

# CS Education in Washington state

*Amy J. Ko* • Professor • University of Washington  
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# Amy

## Professor

*The Information School +  
Paul G. Allen School of Computer Science &  
Engineering*

In addition to research, teaching, service, and overseeing Informatics, I direct *CS for All Washington*, an advocacy group that brings together stakeholders across the state to shape state policy, budget, and opportunities.

# Shannon

## CS Program Supervisor

*Office of the Superintendent of Public  
Instruction*

I guide, organize, implement, the state's K-12 CS education efforts.

# Other statewide CS for all advocates

Representing UW, OSPI, CSTA, TEALS, Olympia, Spokane, Tri-Cities, Central Washington, Bellingham



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[Patrick O'Steen](#)

- **Regional Manager Lead, West Region**, Microsoft TEALS
- [email](#)

Today's talk

**Amy** will discuss  
the gaps in our  
state

**Shannon** will share  
what we're doing  
about it, and how you  
can help

# Inequities in Washington state CS education

*Amy*

# Across Washington, children are going to school

They're learning about reading, writing, humanities, mathematics, science, social studies, art, music, government, health, and wellness

Inspired by their teachers, tweens are cultivating interests in books, arithmetic, nature, history, painting, instruments, civics, medicine, and more.

Throughout, many are encountering computers and software, using it to learn, to connect, and to entertain themselves, integrating it into their daily lives in ways even parents cannot see.



# CS in primary school

Despite all of this learning and all of this computing, only a fraction—fewer than **5%** of primary school children—are encountering ideas from CS.

Why? Their teachers do not know it and aren't expected to teach it. Their parents do not know it and aren't encouraging it. CS is not visible in their communities and lives, except perhaps in television and movies, which primarily portray people who know CS as nerdy white or Asian men.

The only children learning CS at this age have parents who know CS, and bring it into their lives.



# CS in middle school

CS *should* be ubiquitous: science can use code to analyze data, math can use it make functions concrete, social studies can engage it as a site for sociotechnical reflections, and CS itself can trigger interest in robotics, data science.

But only those youth in the <math><10\%</math> of schools that CS, whose parents encouraged a CS elective or after school program, or whose teachers happened to know a bit of CS to integrate—learn about CS.



# CS in high school

By high school, most teens have established interests and hold stereotypes about CS closely: it's for nerdy boys, it's too hard for me. If their high school offers it, it's probably AP CS A, and academic advisors steer youth away from it because of its difficulty, and the low likelihood that it will help college admissions.

Only those students with an existing interest in CS—and at one of the only **60%** of Washington high schools that offer CS—take a CS elective. And few encounter it in other classes, unless they are at one of a few elite districts like Bellevue with CS learning pathways that integrate it into other subject areas.



# CS in higher education

The youth that find their way to CS in higher education, then, are the ones that had a history of privileged access:

- Access to computer and the internet
- Access to inspiring, encouraging CS teachers
- Access to parents that understood the value of CS and encouraged it
- Access to college

This is not a story of youth “discovering” their passion, but of a series of experiences, shaped by opportunities provided by their schools and communities, that *cultivated* a passion.



# The data

Shannon

# Data collection

To help gather well-defined data, last OSPI brought together several stakeholders to define what courses count as CS, gather data based on that definition, and prepare an annual report on CS education participation.



Washington Office of Superintendent of  
**PUBLIC INSTRUCTION**

## **K-12 COMPUTER SCIENCE EDUCATION**

*Data Summary Report 2020*

Authorization Legislation: RCW 29A.0500.587

Mahe Taylor

Assistant Superintendent of Learning and Teaching

Prepared by:

- **Shannon Thissen**, Computer Science Program Supervisor  
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# Washington state's definition of CS

The state definition of computer science includes, but is not limited to:

- *The design of both computer equipment and digital systems, and the interface between the hardware and software required for these systems.*
- *How algorithms, data structures, and modules are used to implement computer software and hardware.*
- *Problem-solving skills for designing computer software and hardware such as pattern recognition, decomposition, debugging, and software troubleshooting.*
- *How hardware and software are used to implement computers, networks, and other digital systems.*
- *The use of computer programs to collect, analyze, store, transform, model, and visualize data.*
- *How networking devices enable communication and organization and increase the need for cybersecurity.*
- *Using computers to collect, analyze, transform and store data to create visualizations, models, and inferences.*
- *How the privacy and security of data can be protected with computers.*
- *How computers affect people and society.*

# CS courses offered, based on this definition (2019-20)

172 districts offering CS courses, 58% of the state's districts.

Courses Offered	Course Code	Course Name
34	10011	Computer Science Principles
21	10012	Exploring Computer Science
<b>47</b>	<b>10019</b>	<b>AP Computer Science Principles</b>
1	10052	Database Management and Data Warehousing
1	10054	Data Systems/Processing
1	10098	Management Information Systems—Workplace Experience
4	10101	Network Technology
9	10102	Networking Systems
11	10108	Network Security
2	10109	Essentials of Network Operating Systems
1	10148	Networking Systems—Workplace Experience
4	10149	Networking System – other
145	10152	Computer Programming
4	10153	Visual Basic (VB) Programming
2	10154	C++ Programming
18	10155	Java Programming
30	10156	Computer Programming—Other Language

Courses Offered	Course Code	Course Name
115	10157	AP Computer Science A
5	10159	IB Computer Science
26	10160	Particular Topics in Computer Programming
10	10197	Computer Programming Independent Study
14	10199	Computer Programming – Other
96	10201	Web Page Design
51	10203	Interactive Media
29	10205	Computer Gaming and Design
4	10206	Mobile Applications
21	10251	Computer Technology
6	10253	Information Support and Services
6	10254	IT Essentials: PC Hardware and Software
1	10297	Information Support Services Independent Study
7	10298	Information Support and Services—Workplace Experience
0	10198	Computer Programming— Workplace Experience
<b>726</b>		<b>Total</b>

**DRAFT**

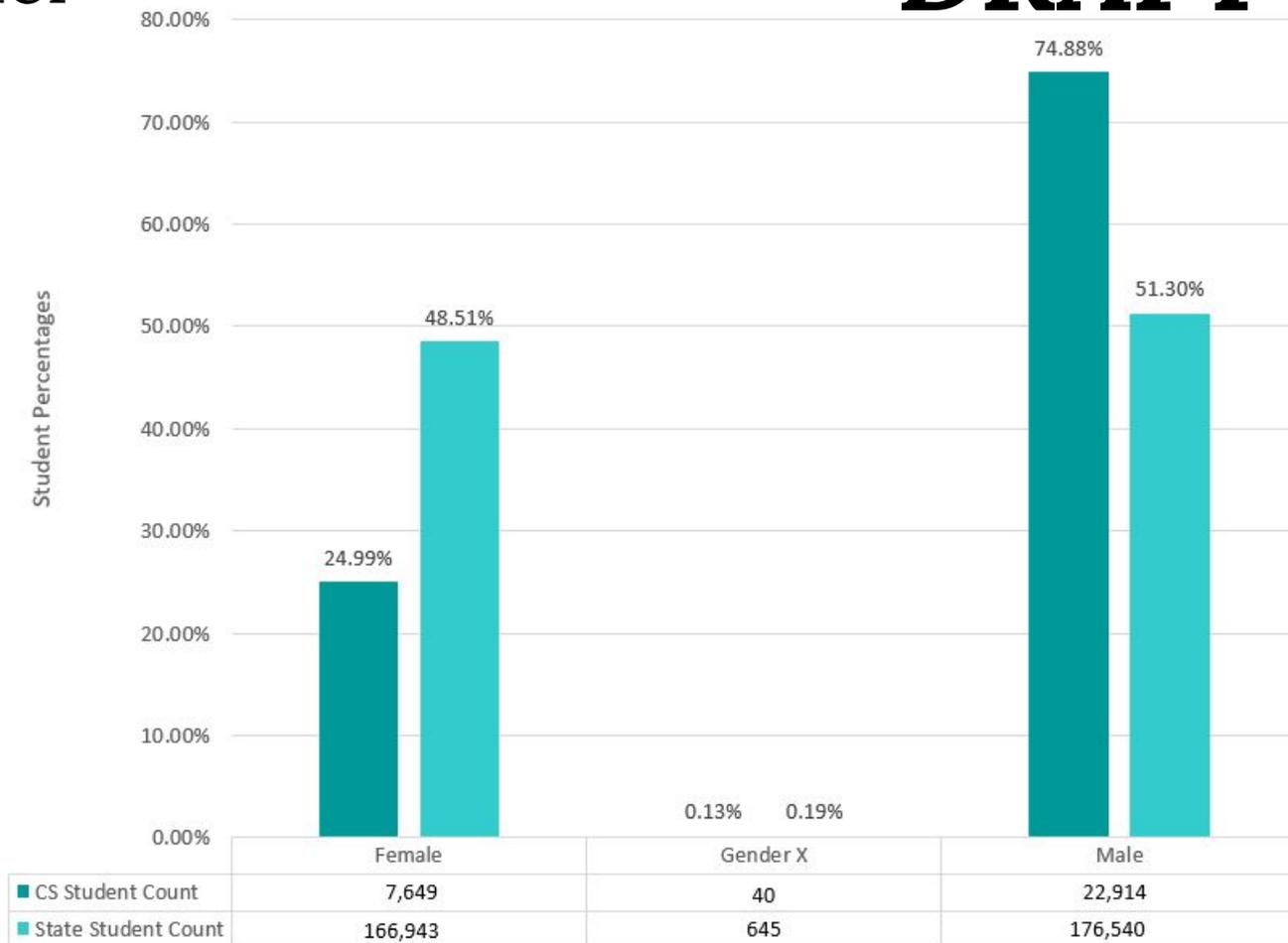
# Student Gender

# DRAFT

2019-2020

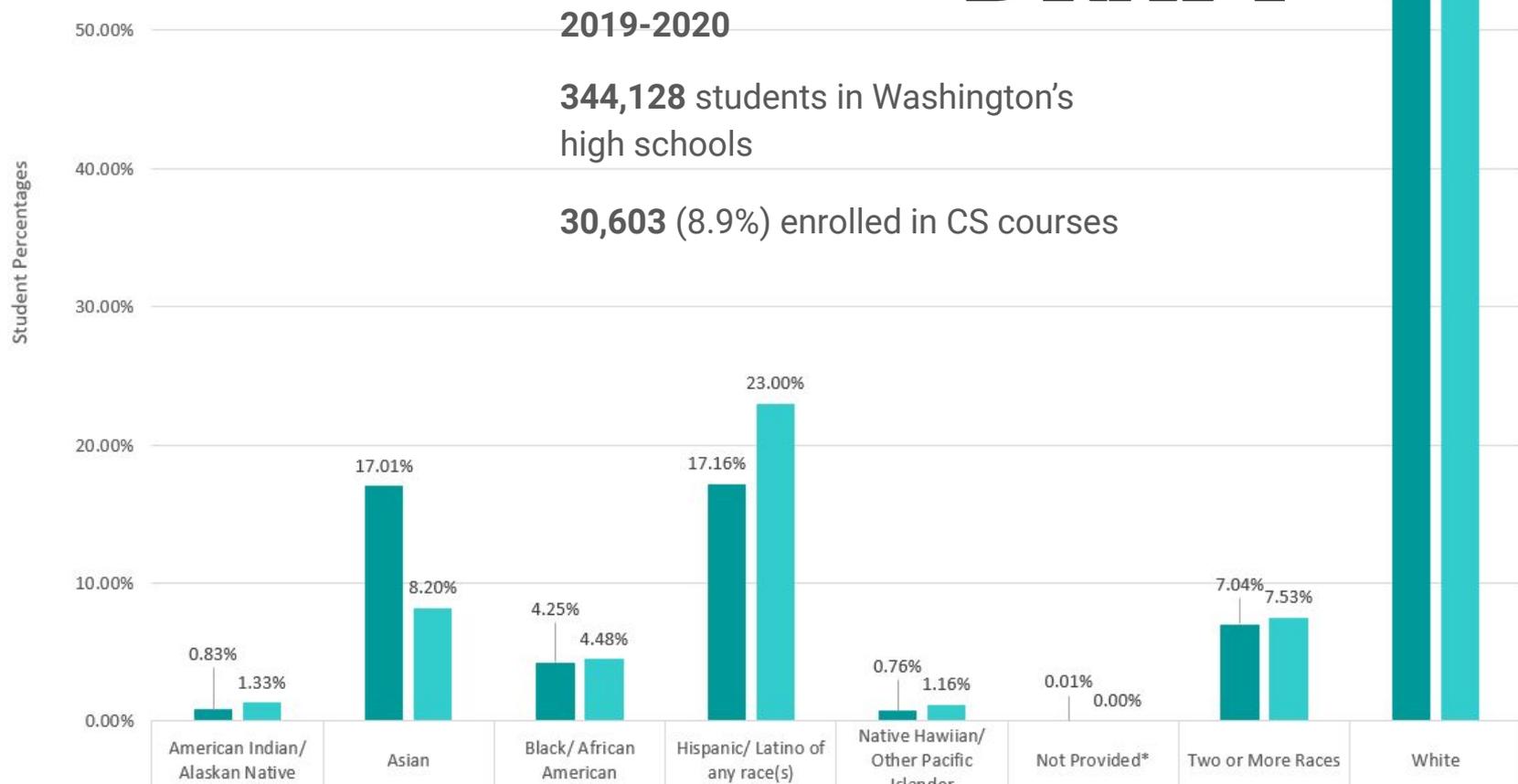
344,128 students in Washington's high schools

30,603 (8.9%) enrolled in CS courses



# Distribution by race/ethnicity

# DRAFT



CS Student Count	255	5,206	1,301	5,253	234	2	2,153	16,199
State Student Count	4,575	28,211	15,404	79,151	4,002	12	25,900	186,873

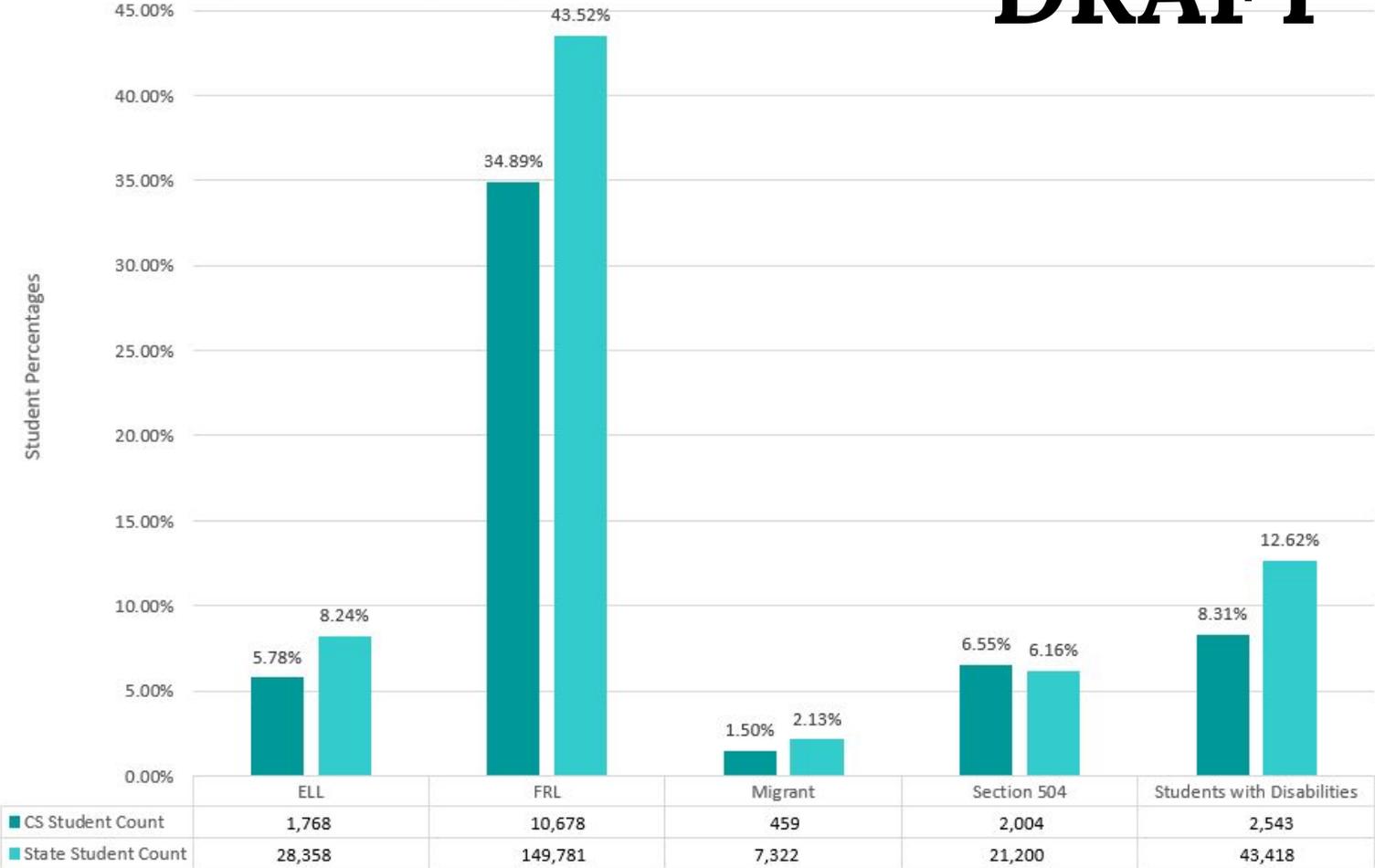
# Distribution by special populations

**DRAFT**

**2019-2020**

**344,128** students  
in Washington's  
high schools

**30,603** (8.9%)  
enrolled in CS  
courses



# DRAFT

## Distribution by grade level

2019-2020

344,128  
students in  
Washington's  
high schools

30,603 (8.9%)  
enrolled in CS  
courses



# Teacher certification

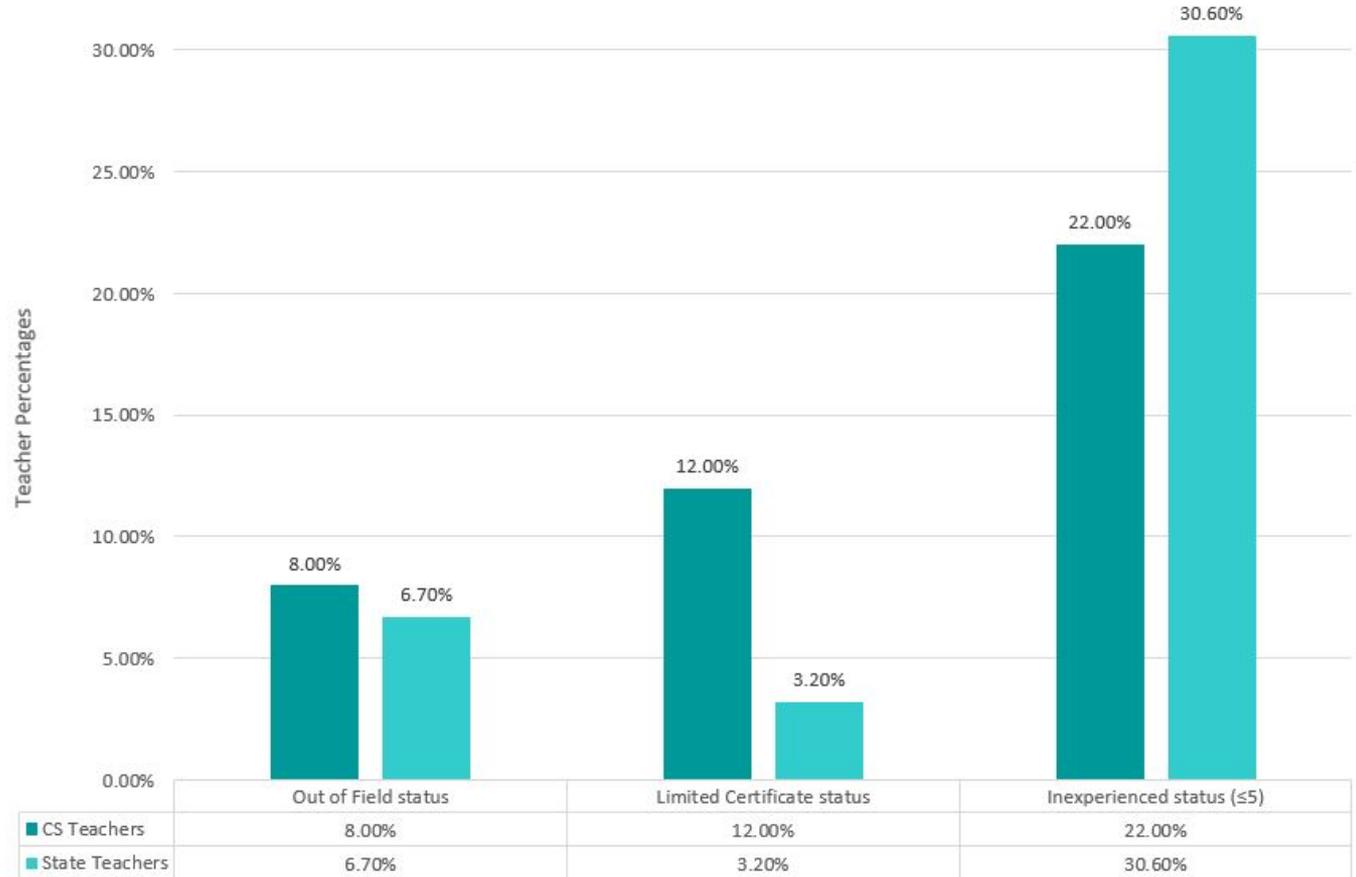
# DRAFT

Among the **476** teachers engaged in computer science instruction in **2019-20** out of **67,856** teachers in WA State.

Out-of-field status means that a teacher taught one or more courses outside of their endorsement area.

Limited Certificates must be initiated by a school district on behalf of the educator who is not eligible for full certification.

Inexperienced status means that a teacher had fewer than or equal to five (5.0) years of teaching experience.



# DRAFT Legislation affecting Computer Science

**SB5299:** The additions will allow for an **approved Computer Science Course** aligned to the Math Standards or Science Standards to count as a third-year Math or Science credit as long as it is **aligned with the student's high school and beyond plan.**

Approved Computer Science Courses are listed in the Computer Science guidance document.

# DRAFT Legislation affecting Computer Science

**SB5389:** (PESB)The professional educator standards board shall develop standards for two specialty endorsements in computer science, one in elementary computer science and one in secondary computer science.

Subject to the availability of amounts appropriated for this specific purpose, the legislature shall appropriate additional funds in the computer science education grant program **to support teachers with the costs associated with becoming certified, endorsed, or licensed in computer science including**, but not limited to, professional development, training, costs for licensure exams, courses in pedagogy, and courses in computer science content.

# Computer Science Grants 21-22

New System will be used in 20-21: It will look different

State Budget: Won't know if we have funds until the budget is signed

# Integration of CS in science, social science, humanities, and art

We actually have very little data on such integrations, since there are no reporting requirements at this level of granularity.

It is possible that some CS learning may be happening in math, science, and other subjects.

# How close are we to CS for All in Washington?

This is not a healthy CS education ecosystem; it does not reflect the diversity of our students, it is not grounded in CS expertise, and it is not leading to literacy

- Who gets to have a computer?
- Who gets to have the internet?
- Who gets to have teachers with CS pedagogical knowledge?
- Who gets to have CS electives?
- Who gets to have diverse CS role models?
- Who gets access to college?

What are Washingtonians  
doing about these equity  
gaps, and how can you  
help?

Amy + Shannon

# Most major efforts are listed on [csforallwa.org](https://csforallwa.org)

Amy

Maintained by Amy, with content from across Washington state.

**Read it and share it with other people who want to advocate for CS for All. Tell us what's missing or wrong using the feedback form.**



Across our state, **too few students learning about computing**, whether it's a lesson in a K-5 class that integrates computer science ideas, a computer science elective in a middle school or high school, or an after school or summer coding camp. Why should our state's youth learn CS?

- *Diversity.* Participation in CS by women, people of color, and people with disabilities is among the lowest of all STEM fields.
- *Skills.* Learning CS promotes 21st-century skills such as creativity, collaboration, and communication.
- *Citizenship.* Being a good citizen in the 21st century include literacy about how computing shapes our lives and society.
- *Community.* Our communities need people empowered to use computing to address local problems.
- *Workforce.* There is a global shortage of skilled software engineers. CS education can fill that gap.
- *School reform.* Teaching CS is a compelling, creative space where pedagogy is rich, experimental, and innovative.
- *Empowerment.* Computing provides youth with the ability to express themselves creatively and have voice.
- *Justice.* Computing can be a powerful tool for enacting justice; everyone should be able to harness it.

# K-12 Computer Science grants Shannon

Each year, Washington state budgets \$1 million to support equitable expansion of CS learning opportunities. **Apply for them, or help schools apply for them.**

113 AESD  
105 Ahtanum Valley Elementary  
121 AVID Center  
113 Centralia School District  
105 Easton School District  
113 Hoquiam School District  
105 Mabton School District  
105 Mount Adams School District  
105 Mountainview Elementary  
171 NCESD 171  
113 Ocosta School District  
123 Othello School District  
123 Prescott School District  
114 South Kitsap School District  
112 Stevenson-Carson School District

105 Summitview Elementary  
121 Tacoma School District  
105 Wahluke School District  
123 Walla Walla Public Schools  
105 Wide Hollow Elementary  
105 Zillah School District

**ESD Planning (SCRIPT)**  
113 Centralia School District  
113 Ocosta School District  
123 Prescott School District  
112 Stevenson-Carson School District  
121 Tacoma School District

## **Sustaining (Finalizing last year)**

113 Hoquiam School District  
123 Othello School District

**Non-Profit**  
NP Techbridge Girls

## **AP Computer Science**

**ESD School/District/ESD/NP**  
171 Ephrata School District  
121 Federal Way School District  
101 Newport School District  
105 Royal School District  
105 Selah School District  
123 Walla Walla Public Schools  
112 Washougal School District

# CS Elective Requirement

Amy

Our advocacy group partnered with Code.org, Microsoft, and others to lobby for a new state law that will require all Washington state high schools to offer CS electives by 2022-23.

**Help schools meet this this requirement by sharing this guidance document (linked on [csforallwa.org](https://csforallwa.org))**



Washington Office of Superintendent of  
**PUBLIC INSTRUCTION**

## GUIDANCE ON TEACHING COMPUTER SCIENCE IN WASHINGTON STATE K-12 PUBLIC SCHOOLS

Authorizing legislation: HB 1577, SHB 5088

2020

# CS Professional Development Shannon

There are an increasing number of opportunities for PD

AVID is a key provider in partnership with Code.org

**If you or someone else needs help finding PD opportunities, send them to [csforallwa.org](http://csforallwa.org) for an up to date list of opportunities.**

# Pre-service CS teacher education *Amy*

There are two approved *programs*—*Whitworth* and *Central Washington University*

A new program is in review at the *University of Washington, Seattle* (led by Amy) and a fourth at *Western Washington University* in development.

**Help develop CS students' interest in teaching! And point them to these pathways as a direct route to equity-focused CS teacher education.**

## K-12 Outreach *Amy*

Until CS is ubiquitous in schools, afterschool and summer programs will be central to developing interest in CS, and they have never been more abundant.

However, they are primarily reaching wealthy white and Asian families in Puget Sound because of their high fees, and such families are already served by schools.

**Partner with outreach organizations to reach underserved communities, or consider starting your own**

# WINforCS Shannon

## Washington Integration Network for Computer Science



The Association of Educational Service Districts in collaboration with OSPI have a goal to lead a statewide effort to advance equitable and sustainable computer science education. This work is being done through:

- **Materials & Curriculum**
  - Awareness and opportunities to expand knowledge for teachers, administrators and district CS leaders
- **Leadership**
  - Increase awareness of the value of CS education and the need for CS K-12 pathways
- **Teacher Capacity**
  - Professional learning and support in integration CS standards into current practice
- **Partners & Community**
  - Identify and build relationships with community members and CS partners

# LMS SOLUTIONS

BEST PRACTICES FOR CONTINUOUS LEARNING

## Continuous Learning Supports

- Supporting the top 5 LMS platforms in Washington -
- Additional support for teachers working through remote and hybrid learning

## Program Components:

- [LMS 101](#) - Basics of LMS platforms, office hours
- [Best Practices for Continuous Learning](#) - Deep dives into LMS platform features and additional courses in the categories of digital tools, content-specific practices, learning environments, and instructional practices
- [District](#), [Family](#), and [Community](#) Resources to support parents and caregivers
- Regional educator networks - coming soon!

# Regional Coordinators Shannon

<b>ESD 114</b> <i>Susan Lathrop</i>	<b>ESD 105</b> <i>Darcie Jamieson</i> <i>Larry Davison</i>	<b>ESD 112</b> <i>Kristina Wambold</i> <i>Katherine Livick</i>
<b>ESD 113</b> <i>Andrew Hickman</i>	<b>ESD 101</b> <i>Tammie Schrader</i>	<b>ESD 121</b> <i>Amber McCulloch</i>
<b>ESD 123</b> <i>Lori Scott</i> ESD 123 <i>Lori Scott</i>	<b>ESD 171</b> <i>Pete Phillips</i>	<b>ESD 189</b> <i>Trinh Pham</i> <i>Amy Colburn</i>

# Participate in the statewide communities

Amy

- Follow **@WINforCS** on Twitter
  - Share events, offer resources, ask questions using the **#WINforCS** hashtag
- Attend a **Sound CS Ed** meetup ([soundcsed.org](https://soundcsed.org)), which brings together diverse advocates across K-12, higher ed, and industry
- Join the CS Ed Connect WA Slack (>100 strong) ([csed-connect.slack.com](https://csed-connect.slack.com)) community to have conversations with other advocates.
- Watch for the upcoming statewide CS summit, led by Shannon and a group of statewide stakeholders (including Amy) Email Shannon if you are interested in helping the planning committee



# Thank you! Questions?

## Action items for you

- Bookmark [csforallwa.org](https://csforallwa.org)
- Follow @winforcs on Twitter
- Think of one thing you can do to help address the statewide inequities in access to high quality K-12 CS education



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