



Alaska Department of  
Education & Early Development

# Alaska Computer Science Education

## State Plan

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(Used for major points from revisions)

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## Introduction

Computer science (CS) is best defined as “the study of computers and algorithmic processes, including their principles, their hardware and software designs, their applications, and their impact on society.” The most important aspect of CS is problem-solving, which is an essential skill for all disciplines. Through CS education, students learn to design, develop, and analyze software and hardware to solve problems in a variety of contexts.

In January 2018, the State Board of Education and Early Development announced a strategic plan to provide transformative change to Alaska’s education system. Alaska’s Education Challenge—developed in collaboration with school districts, legislators, and partner organizations—provides a framework to increase educational outcomes. The framework focuses on establishing positive student performance trajectories via five goals:

1. Support all students to read at grade level by the end of third grade.
2. Increase career, technical, and culturally relevant education to meet student and workforce needs.
3. Close the achievement gap by ensuring equitable educational rigor and resources.
4. Prepare, attract, and retain effective education professionals.
5. Improve the safety and well-being of students through school partnerships with families, communities, and tribes.

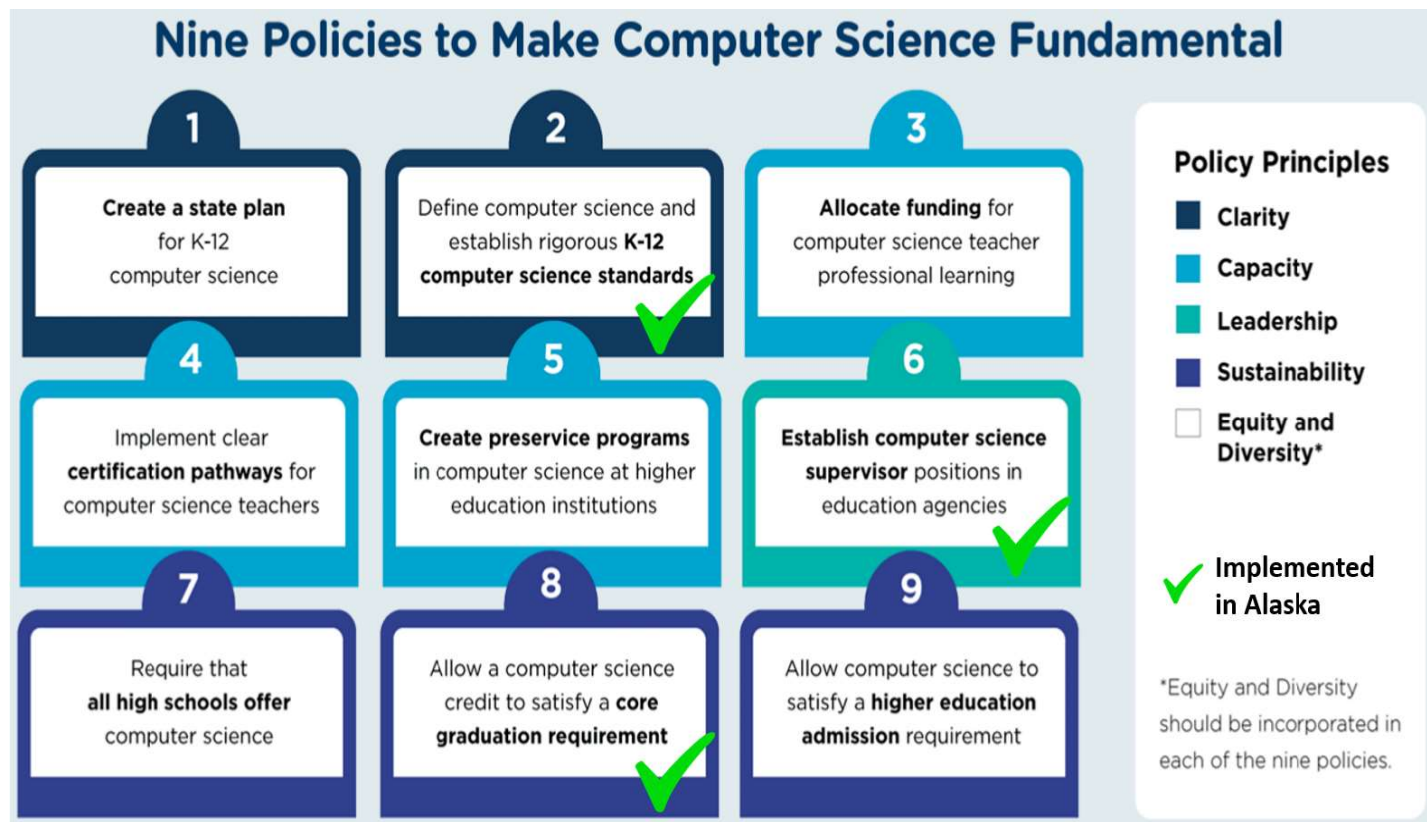
Our world is driven by technology. CS has become a “new basic” skill necessary for all students. One of the main goals identified by Alaska’s Education Challenge is to help our students master the foundational skills and competencies they need for their futures. CS, and furthermore computational thinking, is an important element in these foundational skills. Whether the students grow to pursue computer-related careers, CS education helps “increase career, technical, and culturally relevant education” that prepares Alaska students for the 21<sup>st</sup> century work force.

Research has shown CS instructions have positive impacts on math and science learning in K-12. In a study (Cheng, 2016) on high school math curriculum with CS integrated, students’ passing rate improved significantly from 61% to 94%. Another study by Salac, Thomas, Butler, and Franklin (2021) evaluated math test scores of fourth graders in two groups: one with CS instructions and the other without. In the two-year comparisons, the students who participated in CS instructions showed statistically higher improvement in math scores compared to their peers who did not receive CS instructions.

On July 14, 2022, the National Governors Association (NGA) announced that 50 U.S. governors had signed on to the Governors’ Compact to Expand K-12 CS Education. The governors, including Alaska Governor Mike Dunleavy, committed to:

1. Increase the number of high schools offering CS courses.
2. Allocate state funding to K-12 CS education.
3. Create pathways to postsecondary success in computing and related careers.
4. Provide equitable access to CS for all students.

The NGA also released a toolkit that identified the following Code.org's 9 policy areas that should drive any successful CS initiative and correlate with K-12 CS implementation rates.



The Alaska CS State Plan looks at the current state landscape of CS education, identifies the strategic areas of focus, sets realistic, challenging, and measurable goals to expand CS education to all the students in the state. This state plan is intended to be a working document and designed to respond to changes in the best practice in national K-12 CS education as well as the specific needs of Alaska students.

## Current Landscape

### Computer Science Standards

Alaska adopted its first CS K-12 standards in March 2019. The Alaska CS Standards are based on the CS Teachers Association's Interim K-12 CS Standards. It introduces the

principles and methodologies of CS to all students and addresses the entire K-12 range. K-12 educators from around the state, institutions of higher education, as well as industry were engaged as part of the standards creation process.

## Computer Science Credit Counts in High School Graduation

On March 26, 2019, Commissioner of Education and Early Development Michael Johnson issued a letter<sup>1</sup> that districts may choose to allow a CS course (including advanced placement (AP)) to fulfill one of the following as part of the high school graduation requirements:

1. A credit requirement in mathematics;
2. A credit requirement in science;
3. A local elective requirement; or
4. A local CTE or technology requirement.

## Dedicated Computer Science Position

On August 22, 2022, the Statewide Coding and Computer Science Career Coordinator position was filled at the Department of Education and Early Development.

## Computer Science AP

There are currently two AP computer science classes: AP Computer Science A and AP Computer Science Principles. There are also many other high-quality CS K-12 curriculums developed or adopted in districts across Alaska.

The AP Computer Science Principles (CSP) is an introductory class to CS. It focuses on computational thinking and encourages students to explore how computer software and other technology can be used to solve problems. This course does not designate one specific programming language, but rather explore problem-solving using a combination of block-based and text-based programming languages.

The AP Computer Science A (CSA) is a programming class in Java. Java is used to build server-side applications, games, financial applications, as well as android mobile applications. The course focuses on problem-solving, design strategies and methodologies, data structure, and data analysis using algorithms.

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<sup>1</sup> <https://education.alaska.gov/edtech/pdf/cs-credits-letter.pdf>

## AP Computer Science Exam Participation by Gender<sup>2</sup>

Year	Female Exams	Male Exams	Percent Female Total	Female Exams AP CSA	Male Exams AP CSA	Percent Female AP CSA	Female Exams AP CSP	Male Exams AP CSP	Percent Female AP CSP
2021	20	80	20%	6	33	15%	14	47	23%
2020	16	92	15%	4	39	9%	12	53	18%
2019	29	88	25%	15	47	24%	14	41	25%
2018	29	86	25%	10	17	37%	19	69	21%
2017	17	51	25%	5	21	19%	12	30	29%

## AP Computer Science Exam Participation by Race/Ethnicity<sup>2</sup>

Year	Asian (%)	Black/ African American (%)	Hispanic/ Latino/Latina (%)	Native American/ Alaskan (%)	Native Hawaiian (%)	White (%)	Two or more races (%)
2021	12 (12%)	1 (1%)	3 (3%)	3 (3%)	0 (0%)	71 (72%)	9 (9%)
2020	13 (12%)	0 (0%)	8 (7%)	1 (1%)	0 (0%)	68 (63%)	18 (17%)
2019	9 (8%)	0 (0%)	7 (6%)	6 (5%)	0 (0%)	80 (68%)	15 (13%)
2018	8 (7%)	1 (1%)	14 (12%)	3 (3%)	0 (0%)	70 (61%)	19 (16%)
2017	4 (6%)	0 (0%)	4 (6%)	1 (1%)	0 (0%)	48 (71%)	11 (16%)

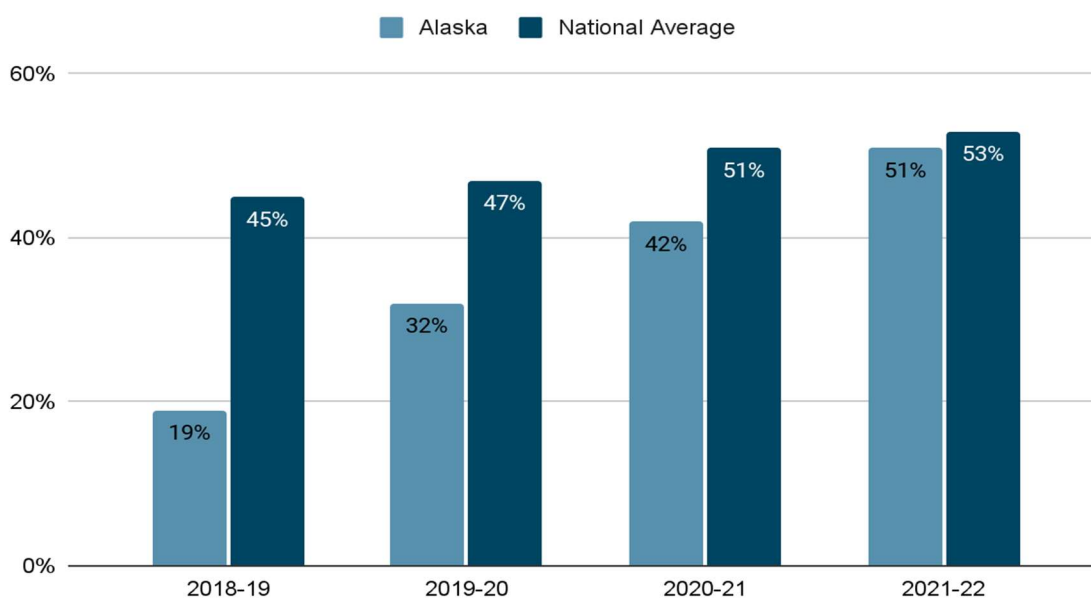
<sup>2</sup> Code.org, CSTA, & ECEP Alliance (2022). 2022 State of Computer Science Education: Understanding Our National Imperative. Retrieved from <https://advocacy.code.org/stateofcs>

## High School Computer Science

### High School Student Population in Alaska<sup>2</sup>

	Student Population in Schools Offering High School Grades	Student Population in Schools Offering High School Grades (percentage)	Percent of Students Who Attend a School that Offers CS (2022)
Asian	2,784	4%	80%
Black/African American	1,398	2%	72%
Hispanic/Latino/Latina	4,018	6%	76%
Native American/Alaskan	20,169	28%	58%
Native Hawaiian/Pacific Islander	1,478	2%	77%
White	34,738	48%	77%
Two or More Races	7,272	10%	76%
Total students	71,857		71%

### Percentage of High Schools Offering CS (AK vs. National)<sup>3</sup>

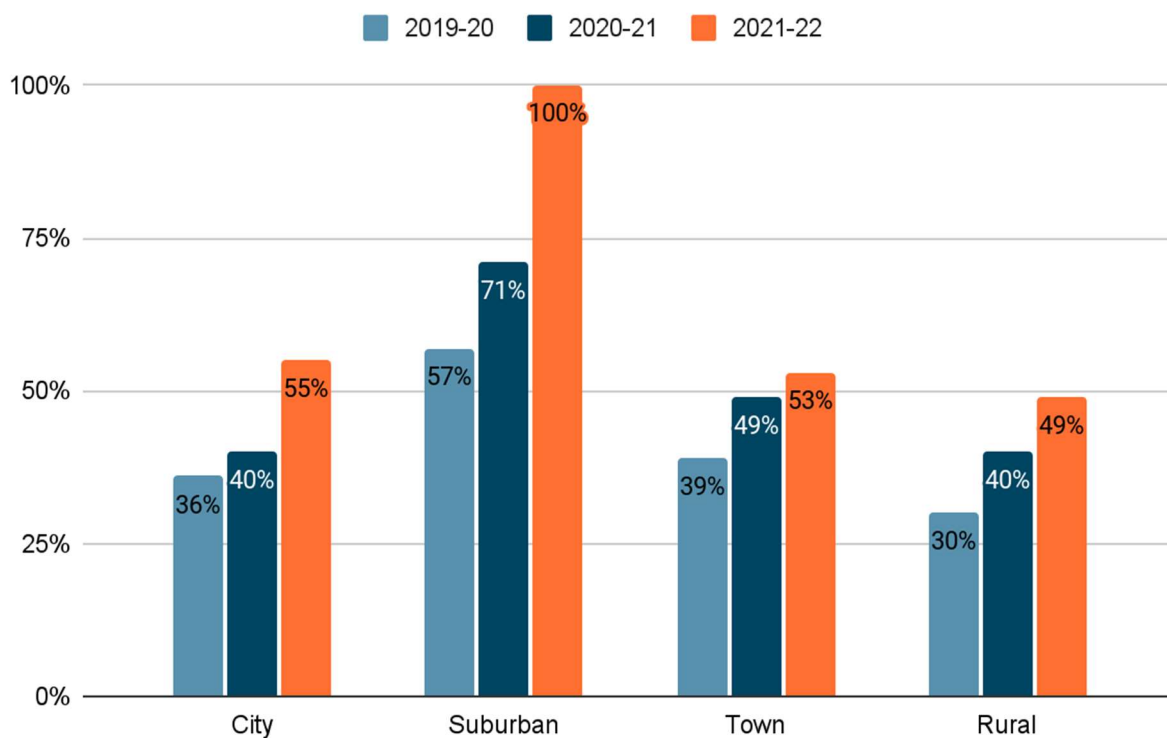


<sup>3</sup> Code.org, CSTA, & ECEP Alliance (2022). 2022 State of Computer Science Education: Understanding Our National Imperative. Retrieved from <https://advocacy.code.org/stateofcs>



## High School Offering Computer Science by Geography in Alaska<sup>4</sup>

Schools by Geography	Total Schools	2022	2021	2020	2022 National	2021 National	2020 National
City	22	55%	40%	36%	47%	48%	44%
Suburban	6	100%	71%	57%	60%	61%	57%
Town	34	53%	49%	39%	N/A	46%	41%
Rural	208	49%	40%	30%	50%	49%	43%



<sup>4</sup> Code.org, CSTA, & ECEP Alliance (2022). 2022 State of Computer Science Education: Understanding Our National Imperative. Retrieved from <https://advocacy.code.org/stateofcs>

# Computer Science State Plan Goals and Strategies

## Equity and Access (EA)

CS prepares students for the future. In Every Student Succeeds Act, CS is included as part of a “well-rounded education”. This means that CS education is not designed to be offered to a selected few or as an elective for interested students, it is intended for all of Alaska’s students.

### Goals

1. Ensure all K-12 students in Alaska have access to quality CS instructions, in urban and rural schools.
2. Reduce the gap in the number of female students enrolled in grade 7-12 CS courses.
3. Reduce the gap in Alaska Native students enrolled in grade 7-12 CS courses.
4. Increase the number of students enrolled in AP level CS courses and earn scores higher than 3 in the CSP or CSA exams.

### Strategies

#	Description	Goals Targeted
1	Assist school districts to develop plans to ensure access to CS instructions and measures to report.	1
2	Develop regular assessments through data collection and analysis to identify any access and equity gaps in the state.	1, 2, 3, 4
3	Develop CS instructional delivery models specifically for rural areas (regional, statewide, online offerings, etc.)	1, 2, 3
4	Advertise and/or sponsor K-12 CS events, trainings, and competitions, in particular a focus on underrepresented student populations, particularly rural, female, and Alaska Native students.	1, 2, 3, 4
5	Identify opportunities by building partnerships with state diversity and equity initiatives to promote diversity in CS education.	1,2,3
6	Provide funding for support to help schools to increase capacity to design creative ways to add CS instructions.	1, 2, 3, 4
7	Provide funding to support districts in providing instructional coaching in CS to increase equity and access across the state.	1, 2, 3

## Teacher Pipeline and Endorsement (TPE)

Professional learning consists of

- CS preparation for current teachers who are interested in either integrating CS in their subject areas or to offer standalone CS classes.
- Offering CS fundamental classes to pre-service teachers.

## Goals

1. Establish at least one teacher or access to a teacher who is teaching high-quality CS courses in every secondary school.
2. Establish certification/endorsement pathways in CS to current teachers.
3. Establish a policy for CS offering/requirements in at least one undergraduate program for teachers.

## Strategies

#	Description	Goals Targeted
1	Collaborate with professional learning organizations, such as Alaska Department of Education and Early Development Career Technical Education (CTE), Alaska Staff Development Network (ASDN), Alaska Society for Technology in Education (ASTE), etc. to organize and secure professional trainings in line with the Alaska's CS standards for each grade band.	1, 2
2	Provide recognition and/or incentives to both current and pre-service teachers for completing CS professional trainings.	1, 2, 3
3	Create partnerships with universities in CS offerings to both pre-service and current teachers.	2, 3
4	Develop guidelines for course work and/or content exams for CS endorsement and/or certification.	1, 2, 3
5	Advocate for an example of Praxis exams of CS and determine the passing scores.	1, 2, 3
6	Assess micro-credential CS options for current teachers.	2

## Curriculum and Standards (CS)

### Goals

1. Establish Alaska's CS standard adoption in all districts.

### Strategies

#	Description	Goals Targeted
1	Promote awareness of the Alaska's CS standards to all school districts.	1

2	Promote the adoption of the Alaska's CS standards at all school districts.	1
3	Provide support and guidance to school districts on how to align CS curriculum to the Alaska's CS standards.	1
4	Provide professional learning on Alaska's CS standards.	1
5	Promote adoption of high-quality CS curriculum aligned with the Alaska CS standards at all grades level.	1

## Outreach (OR)

### Goals

1. Create a common information reservoir of CS K-12 education.
2. Establish a regular channel to obtain feedback and collect data to measure implementation effectiveness and make timely adjustments.

### Strategies

#	Description	Goals Targeted
1	Create a CS website or page hosted under the Department of Education and Early Development's website to centralize CS education-related information.	1
2	Develop engaging media to promote K-12 education to various audiences.	1
3	Develop a list of area experts in K-12 CS to present and advocate to various audiences and educational conferences.	1
4	Seek partnerships to host local and statewide CS competitions to promote K-12 CS education and invite school board members and policymakers to give recognition to winning students and schools.	1
5	Establish and expand indigenous and stakeholder groups to review implementation results, suggest updates, and review Alaska CS state plan revisions annually or as needed.	1
6	Identify and establish working relationships with crucial CS leadership organizations to promote K-12 CS education further.	1
7	Promote awareness of Alaska CS standards and adoption of the standards in all school districts.	1
8	Promote public and private industry recognition that contributes to CS professional learning for K-12 teachers.	1

9	Collaborate with Higher Ed in Alaska to promote CS education as part of teacher preparation programs.	1
10	Facilitate increased awareness of opportunities for students to have early access to the industry through internship, mentorship, and apprenticeship.	1
11	Define CS data to measure the state of CS education.	2
12	Identify sources and develop surveys to collect the CS data.	2

## Funding (FD)

### Goals

1. Identify and secure federal, state, and/or industry funding opportunities to expand CS education.
2. Prepare a budget to implement the strategies in the CS state plan.

### Strategies

#	Description	Goals Targeted
1	Identify and partner with researchers and apply for the National Science Foundation and similar grants to support CS expansion.	1
2	Support and assist school districts interested in building CS pathways in existing or new CTE programs.	1
3	Identify and facilitate free or reduced rates on CS curriculum and professional learning services.	1
4	Work with the Governor and Legislature to appropriate state and/or federal funding for CS in Alaska.	2
5	Research and apply for appropriate grants and partnerships from the industry.	1

## Reference

Salac, Thomas, Butler, & Franklin. (2021). Understanding the Link between Computer Science Instruction and Reading & Math Performance. ITiCSE. [https://jeansalac.github.io/docs/ITiCSE2021\\_CSonReadMath.pdf](https://jeansalac.github.io/docs/ITiCSE2021_CSonReadMath.pdf)

Cheng. (2016). Teaching math with computer programming can help narrow achievement gap. EdSource. <https://edsources.org/2016/teaching-math-with-computer-programming-can-help-narrow-achievement-gap/563371>