March 6, 2024

To Minnesota Legislators:

As computer science faculty at Minnesota colleges and universities, we are writing today in support of the Computer Science Education Advancement bills, HF 3492 and SF 4259. In order to implement the Computer Science Working Group's plan, it is essential to allocate additional funding to move Minnesota from last to first in CS Education.

Every K-12 student in Minnesota should have access to computer science (CS) education because computer science impacts almost every facet of our daily lives. Understanding what CS concepts like algorithms and artificial intelligence are and how they impact our daily lives is necessary to be an informed citizen in the 21st century. Computer science also drives innovation in many areas important to our local economies, from agriculture to healthcare to retail to tourism.

It is important that Minnesota invests in CS education for K-12 students and schools. The students who have exposure to CS before college are more likely to major in computing related fields. However, it is often students with privilege who have had the opportunity to take a CS course, participate in a robotics program, or have a parent or family member encourage them to pursue a career in CS. Adding CS in K-12 schools will increase the number of students aware of computing before college, helping us diversify our programs and the future technologists in our state.

Our college computer science graduates have access to well-paying job opportunities in Minnesota and beyond. Graduates of our programs are in demand and successful in securing job offers. All students in Minnesota should have access before college to the opportunity to learn computer science so they can be engaged citizens and make informed decisions about college and career pathways in computing.

Sincerely,
Minnesota Higher Education Computer Science Faculty

Elena Machkasova, Associate Professor of Computer Science, University of Minnesota, Morris
Peter Dolan, Associate Professor, University of Minnesota, Morris
Kristin Lamberty, Associate Professor of Computer Science , University of Minnesota Morris
Amy Csizmar Dalal, Professor of Computer Science, Carleton College
Eric Alexander, Assistant Professor of Computer Science, Carleton College
Mats Heimdahl, Professor and Department Head, University of Minnesota
Ju Sun, Assistant Professor, University of Minnesota
Shonal Gangopadhyay, Teaching Specialist, University of Minnesota - Twin Cities
Anup Parajuli, Computer Information Systems Faculty , Lake Superior College
Bernardo Binaco Prado, Computer Science Teaching Specialist, University of Minnesota

Yao-Yi Chiang, Associate Professor, Computer Science and Engineering Department, University of Minnesota

Joslenne Peña, Assistant Professor, Macalester College

Lana Yarosh, Associate Professor, University of Minnesota

Joseph Konstan, Distinguished McKnight University Professor and Distinguished University Teaching Professor, University of Minnesota, Twin Cities

Dan Knights, Associate Professor, University of Minnesota

Nicholas Hopper, Professor and Director of Undergraduate Studies, Computer Science & Engineering, University of Minnesota

Ben Weng, STEM Dean, Minneapolis Community and Technical College

Pen Yew, Professor, University of Minnesota

Richard Wells, Computer Science Instructor, Normandale Community College

David Musicant, Professor of Computer Science, Carleton College

Kristopher Glesener, Chair & Assistant Professor, Computer Information Systems Department, The College of St. Scholastica

Daniel Keefe, Distinguished University Teaching Professor and Professor, Department of Computer Science and Engineering, University of Minnesota

Eman Ramadan, Lecturer and Researcher, University of Minnesota - Twin Cities
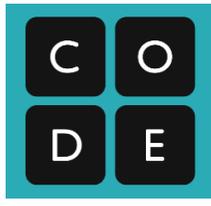
March 7, 2024

TO: Minnesota House Education Finance Committee

RE: Letter of Support for HF 3492

Dear Chair Youakim and Members of the House Education Finance Committee:

Thank you for allowing Code.org and CSforALL-MN to submit a joint letter of support for HF 3492, which provides much-needed funding for computer science education to build teacher capacity and course offerings in Minnesota. Dedicated state funding is one of the most impactful ways states can expand students' access to this foundational subject, and we know Minnesota's need for this is great.

Computer science is an essential skill for K-12 students. It develops their computational and critical thinking skills and teaches them how to create—not just use—new technologies. Computing occupations are the fastest-growing, best paying, and now the largest sector of all new wages in the United States. In Minnesota in particular, the Bureau of Labor Statistics estimates that there are over **7,384 open computing jobs with an average salary of $105,311.** Every student deserves the opportunity to access the knowledge necessary to succeed in the most in-demand jobs of our 21st century economy.

Unfortunately, only [28% of Minnesota public high schools](#) offer even one foundational computer science course. This is the **lowest percentage of all states in the country**. But state funding, which is [directly correlated with higher levels of course offerings](#), can help change that. Based on [CSforAll-MN estimates](#), it costs about $2,250[1] per teacher to provide initial computer science educator professional development in Minnesota. Thus, a $4 million investment could reach ~1,777 teachers. If the goal is to have at least one teacher in each school qualified to teach computer science, this number covers more than half of the approximately 2,344 total teachers who would need initial training.

There is significant support for computer science education from business and state leadership. Eleven CEOs of Minnesota-based industries have signed on to the [Computer Science: Opportunity for Every Student (CEOsForCS)](#) letter which is a call "for every student in every school to have the opportunity to learn computer science." And in July of 2022, Governor Tim Walz [committed](#) to expanding K-12 Computer Science Education in the state of Minnesota as part of a pact with all 50 state Governors, including **a specific commitment to allocate state funding for computer science.**

It is worth noting computer science offers additional benefits for students who take it. [Studies have shown](#) that students who study computer science perform better in other subjects and excel at problem solving. Further, students who take AP computer science are at least [17% more likely to attend college](#), making CS education a critical tool in helping Minnesota reach its MNP20 state postsecondary attainment goal.

Once again, our two organizations strongly support this critical investment in computer science education in Minnesota and urge passage of HF 3492. Thank you for your consideration.

Sincerely,

Julia Wynn
Director of State Government Affairs, Code.org
Julia.Wynn@Code.org

Jennifer Rosato
Member of the Steering Committee, CSforALL-MN
jrosato@umn.edu

---

[1] *Assumes a teacher stipend of $1K for a weeklong professional development opportunity, travel stipend (housing + meals), and payments to facilitators/PD providers.*

The Impact of Funding for Computer Science

Funding for computer science education, particularly teacher professional development, is one of the most impactful ways to increase student access to the subject. Not only is computer science increasingly necessary for students to succeed in a 21st century economy, but its application of critical thinking skills, creative problem-solving, programming, and more teaches students the general technology and thinking skills they need to be well-rounded contributors to our society. As the state with ***the lowest percentage of high schools offering computer science in the country***, Minnesota is in dire need of state investment in this space. Based on the below data, the proposed funding in HF 3492/SF 4259 will have a strong, concrete impact on student access to computer science in Minnesota.

State funding is ***directly correlated with higher levels of course availability.*** Based on 2023 data, states that allocated funding annually to computer science had an average of <u>65% of their high schools offering the course</u>, greater than the average of <u>57% of high schools</u> in states without dedicated funding, and much higher than Minnesota's 28%.

Estimated Impact in Minnesota

Based on CSforAll-MN estimates, it costs about $2,250* per teacher to provide initial computer science educator professional development in Minnesota. Thus, a $4 million investment could reach ~1,777 teachers. To have at least one computer science teacher in every school in the state, about 2,344 teachers would need to be trained.

$4 million → ~ 1,777 teachers

*This covers **more than half** of the 2,344 total teachers who need training.*

*Assumes a teacher stipend of $1K for a weeklong professional development opportunity, travel stipend (housing + meals), and payments to facilitators/PD providers.

Case Study: Colorado (impact of FY 21-22 state funding invested)

$399,543 → 373 teachers trained | 47,736 students impacted | 24 additional courses offered

Case Study: Iowa (impact of FY21-FY24 state funding invested)

~ $1.2 million → 1,165 teachers trained

MINNESOTA

2023 State of Computer Science Education

The rapid pace of technological advancement, as seen with the widespread integration of generative artificial intelligence (AI), underscores the need for foundational knowledge in computer science for all students. This report calls upon advocates to embrace the urgency of this matter and revamp school curricula to align with the demands of the 21st century, including requiring that all students learn computer science.
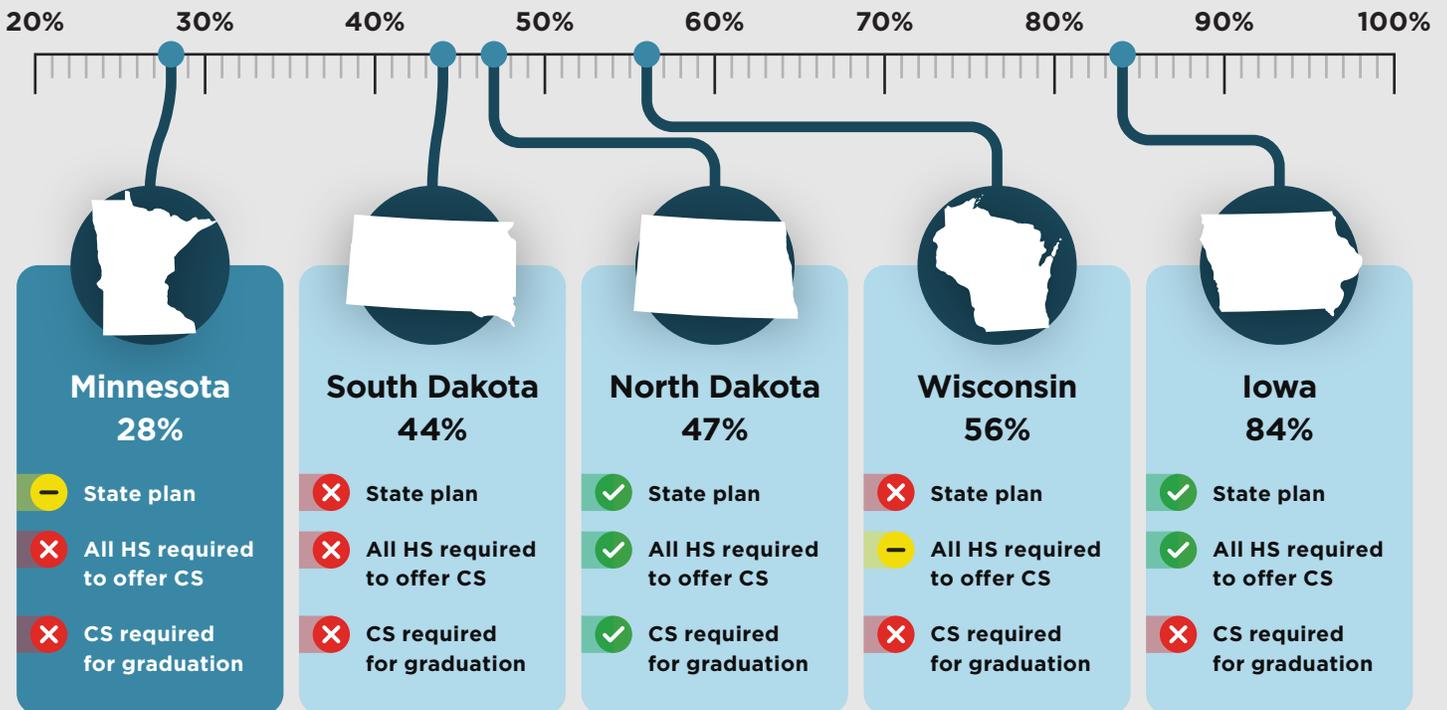
Currently, 57.5% of public high schools in the United States (U.S.) offer a foundational computer science class—an achievement marking the largest percentage growth in the last five years. Across the 35 states* where data is available, 5.8% of high school students are enrolled in foundational computer science. Even with growing access this growth, large disparities still exist, and we must continue to focus on eliminating participation gaps.

7,384
In 2023, MN averaged 7,384 open computing jobs each month

$105,311
These jobs have an average salary of $105,311

*AL, AR, AZ, CT, FL, GA, HI, IA, ID, IL, IN, KS, KY, LA, MA, MD, MS, NC, ND, NE, NJ, NM, NV, NY, OK, OR, PA, RI, TN, TX, UT, VA, VT, WV, WI

Comparative Access to Computer Science Courses
(percentage of high schools offering)

20% 30% 40% 50% 60% 70% 80% 90% 100%

Minnesota 28%
- ➖ State plan
- ❌ All HS required to offer CS
- ❌ CS required for graduation

South Dakota 44%
- ❌ State plan
- ❌ All HS required to offer CS
- ❌ CS required for graduation

North Dakota 47%
- ✅ State plan
- ✅ All HS required to offer CS
- ✅ CS required for graduation

Wisconsin 56%
- ❌ State plan
- ➖ All HS required to offer CS
- ❌ CS required for graduation

Iowa 84%
- ✅ State plan
- ✅ All HS required to offer CS
- ❌ CS required for graduation

MINNESOTA

Ten Policies to Make Computer Science Foundational

1.

Create a **statewide plan** for K–12 computer science

2.

Define computer science and establish standards for K–12 computer science

3.

Allocate funding for rigorous computer science teacher professional learning

4.

Implement **clear certification pathways** for computer science teachers at elementary and secondary levels

5.

Create university programs to **encourage all preservice teachers** to gain exposure to computer science

6.

Establish **dedicated computer science** positions in a state education agency

7.

Require that all schools offer computer science with appropriate implementation timelines

8.

Allow computer science to count toward a core graduation requirement

9.

Allow **computer science to satisfy an admission requirement** at higher education institutions

10.

Require that all students take computer science to earn a high school diploma

What Has Minnesota Done to Advance Computer Science Education?

Minnesota passed $1M for computer science in 2023, the first fully dedicated funding for the subject in the state.

Minnesota added a full-time computer science specialist to the Department of Education in 2023, joining the department's part-time specialist.

How Can Minnesota Increase Opportunities for Students?

Minnesota should continue to fund professional development opportunities annually to ensure there are enough teachers prepared to teach computer science in every school.
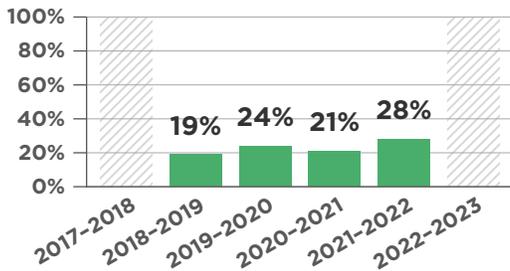
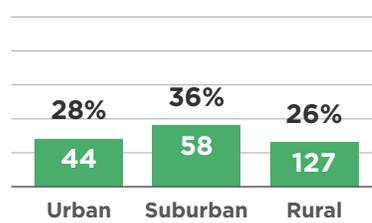Minnesota should require all preservice teachers to receive instruction in computer science education.

MINNESOTA

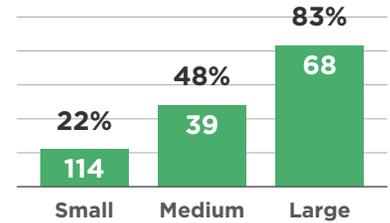## Percentage of Public High Schools Offering Foundational Computer Science

Access by School Year

School Year	Percentage
2017–2018	(blank)
2018–2019	19%
2019–2020	24%
2020–2021	21%
2021–2022	28%
2022–2023	(blank)

Access by Geography*

Region	Percentage	Count
Urban	28%	44
Suburban	36%	58
Rural	26%	127

Access by School Size*

| Size	Percentage	Count
Small	22%	114
Medium	48%	39
Large	83%	68

Small schools are 3 less likely to offer foundational computer science than medium and large schools
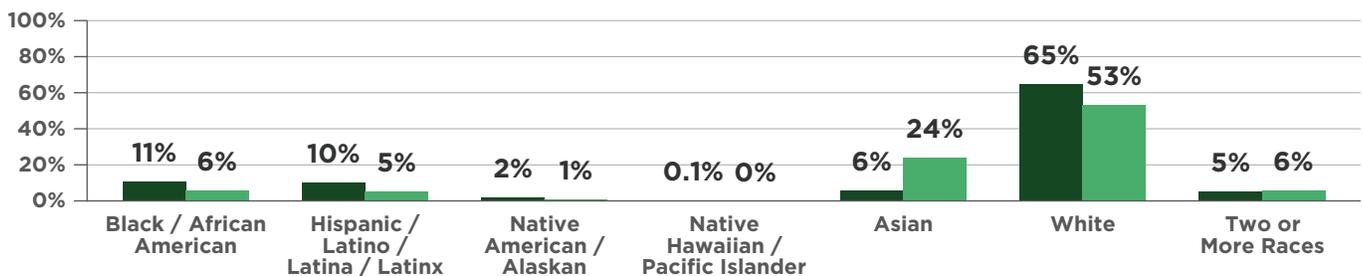
Data is from the most recent data school year 2021-2022

Participation in AP Computer Science Exams by Gender

Course enrollment data for all foundational computer science courses is not available from Minnesota. Nationally, we know that participation in all foundational computer science is broader than AP participation.

- Male — 75%
- Female — 24%
- Other — 1%
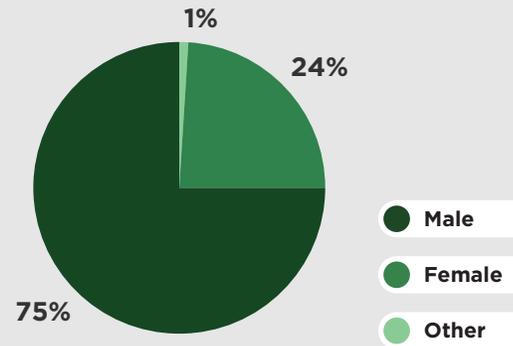
Participation in AP Computer Science Exams by Race/Ethnicity

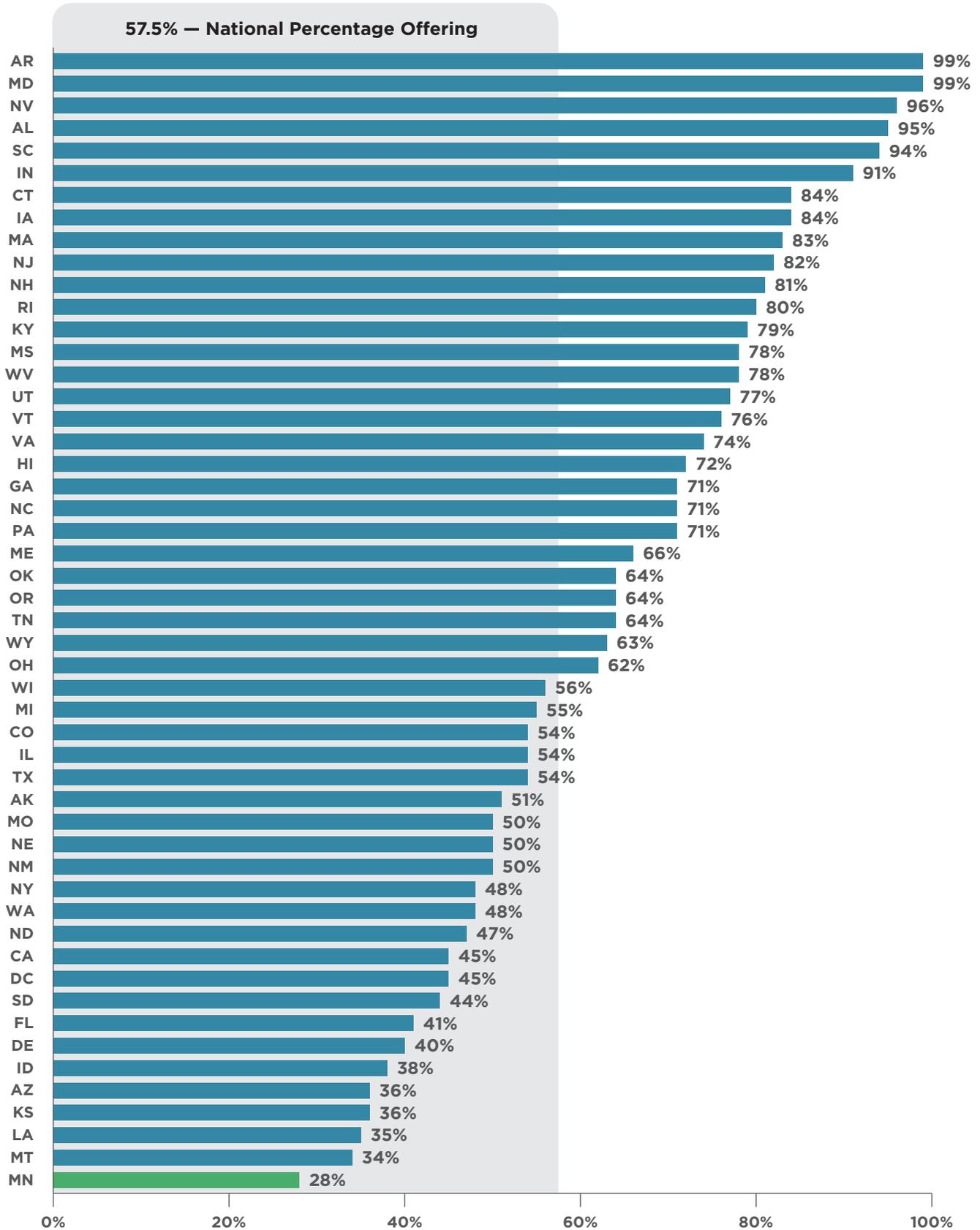| Race/Ethnicity	Student Demographics 9–12	AP Exam Takers
Black / African American	11%	6%
Hispanic / Latino / Latina / Latinx	10%	5%
Native American / Alaskan	2%	1%
Native Hawaiian / Pacific Islander	0.1%	0%
Asian	6%	24%
White	65%	53%
Two or More Races	5%	6%

Black and Hispanic students are 2 times less likely to take AP computer science exams than their white and Asian peers

Legend:
- Student Demographics 9–12
- AP Exam Takers

UNITED STATES

Percentage of Public High Schools Offering Foundational Computer Science Nationally

57.5% — National Percentage Offering

State	Percentage
AR	99%
MD	99%
NV	96%
AL	95%
SC	94%
IN	91%
CT	84%
IA	84%
MA	83%
NJ	82%
NH	81%
RI	80%
KY	79%
MS	78%
WV	78%
UT	77%
VT	76%
VA	74%
HI	72%
GA	71%
NC	71%
PA	71%
ME	66%
OK	64%
OR	64%
TN	64%
WY	63%
OH	62%
WI	56%
MI	55%
CO	54%
IL	54%
TX	54%
AK	51%
MO	50%
NE	50%
NM	50%
NY	48%
WA	48%
ND	47%
CA	45%
DC	45%
SD	44%
FL	41%
DE	40%
ID	38%
AZ	36%
KS	36%
LA	35%
MT	34%
MN	28%

March 5, 2024

Committee Chair Youakim and Members of the House Education Finance Committee:

On behalf of the nearly 200 technology-enabled companies that comprise the membership of the Minnesota Technology Association, we urge you to pass HF 3492 and provide funding for computer science educator training and capacity-building in Minnesota.

Look across Minnesota and it's clear that nearly every industry is impacted by digital technology. Whether in agriculture, healthcare, manufacturing, finance, retail, transportation, education, or the arts, understanding computers and how to use them to solve problems is an important skill for our current and future workforce. Computer science coursework provides an essential foundation to students – not only for careers in technology, but for every career in today's world.

But sadly, Minnesota continues to rank **LAST** in the nation in terms of the percentage of high schools offering computer science coursework, at just 28%. To our south, Iowa's commitment to CS education is showing, with 84% of its high schools now offering coding classes. To our west, North Dakota recently passed legislation making computer science a graduation requirement for all students. While other states recognize the importance of preparing students for the technology-enabled jobs of the future, Minnesota falls further behind.

The time to act is now. The recently drafted MN State Strategic Plan for Computer Science establishes a road map for CS education success for Minnesota school districts and a key component is funding for teacher training and district capacity-building. A relatively modest investment of $8 million can jumpstart this initiative and lay the groundwork to successfully educate our next generation of technology creators, not simply users.

We thank you for your leadership on this important investment in Minnesota's future.

Sincerely,

Jeff Tollefson
President & CEO
Minnesota Technology Association

Dear Representative Hemmingsen-Jaeger,

My name is Tom Cozzolino, I am a middle school computer science teacher in Bloomington Public Schools. I am writing to express our strong support for HF3492, to help expand computer science education opportunities for our students in Bloomington and across Minnesota. It is imperative that we take steps to broaden access and participation in computer science education opportunities for our students, and HF3492 is a great step in that direction.

Technology is changing at an incredible pace, and continues to advance and reach into all areas of our lives. With current advances in AI, robotics, automation, and more it is easy to see that students will be working with many different technologies daily both in their personal and professional lives. It is critically important as educators to help equip students with the skills and mindsets they need to help navigate these changes and be prepared to solve problems that don't even exist yet.

A recent Code.org report of the current state of computer science education in all 50 states has listed Minnesota as 50 out of 50 for how our students are able to access computer science education. This is something that needs drastic and urgent changes if we want to help our students feel successful in their futures. Even if students do not want to go on to pursue a career in a computer science related field, or major in a related area in college, everyone will be interacting with technology in some way no matter what path they choose to pursue. Exploring computer science helps all students to be better able to leverage these technologies and open up new opportunities.

In Bloomington Public Schools we have been working to establish a K-12 Computer Science pathway for all students in order to ensure all students have equitable access to computer science education throughout their schooling. This work is ongoing but has already resulted in new classes being offered at all levels, more students engaging with computer science, integration of computer science skills into other curriculum areas, and additional extra-curricular opportunities as well. Students have shown great excitement and enthusiasm as they have created projects leveraging technologies to help solve problems that are important to them. Earlier this year in my classroom while we were exploring app development a student was able to create an app of a game to keep track of how often they are misgendered, in an attempt to playfully educate others on preferred gender pronouns as well as offer community and support to those who are often misgendered by others. Opportunities like this helped this student to express themselves and share something they feel strongly about, as well as offer help to others. This would not have been possible without a focus on computer science education and helping students leverage tools and technologies available to them.

Passing HF3492 is important to help expand access for all students to have similar opportunities in their schools. In Bloomington we are lucky to have a strong focus on creating K-12 computer science opportunities, but not all students, schools, and districts are in the same position. HF3492 would help our district to be able to build upon what we have started, but also allow other schools and districts to begin their own computer science programs.

I strongly urge you to support HF3492, and help Minnesota show its commitment to our students and their futures. Thank you for considering this important issue. I look forward to the positive impact this will have for our students.

Sincerely,

Tom Cozzolino
Computer Science Teacher, grades 6-8
New Code Academy, Bloomington Public Schools
tcozzolino@isd271.org
651-269-2339

March 7, 2024

TO: Minnesota House Education Finance Committee

RE: Letter of Support for HF 3492

Dear Chair Youakim and Members of the House Education Finance Committee,

My name is Cassie Scharber. As someone who has been working within Minnesota on computer science education for many years, I write this letter **in support of HF 3492**, the Minnesota Computer Science Education Advancement Act.

Please note that this letter does *not* formally represent support from any of the organizations I work at or am involved in. It represents my personal opinions.

My involvement in computer science education has been, and continues to be, long-term and multi-faceted. As an Associate Professor at the University of Minnesota-Twin Cities, I teach classes and advise graduate students' research in this area. I conduct nationally sponsored research specific to computer science education. I work in partnership with local school districts on developing K12 computer science pathways. In addition, I am a CSforAll-MN steering committee member as well as a member of the Computer Science Working Group that was charged with developing a state strategic plan for computer science education.

My efforts in these roles are driven by my understanding of computing to be a **foundational literacy practice**. Computer science literacy extends beyond access to classes and careers. Technology is embedded into our daily lives, and it often replicates and reinforces systemic inequities and injustices. Technology is not neutral. Computer science literacy is directly connected to creating a more equitable and just world.

Funding to support computer science education in Minnesota is critical. HF 3492 provides much-needed funding to the support the development of a high-quality computer science education ecosystem for students, teachers, and teacher educators. I urge the committee to invest in HF 3492.

Thank you for your consideration and support.

C Schh

Cassie Scharber, Ph.D.
Associate Professor of Learning Technologies
College of Education + Human Development / University of Minnesota – Twin Cities
scharber@umn.edu

March 6, 2024

RE: Support for House Bill 3492- Computer Science Education Advancement Program
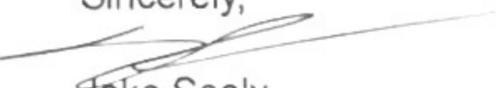
Dear Legislators,

My name is Jake Seely and I am a resident of Minnesota and a parent to two students who attend a MN public school. I also work directly with educators across the state assisting with the adoption of computer science curriculum. It is because of these relationships and experiences that I am writing today in support of House Bill 3492.

Computer science is a vital part of our education system. At its core, it teaches students to think critically and work together more collaboratively with their peers. It unlocks creativity and provides the opportunity to grow the skill sets that our children will need for the future. Computer science is one of the fastest growing technology fields, yet we do not currently have enough graduates to fill these positions in our state. Investing in computer science education will open up career opportunities for many students. HB 3492 will allow school districts to apply for funding to unlock computer science and give students exposure to this field.

I support HB 3492 because it will expand computer science education in Minnesota. It will allow schools and districts to expand and adapt their computer science curriculum to keep pace with this quickly changing field. It will give students the opportunity to expand their learning and continue developing their skills in the areas that will open doors of opportunity to the future of 21st-century tech.

Sincerely,

Jake Seely
734 Brook Circle E
Montrose, MN 55363

SciMathMN brings together a statewide STEM community to promote equitable and accessible STEM learning and workforce participation, empower lifelong learning, and inspire informed community action.

Dear Education Committee Members,

I write in support of HF 3492, the Minnesota Computer Science Education Advancement Act. At SciMathMN we see this bill as key in moving Minnesota forward with equitable access to foundational 21st-century skills and knowledge. All jobs today require digital skills, and moving Minnesota forward on computer science education, builds a more dynamic state economy and skills in high-demand, high-wage jobs.

SciMathMN is a non-profit STEM (Science, Technology, Engineering, and Math) organization that brings together a statewide STEM community, promoting equitable STEM learning and workforce participation, empowering lifelong learning, and inspiring informed community action for all Minnesotans to engage in a dynamic STEM ecosystem, ready for life and work. We are the host of the Minnesota STEM Teachers Center, an online resource for all Minnesota teachers who teach students math or science.

HF 3492 is an important step to approach to the complex challenge of assuring that all Minnesota students have access to computer science education beginning in elementary school, that teachers are adequately prepared and supported, and the state can support the current standards in computer science.

Advanced Placement Computer Science courses act as a useful proxy for access to courses at the high school level. Minnesota's challenge for equity is revealed in the AP test takers. In 2020 only 1,806 high school exams were taken in AP Computer Science by high school students in Minnesota; of those only 23% were taken by female students; only 112 exams were taken by Hispanic/Latino/Latina students; only 82 exams were taken by Black/African American students; only 5 exams were taken by Native American/Alaskan students; only 1 exam was taken by Native Hawaiian/Pacific Islander students (College Board, 2018). Only 84 schools (29% of MN schools with AP programs) offered an AP Computer Science course last year.

The National Center for Science and Engineering Statistics observed in their recent report Diversity in STEM: Women, Minorities, and People with Disabilities "A diverse workforce provides the potential for innovation by leveraging different backgrounds, experiences, and points of view." For Minnesota to have an innovation economy we need to build opportunities for computer science knowledge starting early and continuing toward high school graduation. I urge that the committee pass HF 3492.

Thank you,

Vic Dreier
Board Chair
SciMathMN

John Bartucz
Teaching Specialist
University of Minnesota
215 Johnston Hall
101 Pleasant St. S.E.
Minneapolis MN 55455

(612) 625-7111
jbartucz@umn.edu

3/5/2024

Dear Legislators:

As faculty in both the education and computer science departments at the University of Minnesota, I am writing today in support of the Computer Science Education Advancement bill, HF 3492.

Every K-12 student in Minnesota should have access to computer science (CS) education because computer science impacts almost every facet of our daily lives. Understanding what CS concepts like algorithms and artificial intelligence are and how they impact our daily lives is necessary to be an informed citizen in the 21st century. Computer science also drives innovation in many areas important to our local economies, from agriculture to healthcare to retail to tourism.

It is important that Minnesota invests in CS education for K-12 students and schools. The students who have exposure to CS before college are more likely to major in computing-related fields. However, it is often students with privilege who have had the opportunity to take a CS course, participate in a robotics program, or have a parent or family member encourage them to pursue a career in CS. Adding CS in K-12 schools will increase the number of students aware of computing before college, helping us diversify the students in our programs and the future technologists in our state. Our college computer science graduates have access to well-paying job opportunities in Minnesota and beyond.

Graduates of our programs are in demand and successful in securing job offers. All students in Minnesota should have access to the opportunity to learn computer science before college so they can be engaged citizens and make informed decisions about college and career pathways in computing.

Sincerely,

John Bartucz

John Bartucz