INSPIRE

CS Education: How Do We Get Out of Last Place?

- Katie McClelland, Director, *Public Policy & Research, MnTech*
- Amy Roberts, *Senior Director of State Government Affairs, Code.org*
- Andrea Wilson Vazquez, *Director of Educator Training and School Partnerships, Code Savvy; Steering Committee Member, CSforAll-MN*

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Minnesota Technology Association

Welcome

bit.ly/techtalentinspire1

Agenda

- Welcome
- K12 CSed landscape [national + MN]
- CS Policy Updates
- Industry + Education
- Take action
- Questions / Discussion

CS for All Minnesota

Introductions

Code Savvy™

Andrea Wilson Vazquez
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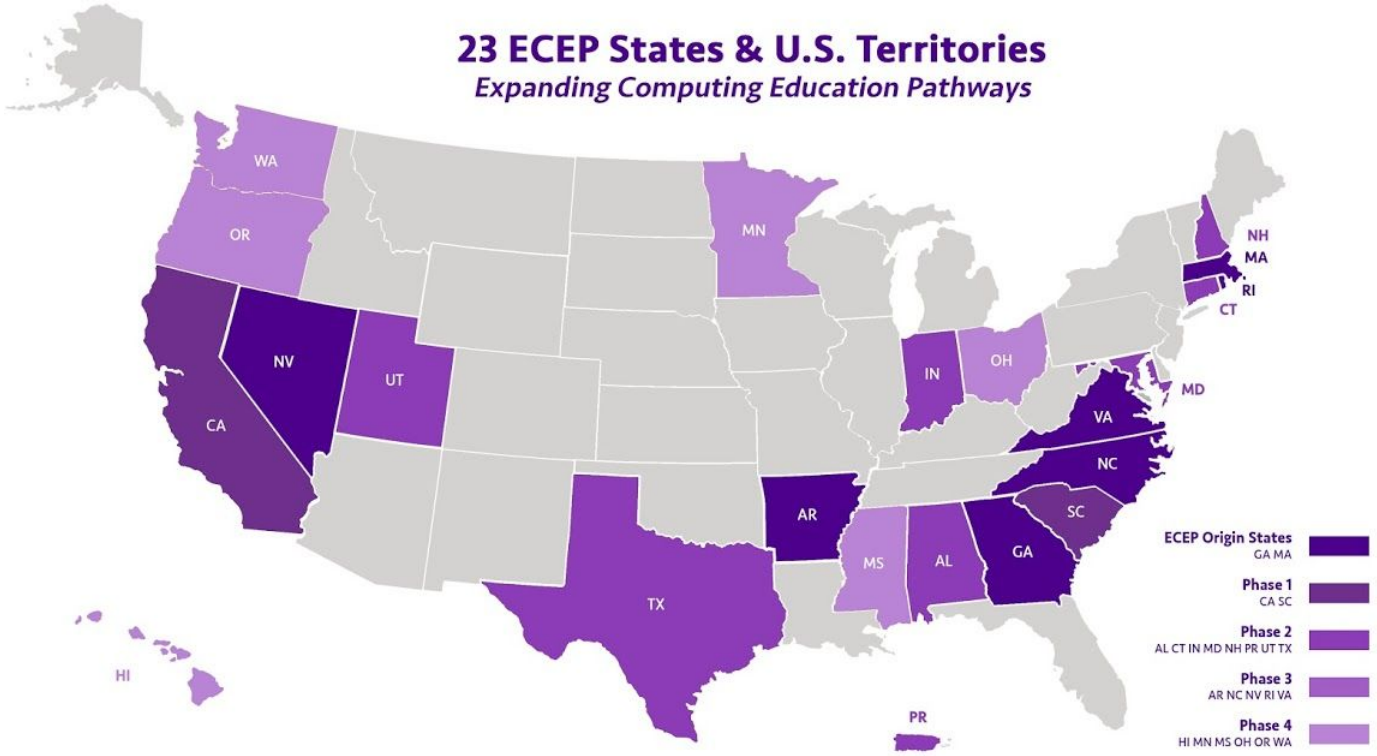
Expanding Computing Education Pathways (ECEP)



ECEP

CS for All Minnesota

CSforALL-MN

CSforAll-MN is a member of the national Expanding Computing Education Pathways Alliance (ECEP) and is driving policy change towards equitable, sustainable CS education in MN.

Our **goals** include:

- ☑ **Writing a landscape report** for the state of computer science in MN
- ❑ **Convening a summit** to draft a state plan & timeline for increasing access to K-16 CS education in MN
- ❑ **Creating pathways & partnerships** to drive state-level CS education

Accomplishments include:

- ➔ Conducted **15 listening sessions** with MN stakeholders
- ➔ **Presented** & **networked** at multiple events (in MN and nationally)
- ➔ **CS EdWeek** social media campaigns
- ➔ Developed & implemented our **commitment to equity**
- ➔ Published **5 briefs** on the state of CS in MN

https://csforallmn.org

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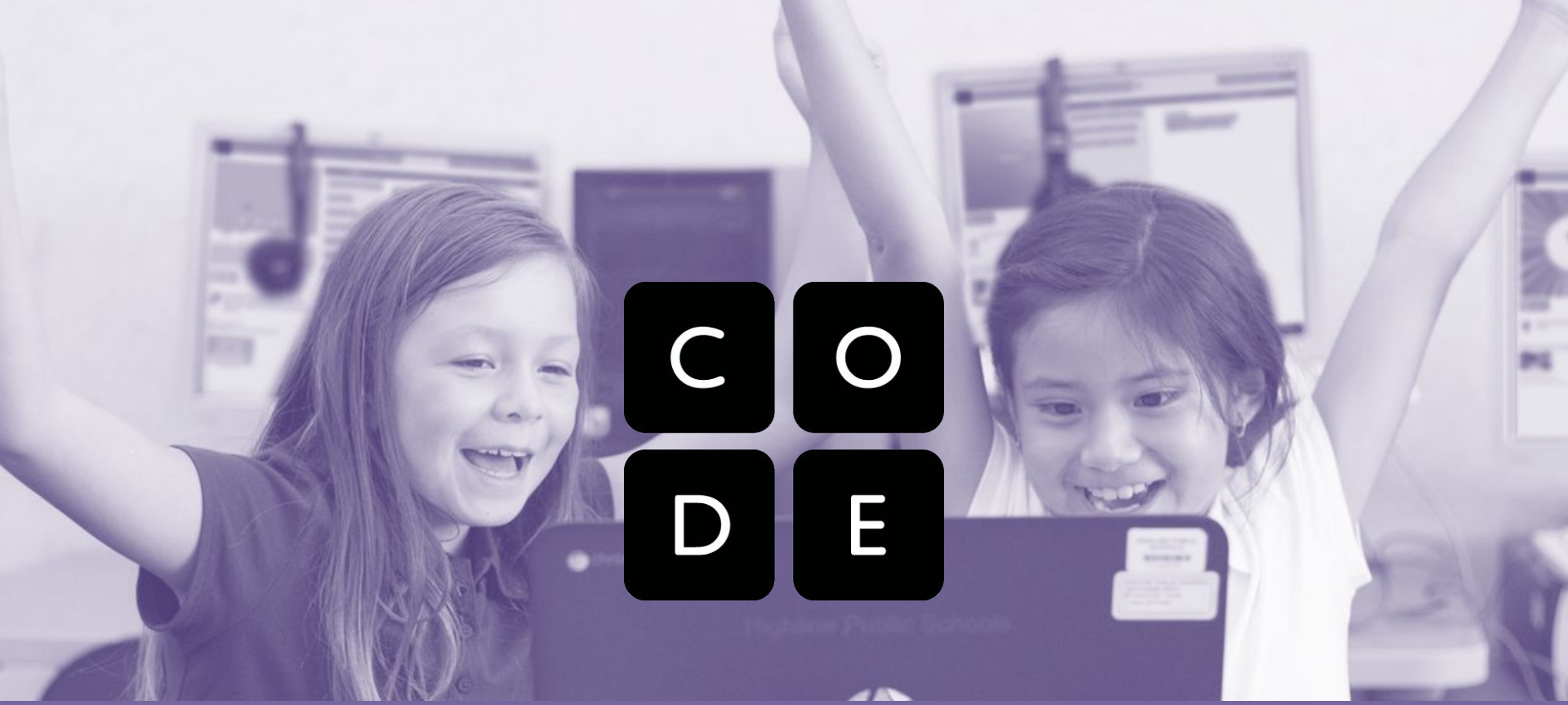


Amy Roberts
Senior Director, State Government Affairs
Code.org

mntech™

Minnesota Technology Association

Definition of CS

#definitions

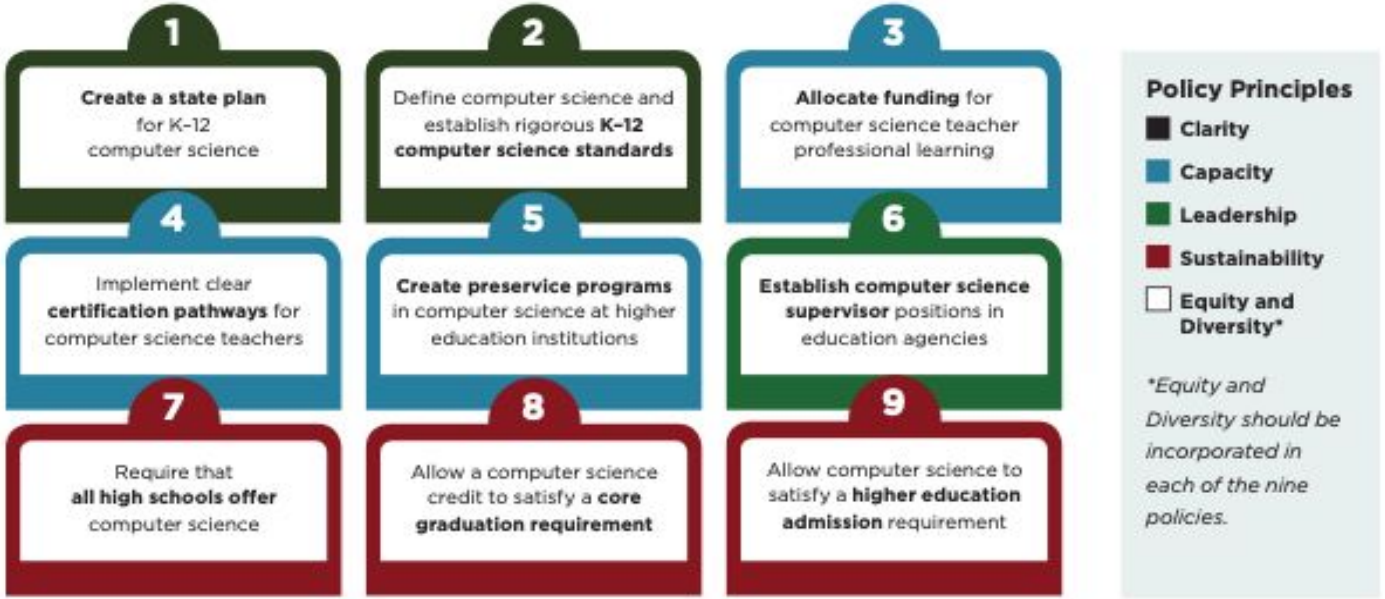
- **Computer science** is the study of computers and algorithmic processes, including their principles, their hardware and software designs, their implementation, and their impact on society.
- **Computational thinking** is a set of problem solving skills and a process that is central to computer science.
- **Coding** (programming) is a specific technical skill within computer science.

From the CS Visions Toolkit

CS for All Minnesota

Landscape of CSed > National >

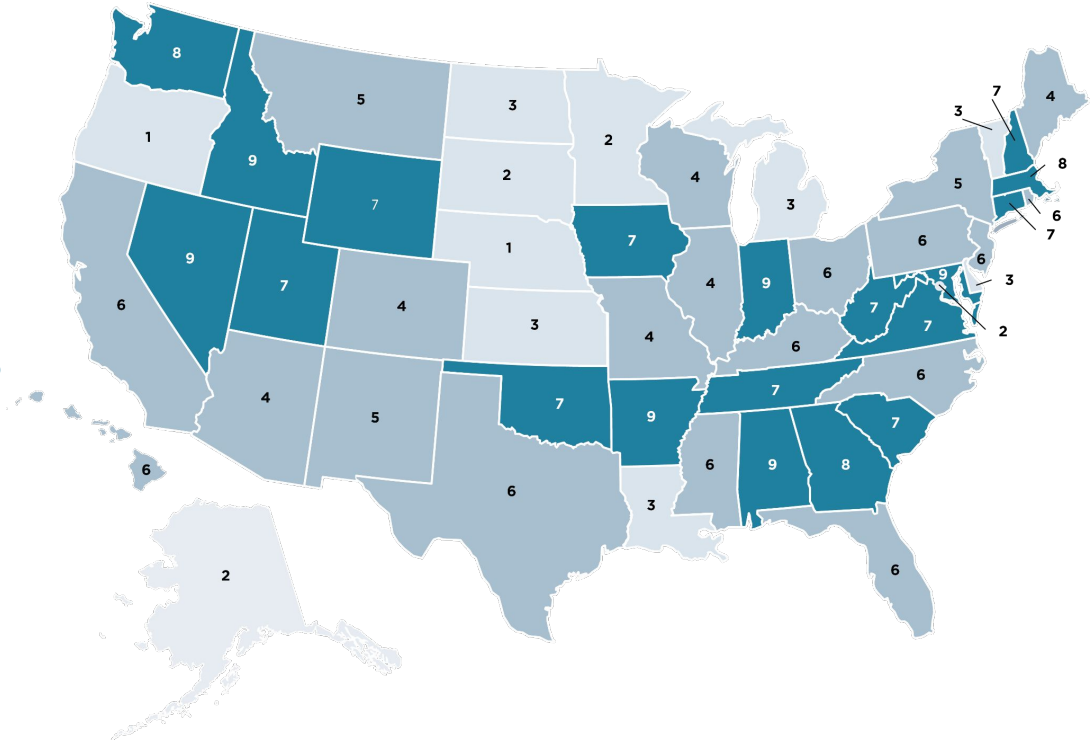
Nine Public Policies to Make CS Fundamental



[7] Code.org (2020), Nine policy ideas to make computer science fundamental to K-12 education.

Policies Adopted by State

Based on the nine policies to make CS fundamental



Policy Highlights (2021)

- 31 states adopted 50 computer science education policies
- All 50 states + DC now allow computer science to count towards a graduation requirement
  - Three states have a high school graduation requirement in computer science (AR, NV, SC)
- AL, AR, ID, IN, MD, NV adopted all nine policies
- More than $65M was allocated for FY 2022 across 21 states
- 23 states require all high schools to offer computer science

Minnesota

State Plan	Standards	Funding
No	No	No

Certification	Preservice	Supervisor
No	No	Yes

All HS Offer	Grad Credit	Admissions
No	Yes	No

Funding: Although Minnesota does not provide dedicated state funding to computer science (CS), the state was awarded a federal grant under the Jacob K. Javits Gifted and Talented Students Education Program to develop a screening process to identify students gifted in CS, particularly English language learners or students from marginalized racial and ethnic groups. Schools that participate receive ongoing professional development, and all students receive computer science instruction.

Supervisor: The Minnesota Department of Education has a STEM and Computer Science Integration Specialist.

Grad Credit: Computer science can count as a mathematics credit for graduation if the course meets state academic standards in mathematics.

Minnesota is a member of the ECEP Alliance and has a statewide CSTA chapter.

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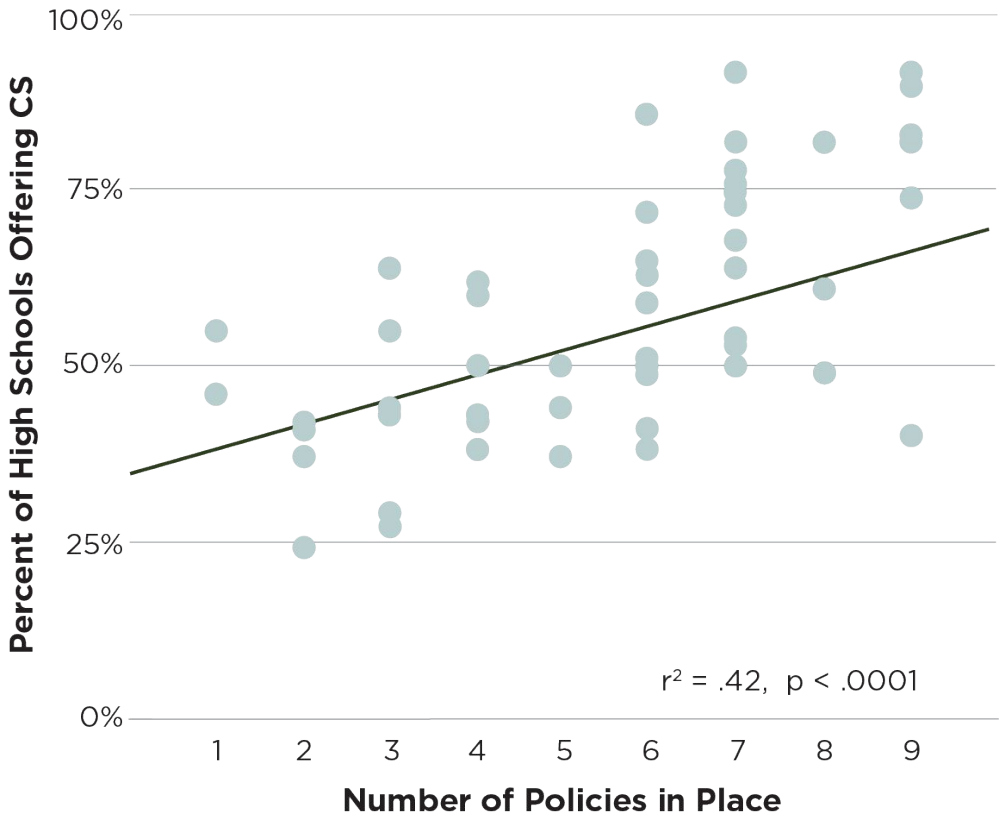
Adoption of computer science policies is correlated with the percentage of high schools offering computer science



Minnesota

14,406
open jobs

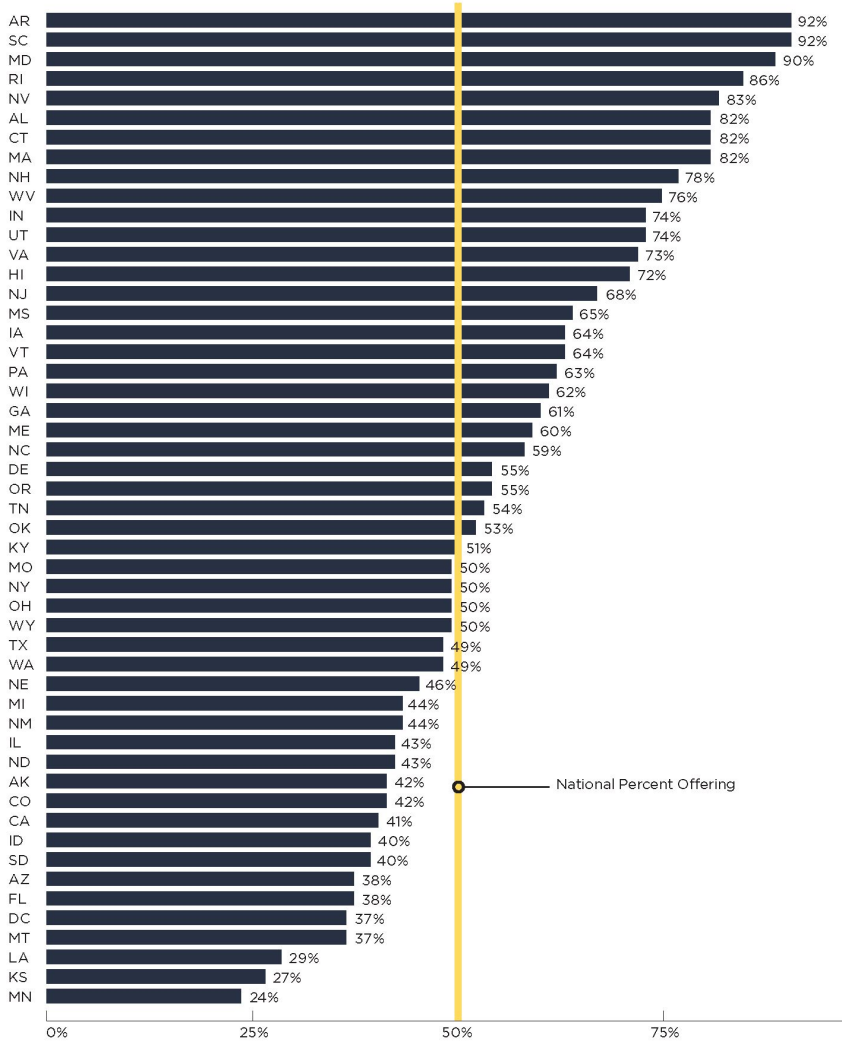
Average salary
of $92,494

91% of software
jobs outside of
Silicon Valley

67% of computing
jobs are outside
the tech center

U.S. Schools Offering Computer Science

Percent of Public High Schools



Regional Comparison of Computer Science Education Policy Adoption

POLICY	MN	IA	ND	SD	WI
State CS Plan					
K–12 CS Standards		✓	✓		✓
Funding for Teacher PD		$2.5M			
Teacher Certification		✓	✓	✓	✓
Preservice Programs					✓
State CS Supervisor	✓	✓			
All High Schools Offer		✓			
Graduation Credit	✓	✓	✓	✓	✓
Higher Ed Admission		✓			

Source: [Code.org 2021 State of CS Ed Report]

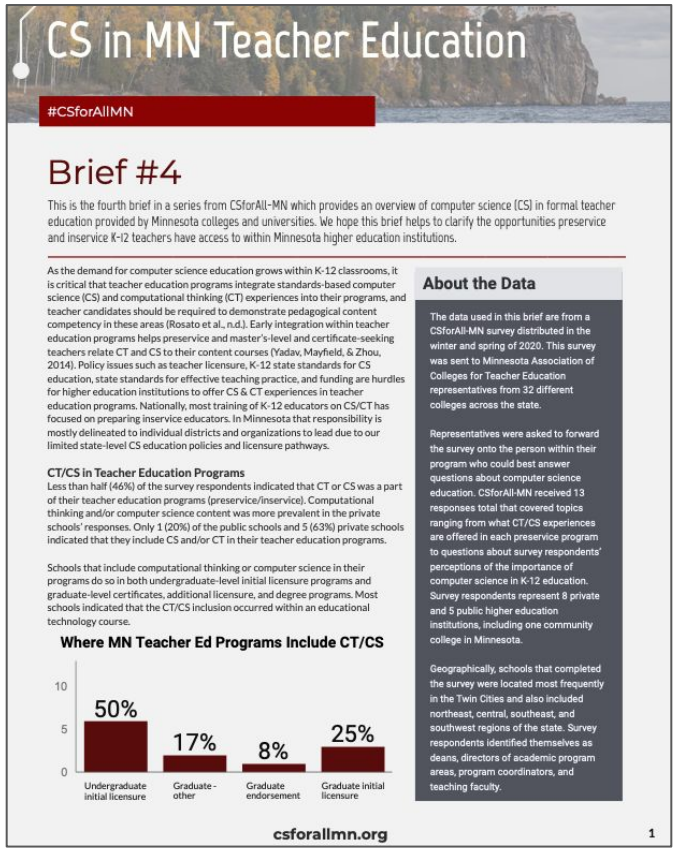
Regional Comparison of Computer Science Education Policy Adoption

POLICY	AL	AR	GA	LA	MS	TN
State CS Plan	✓	✓	✓			✓
K–12 CS Standards	✓	✓			✓	✓
Funding for Teacher PD	$11.9M	$21M	$3.4M		$1.6M	$518K
Teacher Certification	✓	✓	✓	✓	✓	✓
Preservice Programs	✓	✓	✓			✓
State CS Supervisor	✓	✓	✓			✓
All High Schools Offer	✓	✓	✓		✓	
Graduation Credit	✓	✓	✓	✓	✓	✓
Higher Ed Admission	✓	✓	✓	✓	✓	

Source: Code.org 2021 State of CS Ed Report

Landscape of CSed > State (MN)

CSforALL-MN Briefs + Resources



CS in MN Teacher Education

#CSforAllMN

Brief #4

This is the fourth brief in a series from CSforAll-MN which provides an overview of computer science (CS) in formal teacher education provided by Minnesota colleges and universities. We hope this brief helps to clarify the opportunities preservice and inservice K-12 teachers have access to within Minnesota higher education institutions.

As the demand for computer science education grows within K-12 classrooms, it is critical that teacher education programs integrate standards-based computer science (CS) and computational thinking (CT) experiences into their programs, and teacher candidates should be required to demonstrate pedagogical content competency in these areas (Rosato et al., n.d.). Early integration within teacher education programs helps preservice and master's-level and certificate-seeking teachers relate CT and CS to their content courses (Yadav, Mayfield, & Zhou, 2014). Policy issues such as teacher licensure, K-12 state standards for CS education, state standards for effective teaching practice, and funding are hurdles for higher education institutions to offer CS & CT experiences in teacher education programs. Nationally, most training of K-12 educators on CS/CT has focused on preparing inservice educators. In Minnesota that responsibility is mostly delineated to individual districts and organizations to lead due to our limited state-level CS education policies and licensure pathways.

CT/CS in Teacher Education Programs

Less than half (46%) of the survey respondents indicated that CT or CS was a part of their teacher education programs (preservice/inservice). Computational thinking and/or computer science content was more prevalent in the private schools' responses. Only 1 (20%) of the public schools and 5 (63%) private schools indicated that they include CS and/or CT in their teacher education programs.

Schools that include computational thinking or computer science in their programs do so in both undergraduate-level initial licensure programs and graduate-level certificates, additional licensure, and degree programs. Most schools indicated that the CT/CS inclusion occurred within an educational technology course.

Where MN Teacher Ed Programs Include CT/CS

About the Data

The data used in this brief are from a CSforAll-MN survey distributed in the winter and spring of 2020. This survey was sent to Minnesota Association of Colleges for Teacher Education representatives from 32 different colleges across the state.

Representatives were asked to forward the survey onto the person within their program who could best answer questions about computer science education. CSforAll-MN received 13 responses total that covered topics ranging from what CT/CS experiences are offered in each preservice program to questions about survey respondents' perceptions of the importance of computer science in K-12 education. Survey respondents represent 8 private and 5 public higher education institutions, including one community college in Minnesota.

Geographically, schools that completed the survey were located most frequently in the Twin Cities and also included northeast, central, southeast, and southwest regions of the state. Survey respondents identified themselves as deans, directors of academic program areas, program coordinators, and teaching faculty.

csforallmn.org 1

https://csforallmn.org/reports/

Brief 1: Definitions & State Overview

A three-page brief defining computer science education, exploring why everyone should learn CS, and sharing Minnesota data at a glance.

Brief 2: AP Computer Science in Minnesota

A three-page brief providing an overview of Advanced Placement (AP) Computer Science courses taken by Minnesota's students.

Brief 3: K-12 CS Teacher Licensure in Minnesota

A two-page brief providing an overview of the existing system for licensing Minnesota K-12 teachers, as well as policies and models from other states.

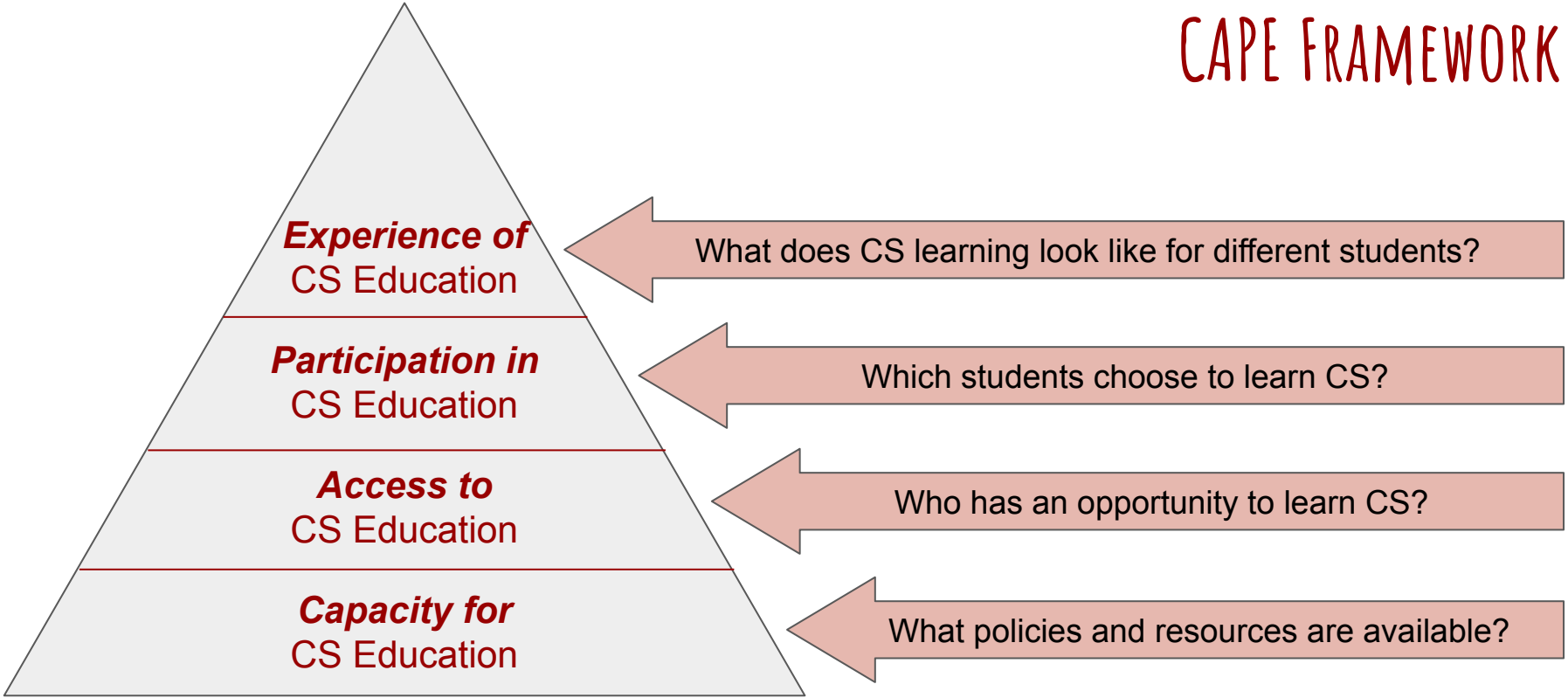
Brief 4: Computer Science in Minnesota Teacher Education

A three-page brief providing an overview of computer science in formal teacher education provided by Minnesota colleges and universities.

Brief 5: Computer Science Professional Learning

A three-page brief providing an overview of professional learning funding, opportunities, and state policy for Minnesota educators.

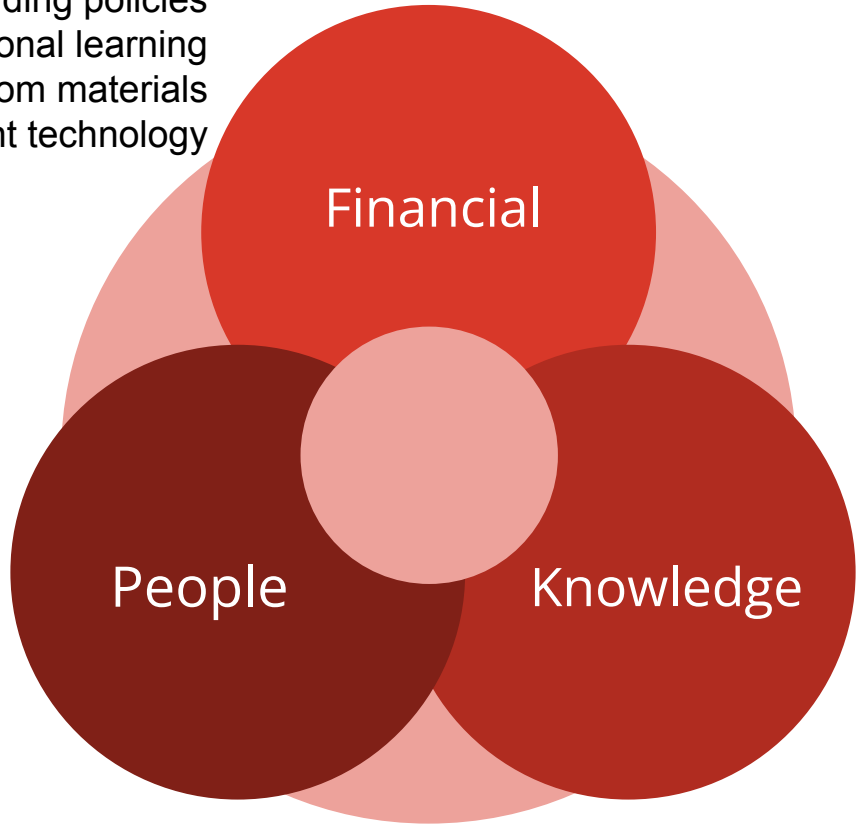
Assessing Equity in CS Education: CAPE Framework



Source: Fletcher & Warner (2020). Summary of the CAPE framework for assessing equity in Computer Science Education.
https://www.tacc.utexas.edu/epic/research

Capacity: Availability of Resources

State funding policies
Professional learning
Classroom materials
Student technology



Administrators
Counselors
Teachers
Paras

What is and is not CS
Inclusive pedagogy
How to sequence CS learning

Measuring progress (data at state, school, teacher, student levels)

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Capacity: Who can teach CS in Minnesota?

Minnesota does not currently have any licensure specific to CS, although there are several licenses that have authorization to teach CS-related courses.

Table 1. Teacher Licenses Authorized to Teach CS in Minnesota

Teacher Licensure	CTE Licensure	Elementary or Specialist Licensure
100100 Technology **110000** Mathematics **140050** Business	**140500** Business **300000** Communications Technology Careers	**180100** Elementary Education (up to 33% FTE assignment on keyboarding/computers) **149999** Teachers of Computer, Keyboarding, and Related Technology Application (Endorsement) **94100** Library Media Specialist

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Source CSforAll-MN Brief #3

Capacity: Professional Development Providers

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 Mobile CSP and CSAwesome curricula
MN State IT Center of Excellence	Training for 6-12th grade teachers on IT Exploration curriculum

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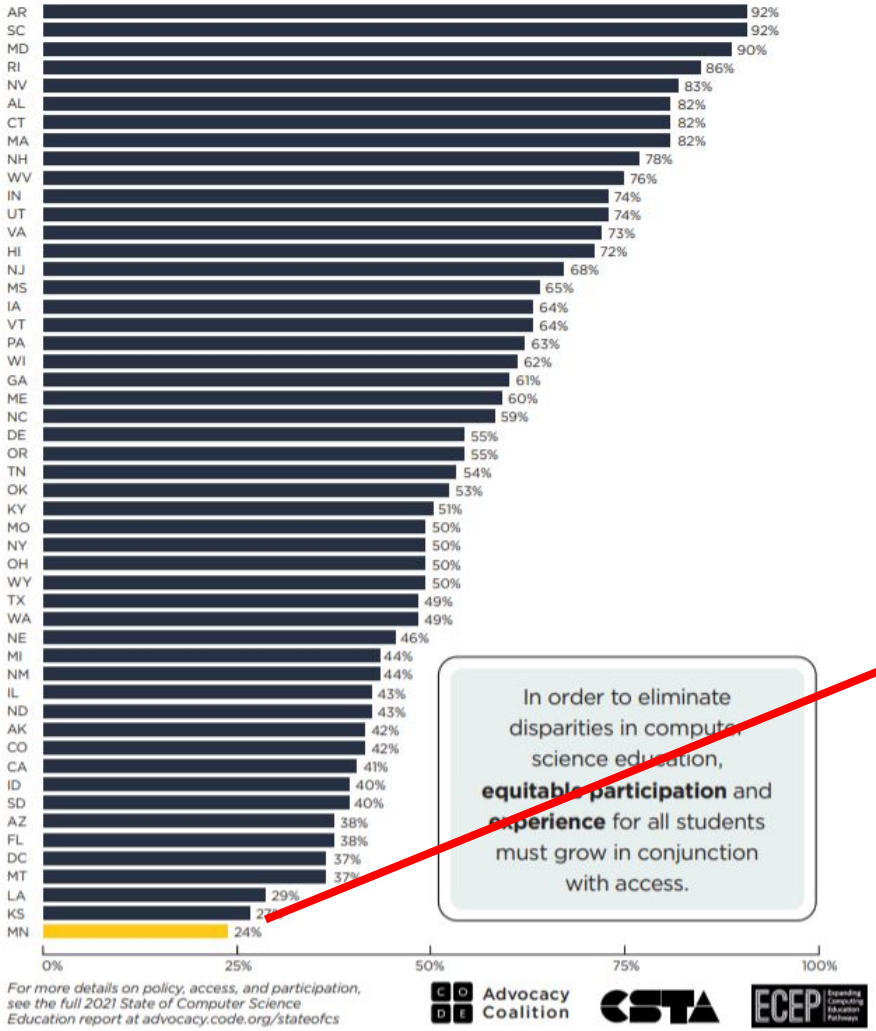
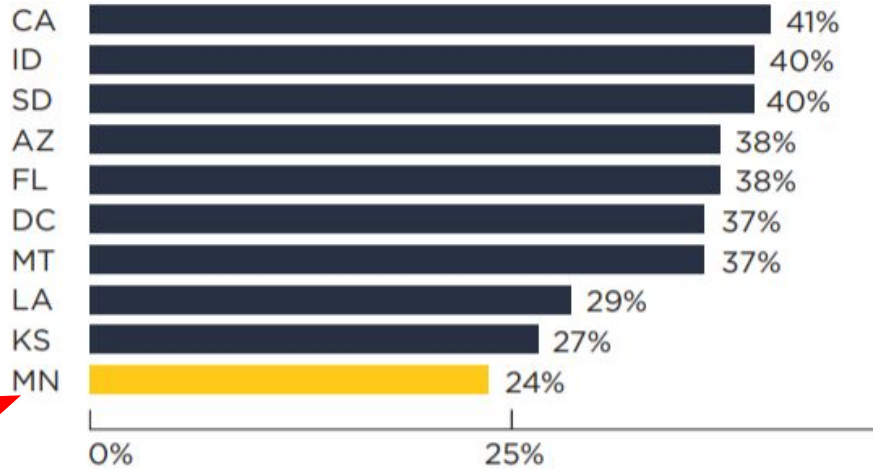
Source CSforAll-MN Brief #3

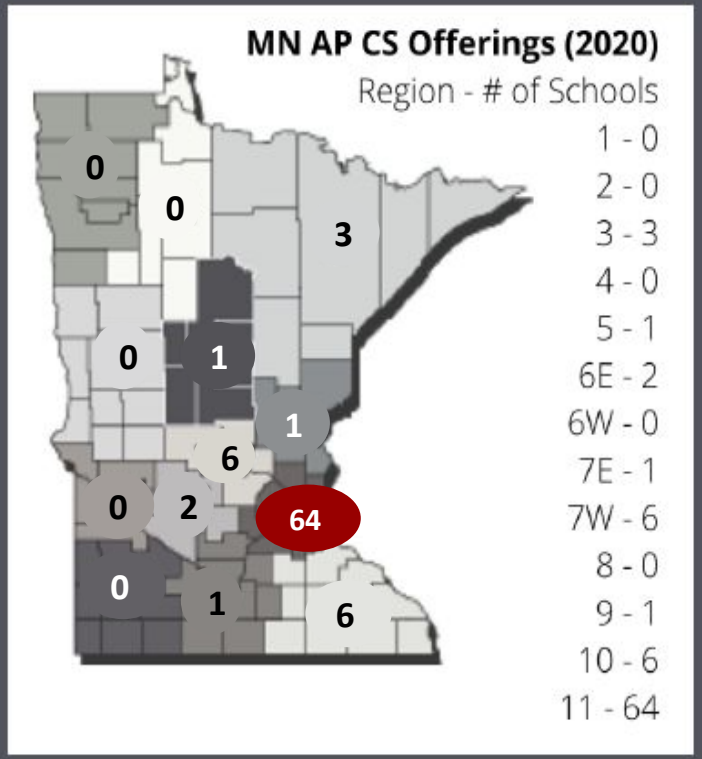
Access to CS in High School





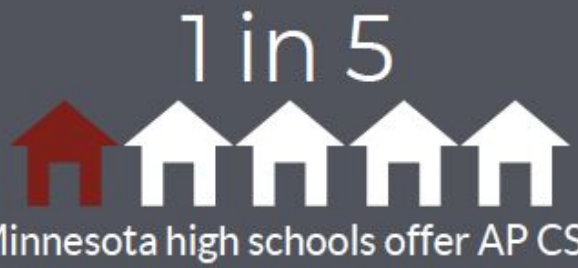
[Source: MN State Handout, State of CS Education]

Access by Region



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.



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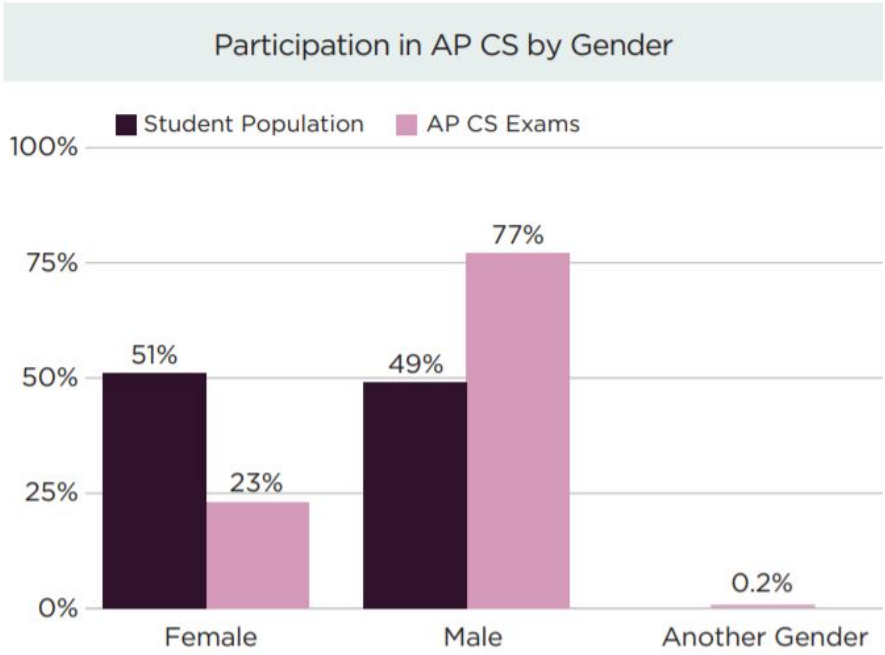
Source [CSforAll-MN Brief #2]

Participation in AP CS



2020 AP CS Exam Takers in MN:

- Black students are 3x *less likely* than white & Asian students
- Only 5 Native American & 1 Native Hawaiian/Pacific Islander students

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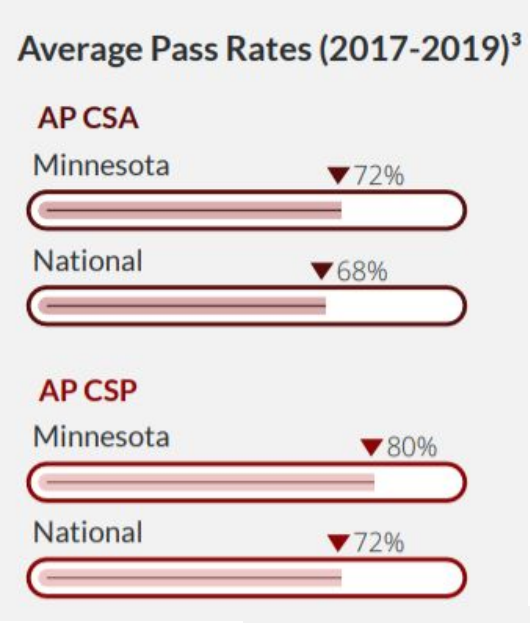
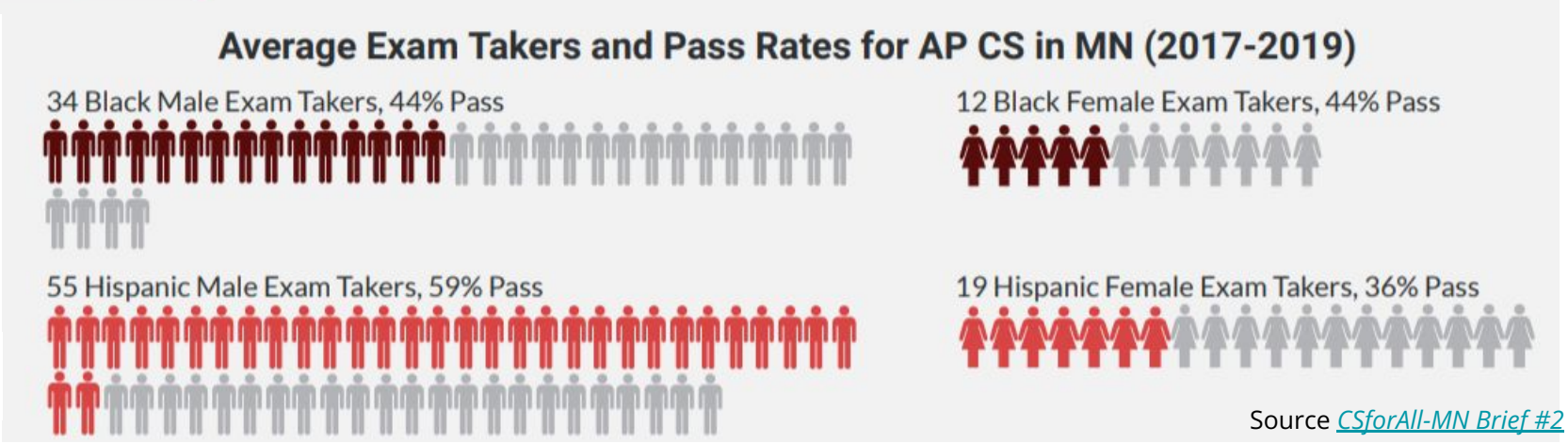
[Source: MN State Handout, State of CS Education]

Experience of CS Education





Source [CSforAll-MN Brief #2]

Policy Updates > State (MN)

2022 Legislative Session

HF 3243 (Davnie) and **SF 3578** (Koran)

- Establishes a CS Task Force through MDE
- To develop a Foundational Blueprint for a statewide CS program for elementary and secondary schools

2022 Legislative Session

HF 3243 (Davnie) and **SF 3578** (Koran)

- Describes objectives and goals of a CS program; identifies strategies and resources needed to achieve goals and a timeline
- A plan to develop comprehensive and foundational voluntary K-12 CS academic standards
- A plan for professional development opportunities for teachers
- A plan for a CS teacher licensure endorsement and teacher preparation programs
- A plan for expanding CS opportunities in every school within five years

Industry + Education Examples

Call to Action

Get Involved

- Reach out to legislators - advocacy.code.org
- Get involved with MnTech
- Get involved with community-based organizations (Session #3!)
- Share via CS Journeys through Code.org

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Resources

More Info

Code.org

- 2021 State of CS Report
- State policy tracker
- Code.org CS advocacy resources
- MN State Fact Sheet

MN Department of Education

- Computer Science info
- FAQs
- Webinar slides (Dec. 2021)

CSforAll-MN

- Briefs and Reports

CS for All Minnesota

Questions?

Amy Roberts, Code.org

Andrea Wilson Vazquez, Code Savvy

Katie McClelland, MnTech