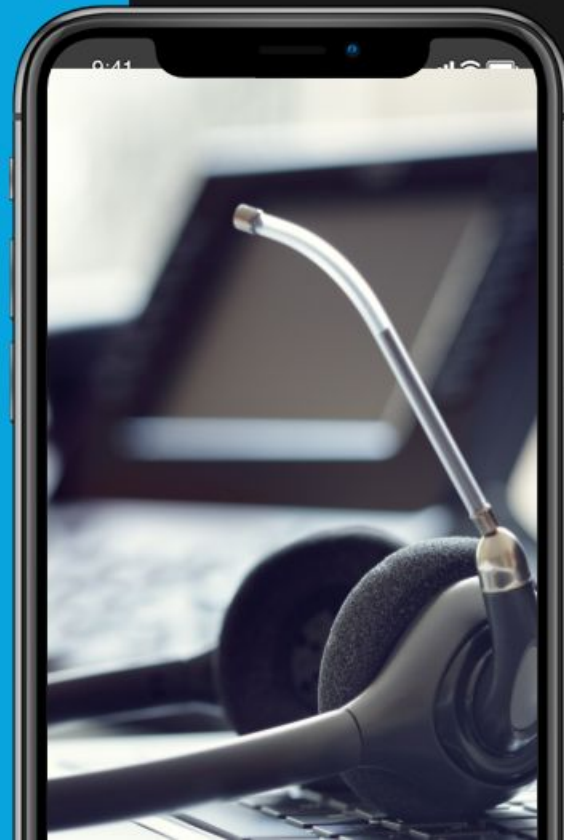
MINNESOTA TECHNOLOGY ASSOCIATION

WELCOME!

LET'S GET TO WORK: INCREASING CS EDUCATION

& PARTNERING WITH INDUSTRY

→ Powered by the MnTech Tech
Talent Community



FUELING THE SUCCESS OF MINNESOTA'S TECHNOLOGY
ECOSYSTEM SINCE 1982

FOUNDATIONAL PILLARS

mntech.



ADVOCACY

Advocating for smart public policies and the people and companies fueling innovation in Minnesota.



TALENT

Developing the skilled workforce tech-driven companies need for continued business success.



COMMUNITY

Creating opportunities for business and technology professionals to engage in meaningful ways.





TECH TALENT

brings our technology ecosystem together to tackle some of our most critical regional challenges. We gather to generate innovative strategies to close the talent gap and create a more diverse and inclusive tech workforce here in Minnesota.

6-8 gatherings per year

Online engagement and resources

Connect and learn with peers and the broader tech ecosystem

TECH TALENT STEERING TEAM

mntech.

- **Jake Krings**, Target
- **Katherine Garvey**, Medtronic
- **Kevin Boeckenstedt**
- **Andrea Wilson Vazquez**, Code Savvy
- **Hillary Spreizer**, The Latitude Group
- **Meaghan Kirk**, C.H. Robinson
- **Rob Bentz**, Dunwoody College of Technology
- **Erin Olson**, Real Time Talent



Welcome!



Sarah Carter

+



Andrea Wilson Vazquez
Cassie Scharber

Goal

Share Minnesota's computer science education context and opportunities in order to identify points of connection and partnership between K12 education and industry.

CS for What?



Diverse Visions of Computer Science Education in Practice

Rafi Santo, Sara Vogel
& Dixie Ching

CsforALL

What is Computer Science?

Computer science (CS) is fundamental to our society, from the algorithms that determine social media feeds to the technology powering our elections.

Computer science is defined as "the study of computers and algorithmic processes, including their principles, their hardware and software designs, their [implementation], and their impact on society" (Tucker et. al, 2003, p. 6).

CS Visions Values & Impact Areas



Personal Agency, Joy
& Fulfillment



Economic & Workforce
Development



Competencies & Literacies



School Reform &
Improvement



Equity & Social
Justice



Technological, Social &
Scientific Innovation



Citizenship & Civic
Engagement

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Personal Agency, Joy
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Technological, Social &
Scientific Innovation



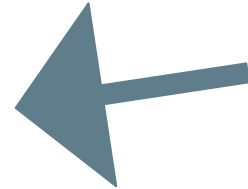
Citizenship & Civic
Engagement

Which areas resonate?
(identify top 2)

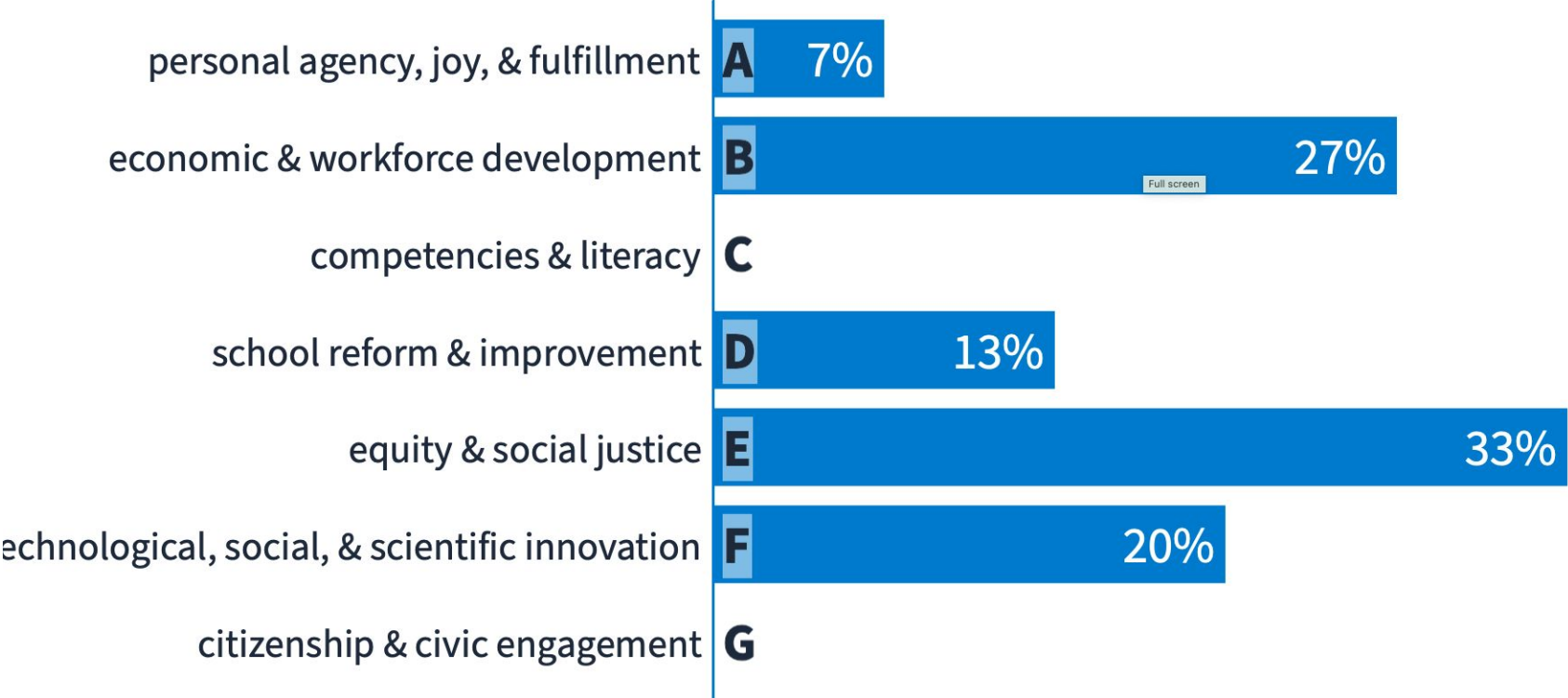
Web:

[PollEv.com/cassiescharb053](https://poll-ev.com/cassiescharb053)

Text [CASSIESCHARB053](https://poll-ev.com/cassiescharb053) to [37607](https://poll-ev.com/cassiescharb053)
to join the poll, then text A,B,C

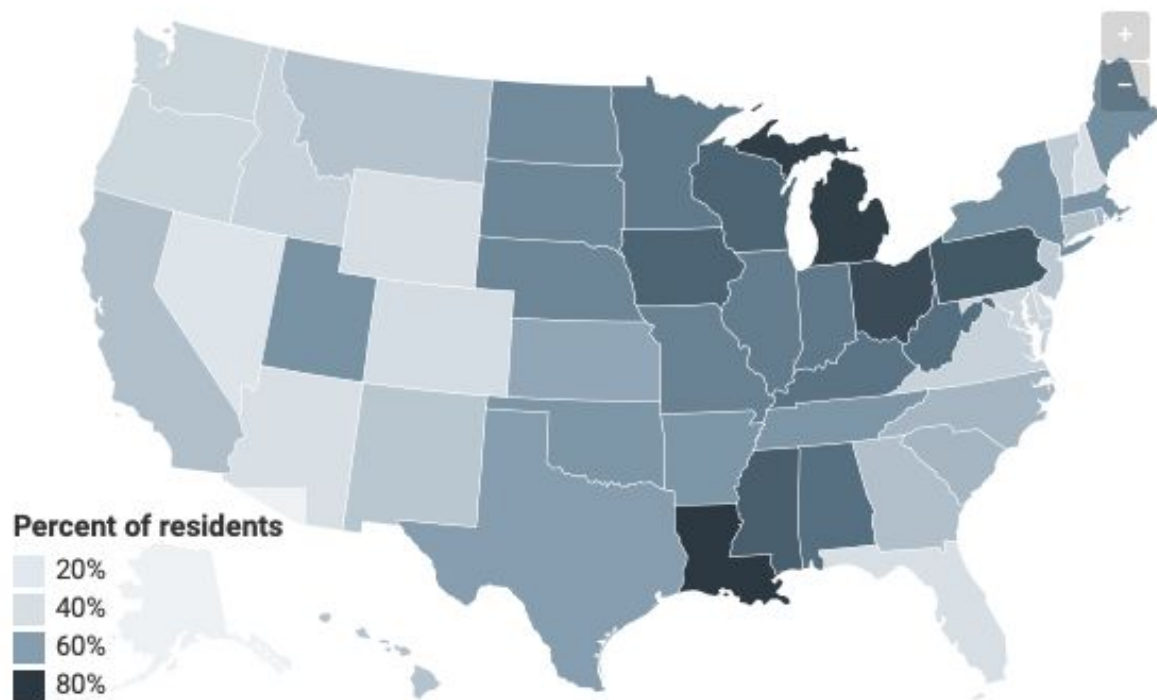


Why is computer science education important? (select top 2 areas)



Percent of residents living in their birth state

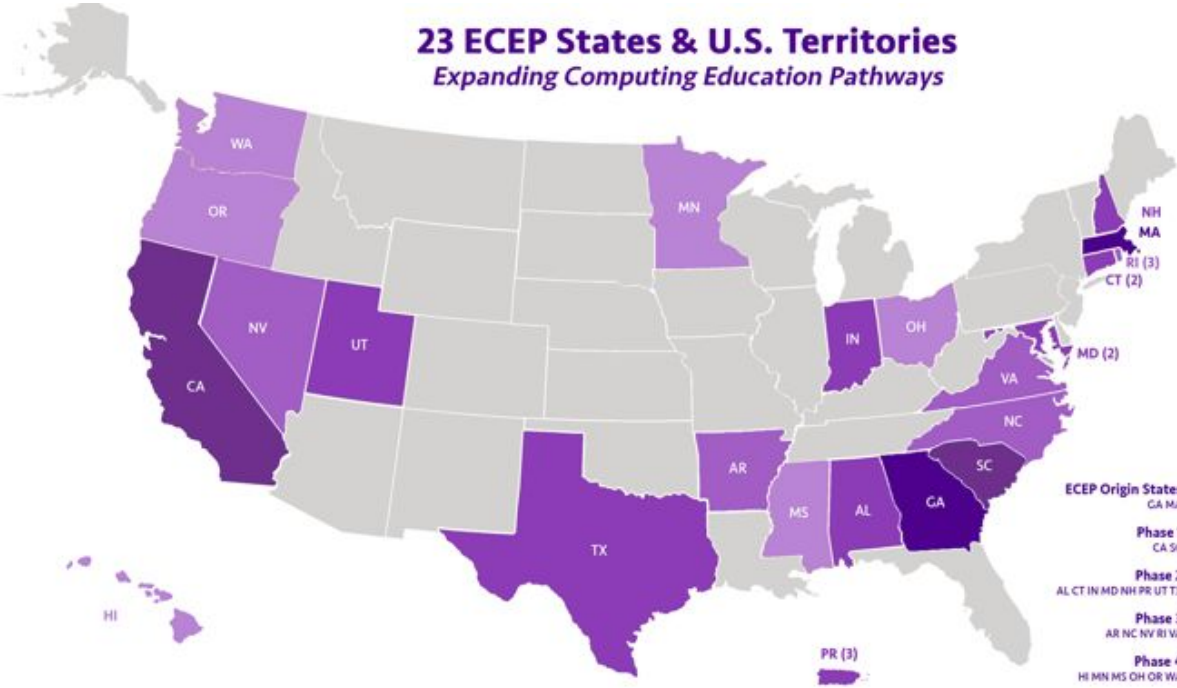
An estimated 68 percent of people living in Minnesota were born in Minnesota, marking the 12th highest in the country. In Louisiana, an estimated 78 percent of current residents were born in the state, which is the highest in U.S.



Map: Austen Macalus, University of Minnesota/Star Tribune

• Source: U.S. Census Bureau, American Community Survey • [Get the data](#)

Minnesota has joined 23 other states and territories in seeking to increase the *number* and *diversity* of K-16 students with access to computer science through the national Expanding Computing Education Pathways Alliance (ECEP).



 [@CSforAllMN](https://twitter.com/CSforAllMN)

<https://csforallmn.org>



Where do you
live/work?

Where are your
MN connections?

Poll:

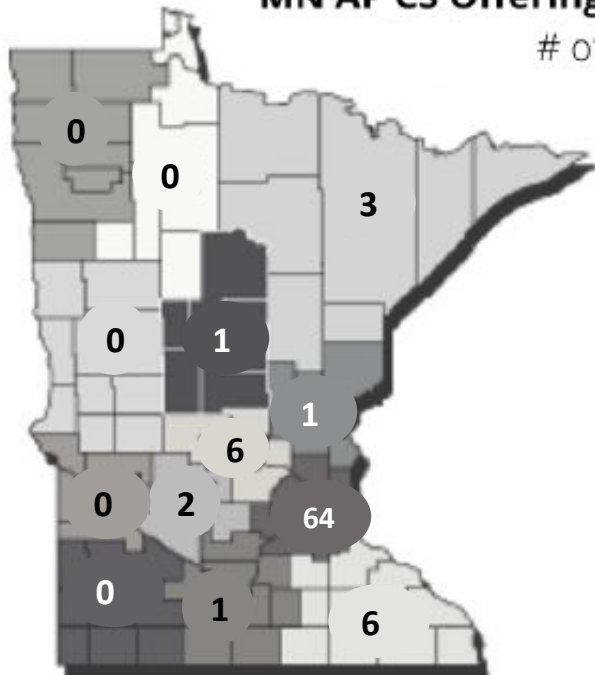
bit.ly/techtalentmap





MN AP CS Offerings (2020)

of Schools



Access: Where is AP CS taught?

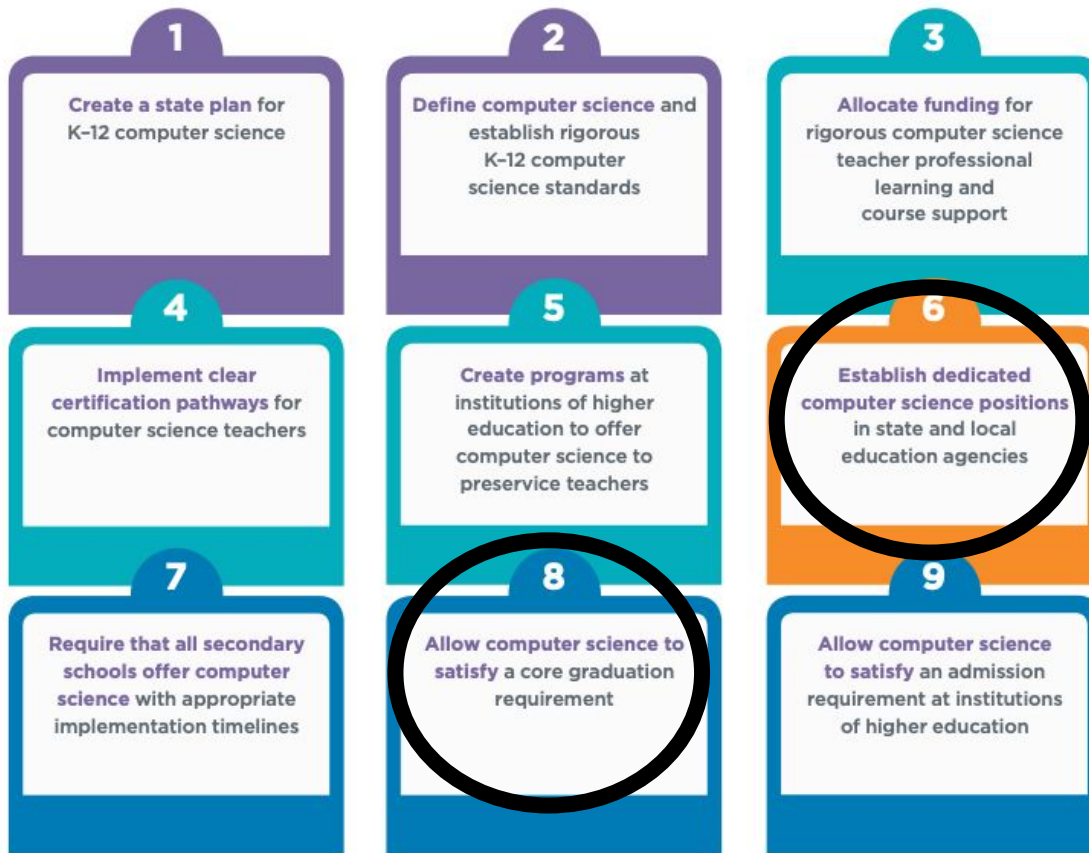
About 1 in 5 Minnesota high schools offer either or both AP CSP and CSA.² Geographically, the number of high schools offering AP CS courses varies by the economic development regions with more students having access to an AP CS course in the Twin Cities metropolitan area (region 11) and no students having access in regions 1, 2, 4, 6W, and 8.

1 in 5



Minnesota high schools offer AP CS

4 Briefs (so far) on K12 MN CSEd: <https://csforallmn.org/reports/>



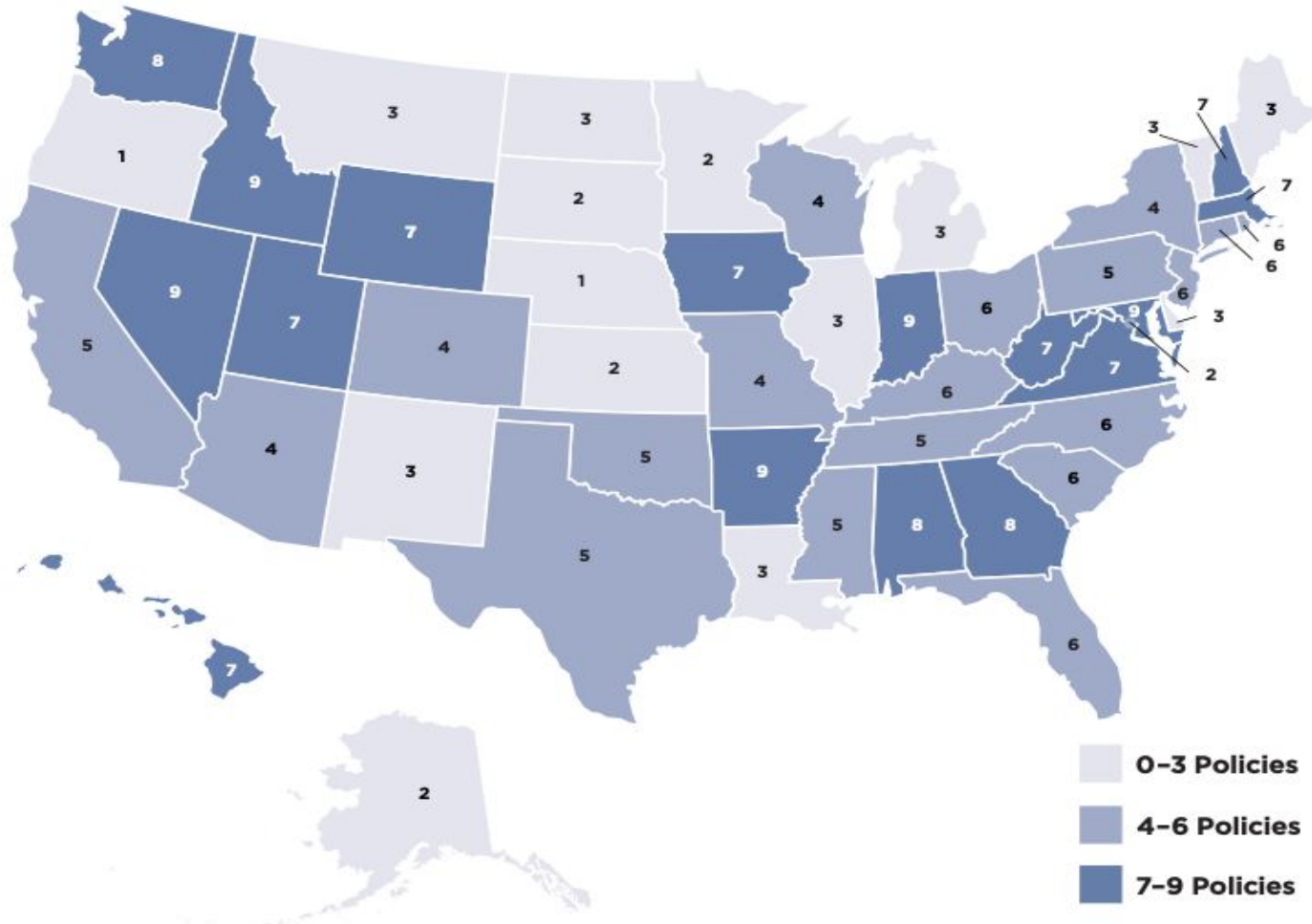
These 9 recommendations are intended to help build and sustain a **comprehensive state policy framework** to broaden the teaching and learning of computer science. .
[\[code.org\]](https://code.org)

Policy Principles

- Clarity
- Capacity
- Leadership
- Sustainability
- Equity and Diversity*

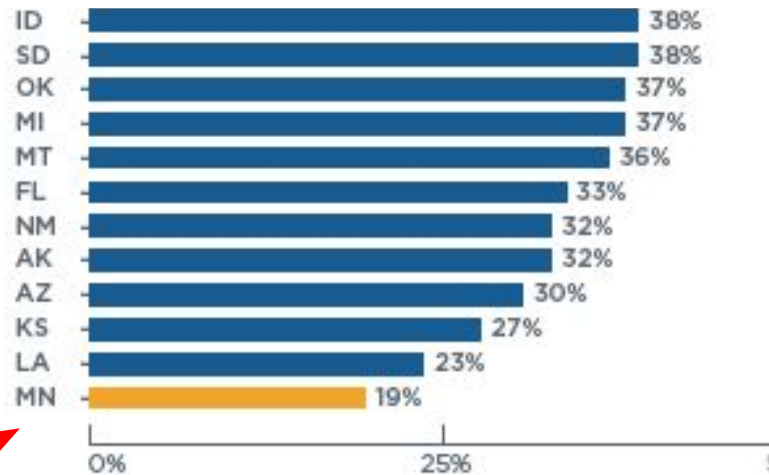
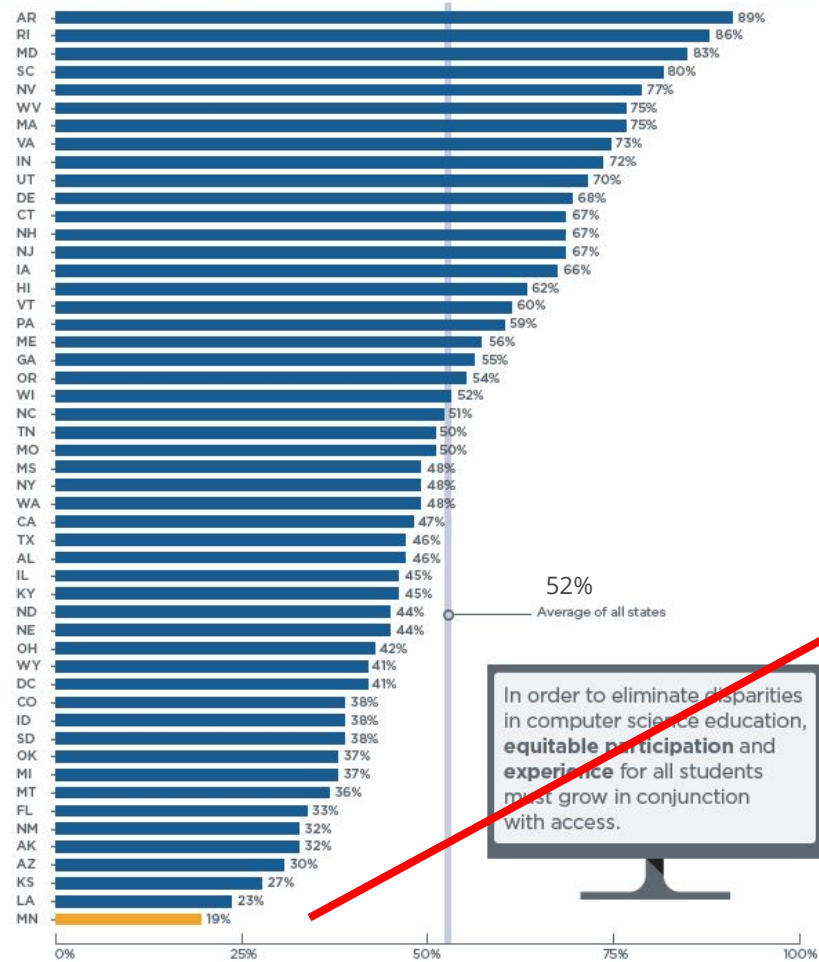
*Equity and Diversity is incorporated in each of the nine policies.

Number of Policies



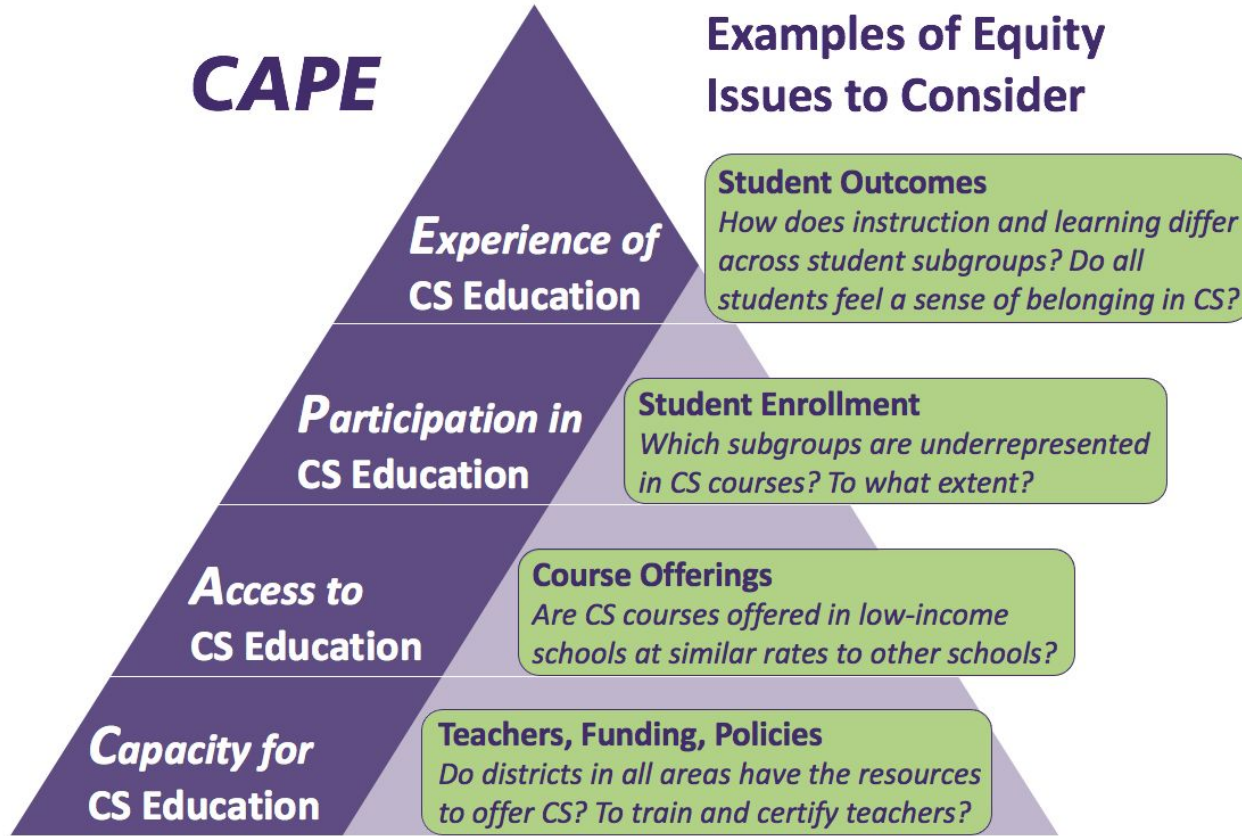


Percent of High Schools Teaching Computer Science by State



In order to eliminate disparities in computer science education, **equitable participation and experience** for all students must grow in conjunction with access.

CAPE



Examples of Equity Issues to Consider

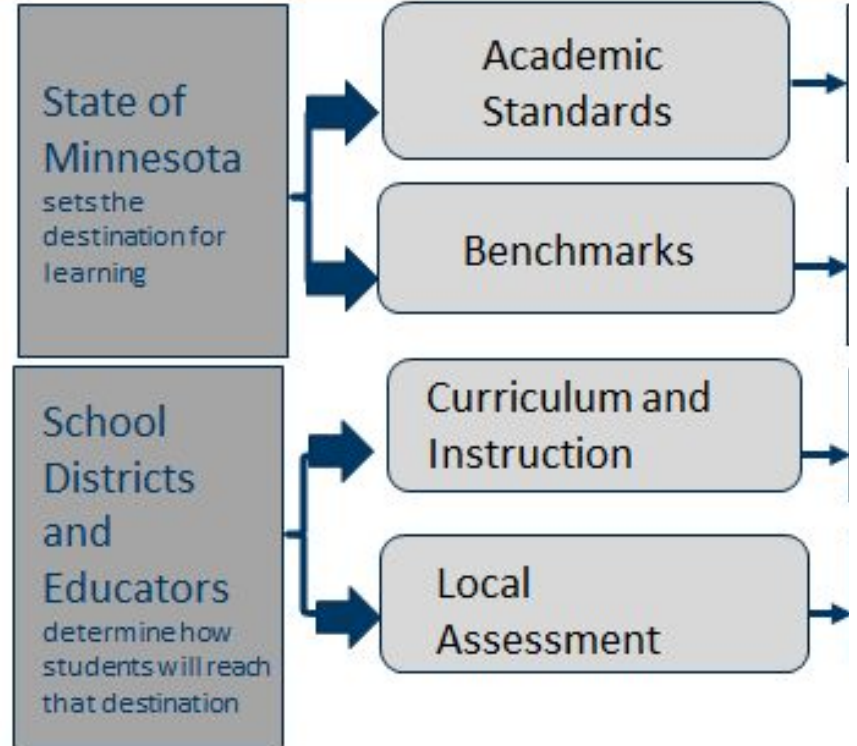
**Capacity, Access, Participation, and Experience (CAPE)
A Framework for Examining Equity in CS Education**

Capacity Building / Professional Development:

Organization	Audience and Area of Focus
Code Savvy	Training for K-12 and community educators; Equitable and engaging CS; Integration of CS across all subject areas
TpT and Code.org	Training for 6-12th grade teachers on CS Discoveries and CS Principles curricula
National Center for CS Education at the College of St Scholastica	Training for 9-12th grade teachers on MobileCSP and CSAwesome curricula
MN State IT Center of Excellence	Training for 6-12th grade teachers on IT Exploration curriculum

Computer Science Access in Minnesota

- **Computer Science in all** – Computer science concepts and practices are being integrated as Minnesota Academic Standards are revised.
 - Arts
 - Science
 - ELA
 - Social Studies
 - Math
- Integrating computational thinking into existing disciplines can empower educators and students to better understand and **participate in a computational world.**



Participation in CS Education

Minnesota AP CS Exam Takers by Gender and Race/Ethnicity (2019)

	Total	American Indian	Asian	Black	Hispanic	Native Hawaiian or Pacific Islander	Two or More Races	White
AP CS - Female	21.3%	0.0%	5.9%	0.3%	1.5%	0.0%	1.2%	11.2%
AP CS - Male	78.7%	0.3%	13.7%	3.6%	4.1%	0.1%	3.7%	50.9%
AP CS - All	100.0%	0.3%	19.7%	3.9%	5.6%	0.1%	5.0%	62.1%
MN - All (Gr 9 -12)	100.0%	1.6%	6.7%	10.8%	9.5%	0.1%	4.3%	67.0%

Minnesota K12 students: Female students = 49% / Male students = 51%

csforallmn.org

Participation in CS Education

Student Enrollment

Which subgroups are underrepresented in CS courses? To what extent?

Access to CS Education

Course Offerings

Are CS courses offered in low-income schools at similar rates to other schools?

Capacity for CS Education

Teachers, Funding, Policies

Do districts in all areas have the resources to offer CS? To train and certify teachers?

0.56%

Minnesota Students in Grades 9-12 Taking AP Computer Science Exams

Female AP CS Exam Takers in MN (2019)

18%

AP CSA

26%

AP CSP

Experience of CS Education

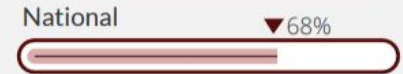
AP CS Exam Takers and Pass Rates in Minnesota

(exam takers expressed in whole numbers; pass rates expressed in percentages)

	CSA			CSP		
	2017	2018	2019	2017	2018	2019
Female	129 (72%)	169 (74%)	173 (74%)	113 (80%)	135 (83%)	156 (69%)
Male	616 (72%)	710 (75%)	769 (70%)	343 (89%)	466 (84%)	449 (74%)
Asian	140 (73%)	179 (77%)	181 (70%)	111 (96%)	148 (85%)	123 (79%)
Black	11 (46%)	26 (62%)	29 (28%)	16 (44%)	18 (56%)	39 (39%)
Hispanic	24 (71%)	34 (68%)	29 (59%)	32 (53%)	45 (56%)	58 (38%)
Two or More Races	30 (67%)	32 (88%)	55 (78%)	19 (84%)	20 (95%)	22 (82%)
White	530 (73%)	590 (75%)	623 (73%)	266 (90%)	343 (88%)	337 (81%)

Average Pass Rates (2017-2019)³

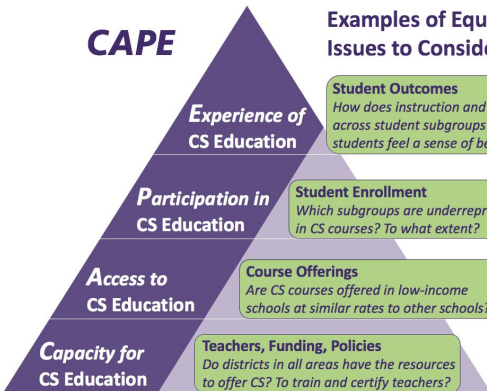
AP CSA



AP CSP



CAPE



Examples of Equity Issues to Consider

Student Outcomes
How does instruction and learning differ across student subgroups? Do all students feel a sense of belonging in CS?

Student Enrollment
Which subgroups are underrepresented in CS courses? To what extent?

Course Offerings
Are CS courses offered in low-income schools at similar rates to other schools?

Teachers, Funding, Policies
Do districts in all areas have the resources to offer CS? To train and certify teachers?

Average Exam Takers and Pass Rates for AP CS in MN (2017-2019)

34 Black Male Exam Takers, 44% Pass



12 Black Female Exam Takers, 44% Pass



55 Hispanic Male Exam Takers, 59% Pass

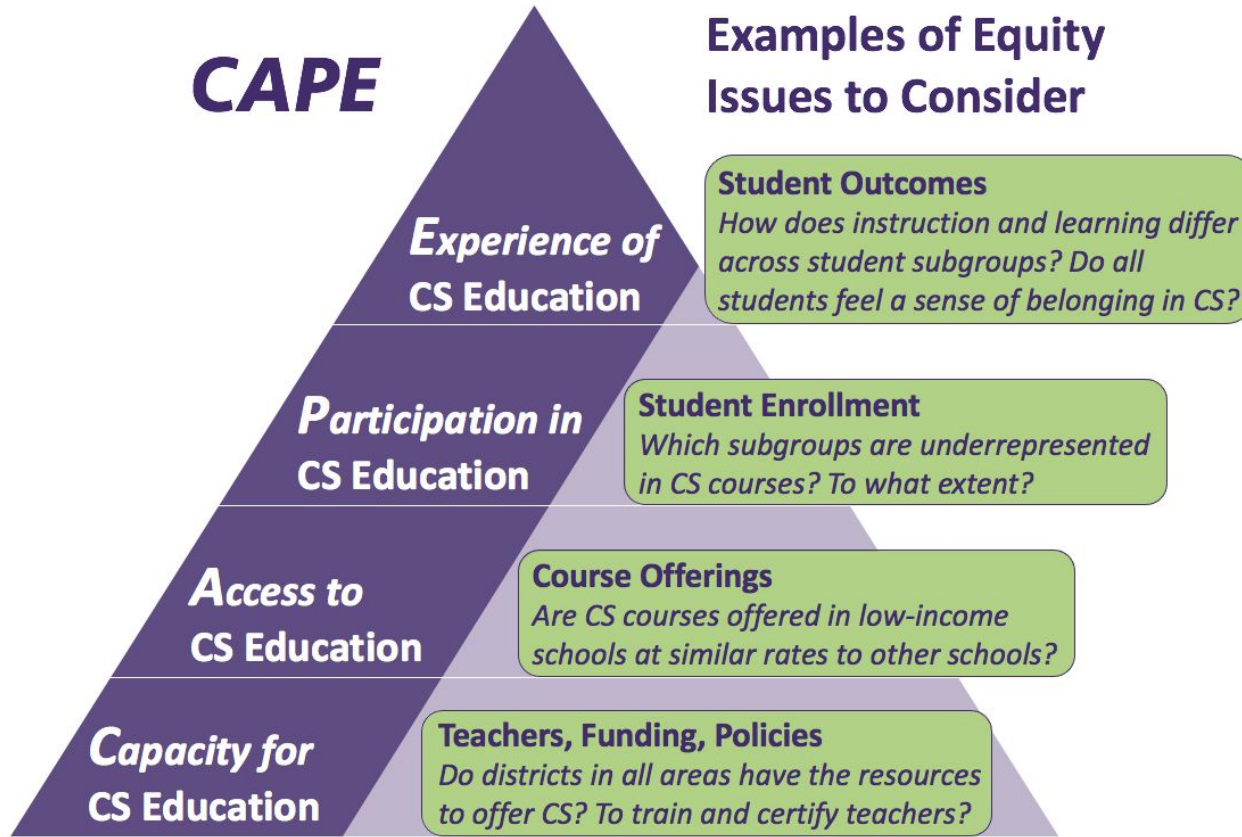


19 Hispanic Female Exam Takers, 36% Pass

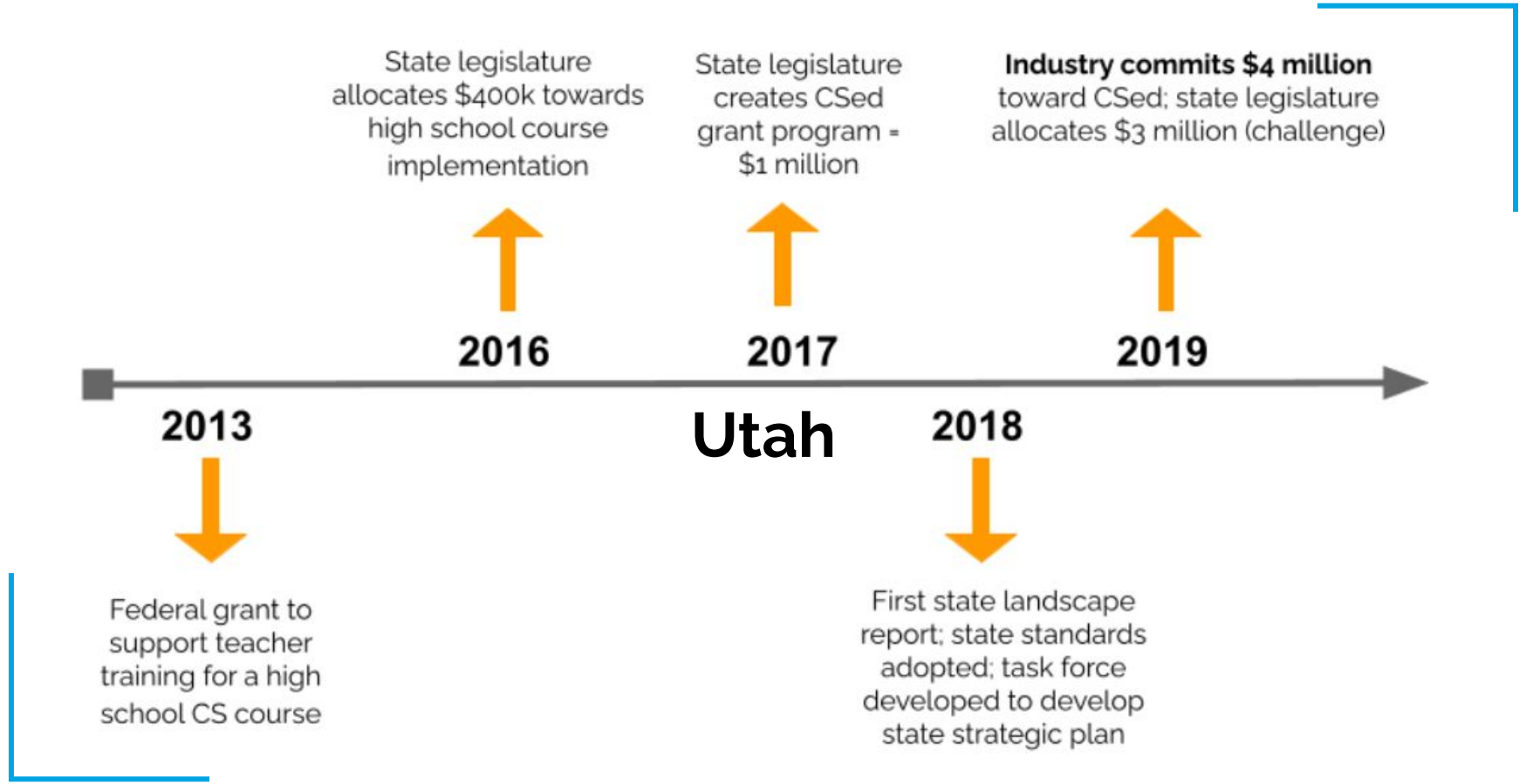


CAPE

Examples of Equity Issues to Consider



**Capacity, Access, Participation, and Experience (CAPE)
A Framework for Examining Equity in CS Education**



2013

Federal grant to support teacher training for a high school CS course

State legislature allocates \$400k towards high school course implementation

2016

Utah

State legislature creates CSed grant program - \$1 million

2017

2018

First state landscape report; state standards adopted; task force developed to develop state strategic plan

Industry commits \$4 million toward CSed; state legislature allocates \$3 million (challenge)

2019



C Spire Foundation Commits \$1 Million to Help Fund Computer Science Education

2021-01-07

Technology firm's non-profit arm supports efforts to get critical learning component in all classrooms

Jackson, Miss. (January 7, 2021) - The C Spire Foundation made a \$1 million commitment Thursday to assist school districts across Mississippi with implementing computer science programs in the classroom.

One of the primary objectives of the C Spire Foundation is to support community efforts to improve educational opportunities in Mississippi, especially in the areas of science, technology, engineering and mathematics. "In all our efforts, our goal is to improve the quality of life in the communities we serve and help students achieve their dreams of success through STEM-related educational initiatives," said Foundation Executive Director Beth C. Pickering,

The commitment comes as the Mississippi State Legislature reconvened this week and is expected to consider legislation in the 2021 session to give elementary, middle and high school students equal access to computer science curriculum in the classroom.

Which of the following would you prioritize to ensure more schools can make high-quality computer science education available to students?

- Advocacy **A**
- Career exposure **B**
- Curriculum **C**
- Funding **D**
- External learning **E**
- Materials / Equipment **F**
- Update hiring practices **G**

Take live poll: https://PollEv.com/multiple_choice_polls/n83y2aO8PK5BPE2P3uL1r/respond

OR - Drop the corresponding letter in the chat

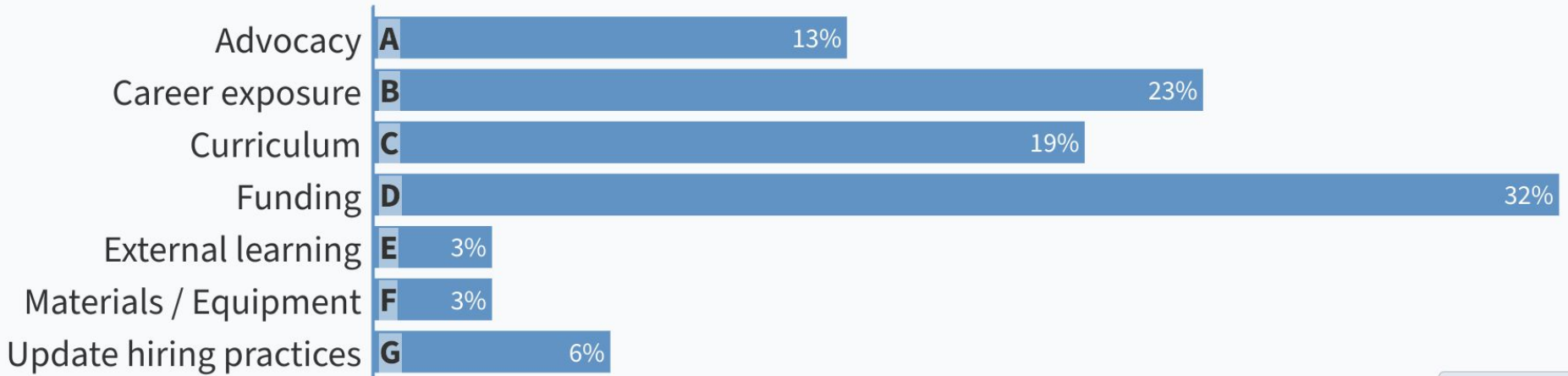
Which of the following would you prioritize to ensure more schools can make high-quality computer science education available to students?

Show responses

Lock

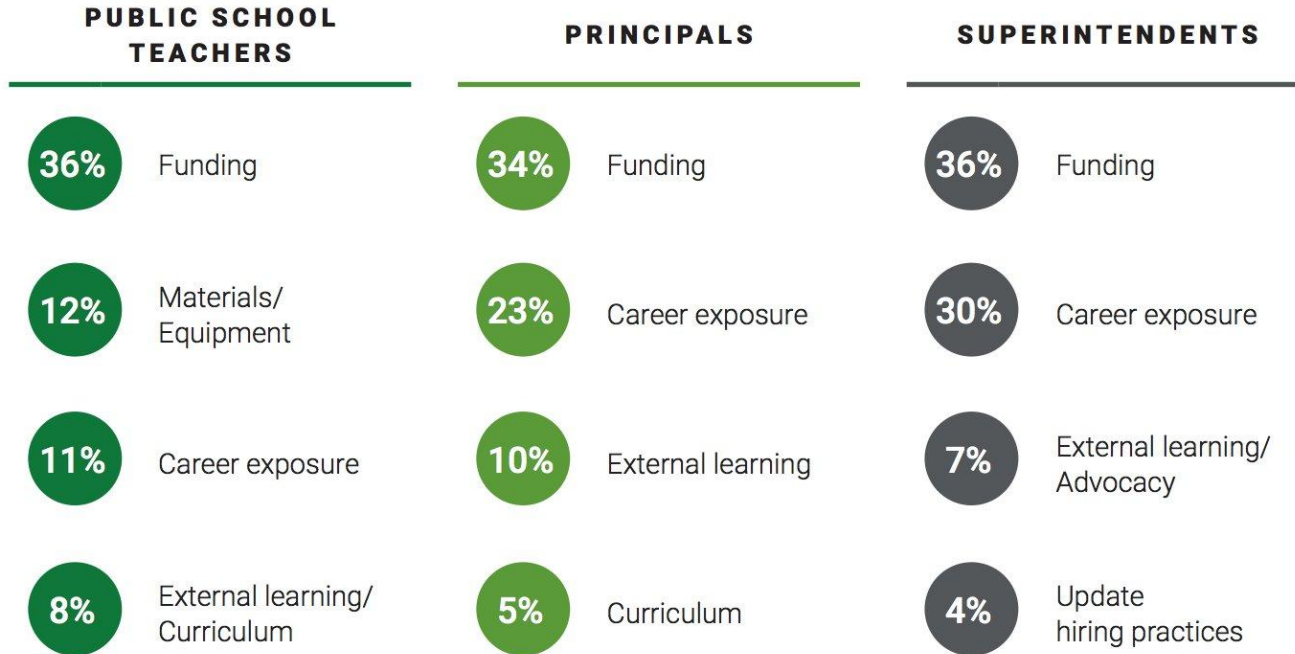
Clear responses

Full screen



What can businesses or other organizations do to ensure more schools can make high-quality computer science education available to students?

*First response**



*Surveys of teachers, principals and superintendents included this open-ended question. Free responses were cleaned and coded. Results reflect frequencies of the coded responses.

Key Opportunities in MN

- Share the importance of Computer Science (CS)
 - Share information about the demand for CS workers
 - Train new CS teachers through teacher professional development and other resources
 - Demonstrate importance of CS education to students
 - Build interest among students
-

Next Steps / Calls to Action

Short-Term Levers

Address present workforce needs

Contact your local school to ask if they offer computer science

Volunteer mentor or speak at a local CS ed event

Join a CS ed mailing list: CSTA-MN, CSforAll-MN, Code Savvy, etc...

Host a CS ed training event

Long-Term Levers

Develop meaningful partnerships between industry and education to support equity and pathways across CAPE (Capacity, Access, Participation, Experience)

Jump-start state-level CSed efforts through funding

Advocate for expanding and supporting CS ed on a state level

Join a local or state-level CS ed working group, task force, or advisory board

Offer teacher externships and/or partner with CS educator training initiatives

Community Discussion



In what ways does your company rely on professionals with computing skills?



In what ways is K-16 computer science education connected to/important to Minnesota's companies and industries?



What is/are the possible role(s) of industry in supporting computer science education for K12 students?



What is 1 thing you want policy makers to consider/know about CSed in MN?

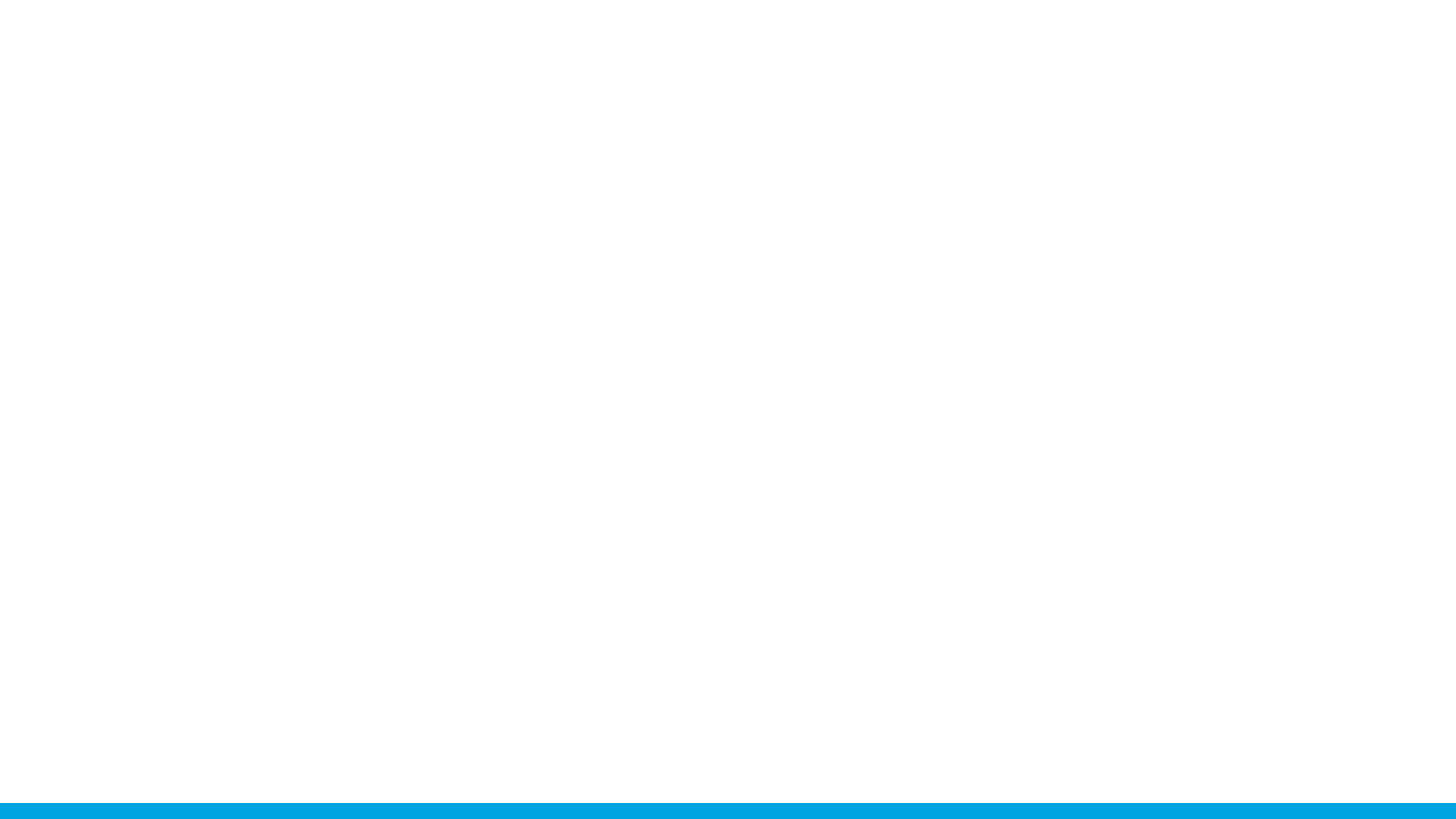


What information would you need in order for your company to support efforts in getting computer science education into MN's K12 schools?

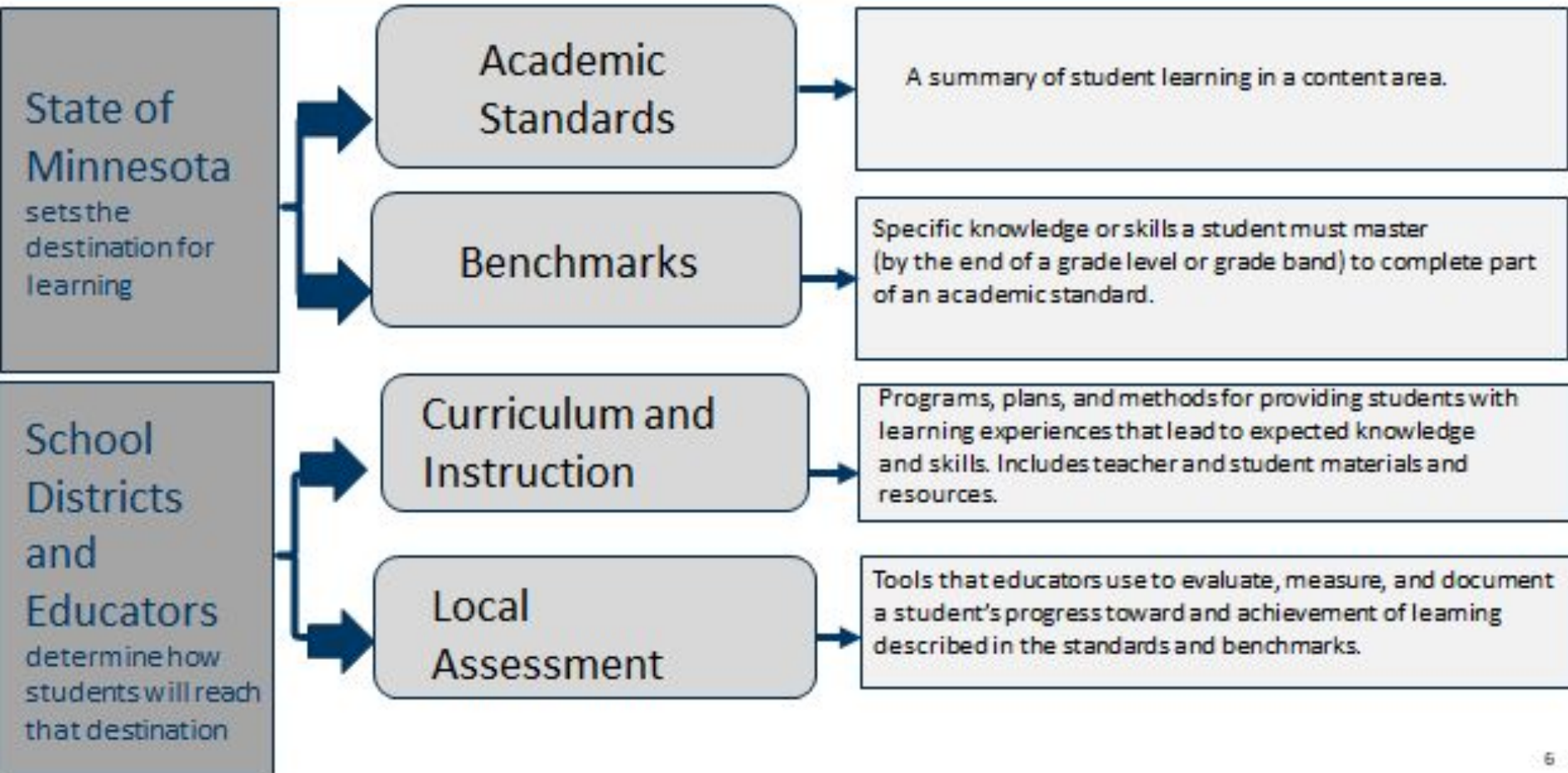


Thank you!

- Sarah Carter, MN Department of Education
- Cassie Scharber, University of Minnesota
- Andrea Wilson Vazquez, Code Savvy



The Relationship Between State Standards and Local Curriculum



Why integrate computer science?

Integrating computational thinking into existing disciplines can empower educators and students to better understand and participate in a **computational world**.

We need to look at how we prepare these students to not only succeed, but also thrive in a landscape in which they may not need to program, but will need to deeply **understand how computing (and programming) can influence and shape their work and lives**.

The K-12 Computer Science Framework envisions a future in which students

- critically engage in public discussion on computer science topics;
- develop as learners, users, and creators of computer science knowledge and artifacts;
- better understand the role of computing in the world around them; and
- learn, perform, and express themselves in other subjects and interests.

Standards and Benchmarks Definitions

Standard: “a summary description of student learning in a required content area” (big idea spanning several grades)

Benchmark: “specific knowledge or skill that a student must master to complete part of an academic standard by the end of the grade level or grade band.”

Curriculum and courses are determined at the local district level.

MDE Standards Updates

- Arts – Implementation '21-'22*
- Science – In the process of Rulemaking.
- English Language Arts – in the process of Rulemaking
- Social Studies – in the process of drafting/collecting public comment
- Mathematics – standards review in '21-'22*

Integrated Computer Science Benchmark Document

- Computer Science Integrated Benchmarks from the Minnesota Academic Standards
 - K-6 organized by grade level and content area
 - 7-12 organized by content area and grade level

<https://bit.ly/2ZHOheF>

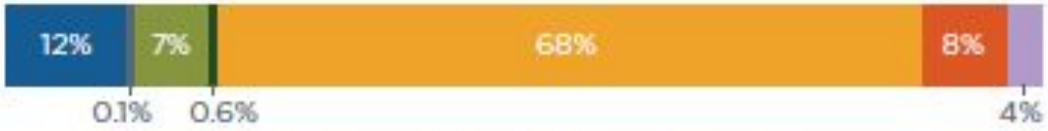
#whereweare

Access and Participation by Race/Ethnicity

Overall Student Demographics



Demographics in Schools Teaching AP CS

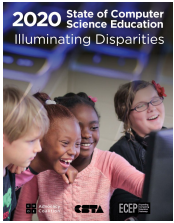


Demographics of Students Taking AP CS Exams



LEGEND

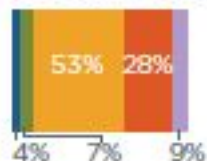
- Black/African American
- Native Hawaiian/Pacific Islander
- Hispanic/Latino/Latina
- Native American/Alaskan
- White
- Asian
- 2+ Races/Other



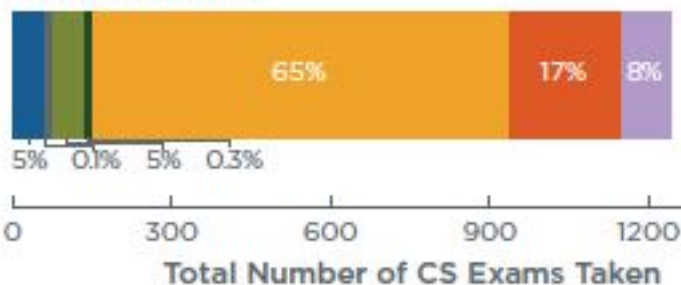
AP CS Participation by Race/Ethnicity and Gender



Female Students

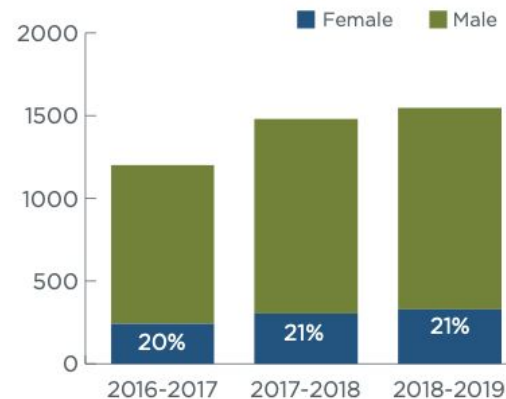


Male Students



#whereweare

AP CS Student Participation



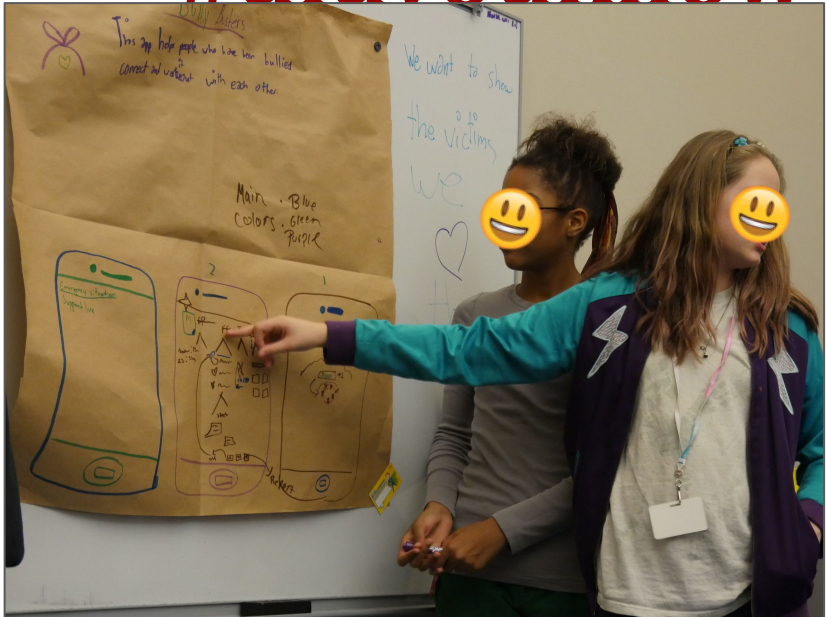
Minnesota K12 students: Female students = 49% / Male students = 51%



! It is projected that 550,000 of the new STEM-related jobs between 2018-2028 will be in computing (U.S. Department of Labor, 2019), but only 10% of all STEM graduates will be in computer science

! Research consistently shows that CS within K-12 schools remains widely inaccessible to girls, especially in **middle school years**, when they often start to make decisions that influence future career choices

#didyouknow



Middle school girls pitching an app idea during an outside-of-school computer science program



ACCESS TO + PARTICIPATION IN CS
education needs to start early =
in **ELEMENTARY SCHOOL**



Call to Action

Future: How do we get there?



bit.ly/techtalentinspire



Support efforts to get CS education into Minnesota's K12 schools



Contact your local school to ask if they offer computer science

[Sample email!](#)

Call to Action

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Support efforts to get CS education into Minnesota's K12 schools



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bit.ly/techtalentinspire

tech•talentTM
inspire > hire > develop > retain

Questions?

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