November 2023

COMPUTER SCIENCE EDUCATION

STATEWIDE IMPLEMENTATION PLAN

PREVIEW DRAFT

OREGON DEPARTMENT OF EDUCATION

Oregon achieves . . . together!

HIGHER EDUCATION COORDINATING COMMISSION

Oregon
Tina Kotek, Governor

OREGON DEPARTMENT OF EDUCATION
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HIGHER EDUCATION COORDINATING COMMISSION

Dear Oregon Educators, Families, Industry Professionals, and Community Members,

We are pleased to announce the release of Oregon's Computer Science Education Statewide Implementation Plan, a comprehensive roadmap designed to guide the future of computer science education across the state of Oregon. This plan was formulated in close partnership between the Oregon Department of Education (ODE) and the Higher Education Coordinating Commission (HECC), alongside input from school districts, colleges, universities, industry professionals, and community organizations.

Central to our mission is the aim to focus on equity and to address the historical disparities that have disproportionately affected Oregon students, particularly female-identifying students, students of color, students with disabilities, and multilingual students. As such, the overarching goal of the Computer Science Education Statewide Implementation Plan is to broaden access, participation, and engagement in computer science education. The team at ODE and the HECC, through a robust process of community engagement, have identified seven outcomes for computer science education statewide, recommended strategies to make them a reality, and measures of progress to monitor their impact on student engagement in computer science education. These outcomes include a focus on supporting educators new to the profession or new to teaching computer science, dedicated resources for smaller schools and districts in rural areas that may face unique challenges offering computer science learning opportunities, alignment with higher education pathways, and stable funding for computer science education.

Computer science plays an ever-increasing role in this era of digital innovation, and high technology is a central pillar of Oregon's economy. To ensure the future and prosperity of all Oregonians, we must take collective action to make computer science education a priority, and more importantly, a possibility for every public school student in Oregon.

We invite you to review the full plan on our websites and engage with us as we take this crucial step towards a more equitable future in computer science education in Oregon.

Sincerely,

Dr. Charlene Williams

Director, Oregon Department of Education

Ben Cannon

Executive Director, Higher Education Coordinating Commission

EXECUTIVE SUMMARY

Every Oregon student deserves the opportunity to learn computer science and critical thinking as part of a well-rounded education. The study of computer science supports developing the collaboration and interdisciplinary skills that open doors both to higher education and to high-wage, high-demand careers. As technology continues to impact every aspect of society, a basic understanding of computer science is vital to navigate the modern world.

However, this opportunity is not available to every student within Oregon's current educational landscape. Disparities exist in access to and participation in computer science education statewide, particularly among female-identifying students, students of color, students with disabilities, and multilingual students.[1] These inequities point to the need to broaden participation in computer science early in every student's education journey.

In response to these inequities, in May of 2022, the Oregon Department of Education (ODE) and the Higher Education Coordinating Commission (HECC) were directed by former Governor Kate Brown to develop a statewide, long-term implementation plan for computer science education to broaden participation for all students by the 2027-2028 school year. The directive specified that the implementation plan achieve the following goals:[2]

- Computer science education is made available to public school students on an equitable basis.
- Computer science education be based on a framework that guides students from computer users to computer literate creators who are proficient in the concepts and practices of computer science, as informed by national frameworks and standards.

> "One of the most important things I've learned in school about computer science is that it is a very extensive pathway and there are many branches to computer science. I think there should be a great focus on computer science in school curricula because the skills you learn are widely applicable."
>
> **- Oregon Student**

1 Oregon Department of Education Administrative Data (2022)
2 More information about the directive can be found in Appendix A - Computer Science Directive

The development of this implementation plan included robust community engagement. ODE and HECC engaged with approximately 700 Oregonians and convened a consult group of 45 students, educators, and industry partners from around the state to provide insight, feedback, and perspective on the plan.[3] **Through the engagement process, seven outcomes and supporting strategies were identified to achieve the overarching goal of ensuring equitable access and broadening participation in computer science education statewide.** These outcomes and strategies are listed below.

Outcomes and Recommended Strategies

Outcome #1: Every Public School Offers Opportunities to Learn Computer Science

Strategy 1.1 Legislate and fund the statutory requirement that all **elementary schools** offer computer science and computational thinking experiences at all grade levels.

Strategy 1.2 Legislate and fund the statutory requirement that all **secondary schools**[4] offer at least two computer science courses, one of which must be a foundational computer science course.

Strategy 1.3 Establish non-competitive grant funds specifically for small schools and schools in rural[5] communities to engage in local projects related to computer science that emphasize equity and culturally responsive practices.

Strategy 1.4 Establish grant funds to reinforce and integrate with existing programs that support expanded learning opportunities inclusive of summer learning, after-school learning, and learning on school breaks.

Strategy 1.5 Communicate with K-12 school counselors and administrators and engage in statewide professional development about inclusive computer science course design, offerings, and recruitment strategies for computer science education.

Strategy 1.6 Develop tools and resources to support schools and districts in expanding and improving equitable computer science opportunities.

Outcome #2: Systems are Established to Recruit, Prepare, Support and Retain Computer Science Teachers

Strategy 2.1 Fund initiatives to support racially, ethnically, culturally and linguistically diverse teacher candidates who are pursuing a teaching license and have interest in teaching computer science.

Strategy 2.2 Fund initiatives to support current teachers to expand their capacity to teach computer science classes and to integrate computational thinking into existing classes.

Strategy 2.3 Develop teacher training experiences to help prepare new teachers to include computational thinking in their instruction.

Strategy 2.4 Develop a computer science micro-credential to support the preparation of current educators to teach computer science concepts.

Strategy 2.5 Fund regional computer science education instructional coaches to support computer science and CTE[6] instruction, mentor new computer science teachers, and help coordinate regional and statewide professional learning experiences.

Outcome #3: Computer Science Education has Stable, Long-Term Funding

Strategy 3.1 Fund efforts to support and expand equitable access to culturally responsive and sustaining computer science education for Oregon students on an annual basis.

Strategy 3.2 Fund and authorize permanent positions at the Oregon Department of Education to support computer science education.

3 More information about the engagement process can be found in Appendix B - Engagements and Findings
4 For the purposes of this document, the term 'secondary schools' refers to both middle and high schools.
5 Based on the 2021 locale classification determined by the National Center for Education Statistics (NCES).
6 CTE: Career and Technical Education

Outcome #4: Computer Science is Recognized as a Content Area in Rule and Statute

Strategy 4.1 Establish computer science as a content area by amending the related statutes and regulations.

Strategy 4.2 Adopt K-12 content standards and CTE Knowledge and Skill Statements that integrate equity and culturally responsive computer science education throughout grade levels and courses.

Strategy 4.3 Engage in a materials adoption process for computer science.

Strategy 4.4 Expand, review, and make available computer science and related instructional materials which are Open Educational Resources, with an emphasis on inclusive curricula that integrate computational thinking into other content areas.

Outcome #5: High School Computer Science Education Aligns with Postsecondary Requirements

Strategy 5.1 Incentivize enrollment in high school computer science courses or courses that integrate computer science concepts and computational thinking.

Strategy 5.2 Connect students with opportunities to explore postsecondary options.

Strategy 5.3 Review high school computer science course offerings and create a crosswalk with introductory computer science courses at Oregon community colleges, four-year colleges, universities, and workforce opportunities.

Outcome #6: Computer Science Learning is Current, Relevant, and Connected to Career Opportunities

Strategy 6.1 Develop, cultivate, post publicly, and share with school districts a list of industry partners that offer work-based learning opportunities for computer science.

Strategy 6.2 Support the creation of regional advisory committees to support CTE programs.

Strategy 6.3 Work with an industry, postsecondary, and secondary panel to ensure that computer science content standards and skill sets are evolving and aligning with technological advancements on an ongoing basis and create a plan to communicate these trends with educators throughout Oregon.

Outcome #7: Progress on Expanding Participation in and Access to Computer Science Education is Monitored and Reported

Strategy 7.1 Develop an ongoing evaluation process of computer science education that is reviewed by the State Board of Education to ensure the statewide plan is sustainable in the long term.

Strategy 7.2 Create public-facing data highlighting disaggregated enrollment in computer science classes statewide.

Strategy 7.3 Establish a clear list of National Center for Education Statistics (NCES) course codes indicating which classes may be considered as foundational and advanced computer science classes in secondary schools.

Strategy 7.4 Create a Technical Advisory Committee (TAC) of expert consultants with a clear commitment to equity, diversity, and inclusive practices to review and provide feedback on implementing the strategies described in the Implementation Plan.

Key considerations, measures of progress, and entities responsible for implementation are described for all the outcomes and strategies in the remainder of this document. A potential timeline for implementation is also included in Appendix E - Implementation Roadmap. Achieving these outcomes will require the coordinated efforts of ODE and HECC through the 2027-2028 school year and beyond as well as legislative funding and authority. Based on the projected costs in the implementation plan, it is estimated that these strategies will cost approximately **$20 million per biennium**. This estimate assumes that the additional staff needed would largely come from existing teachers transitioning into new roles and therefore does not include the cost of hiring and equipping new staff. If hiring and equipping new computer science teachers is included, the estimate for the first biennium of implementation would be $50 million. This figure would increase incrementally over successive bienniums to approximately $200 million to meet the state's current need for additional computer science positions.

Please send questions or comments regarding the computer science initiative in Oregon to ode.csinitiative@ode.oregon.gov. More information about this work can be found on the computer science initiative website.

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INTRODUCTION

A strong foundation in computer science education is a key component for student success in an increasingly digital world. The release of this Computer Science Education Statewide Implementation Plan demonstrates Oregon's commitment to ensure that each and every public school student is equipped with the critical computational thinking skills and knowledge in computer science to be empowered digital citizens, innovators, and problem-solvers in the years ahead. This plan embodies a steadfast commitment to equitable outcomes where every student is afforded the opportunity to immerse themselves in computer science and every teacher possesses the tools and resources to effectively facilitate this learning.

Disparities in Access and Participation

As technology continues to impact every aspect of society, a basic understanding of computer science is vital for all Oregon students. However, historical data show that disparities exist in access to and participation in K-12 computer science education statewide and across the nation; disparities that have continued to persist despite the growth of technology-related fields.[7] These disparities show up across student groups and geography and are seen in higher education and industry as well. The data shows that female-identifying students, students of color, students with disabilities, multilingual students, and students attending rural or small schools are underrepresented in all areas of computer science education across their K-12 educational experience.[8]

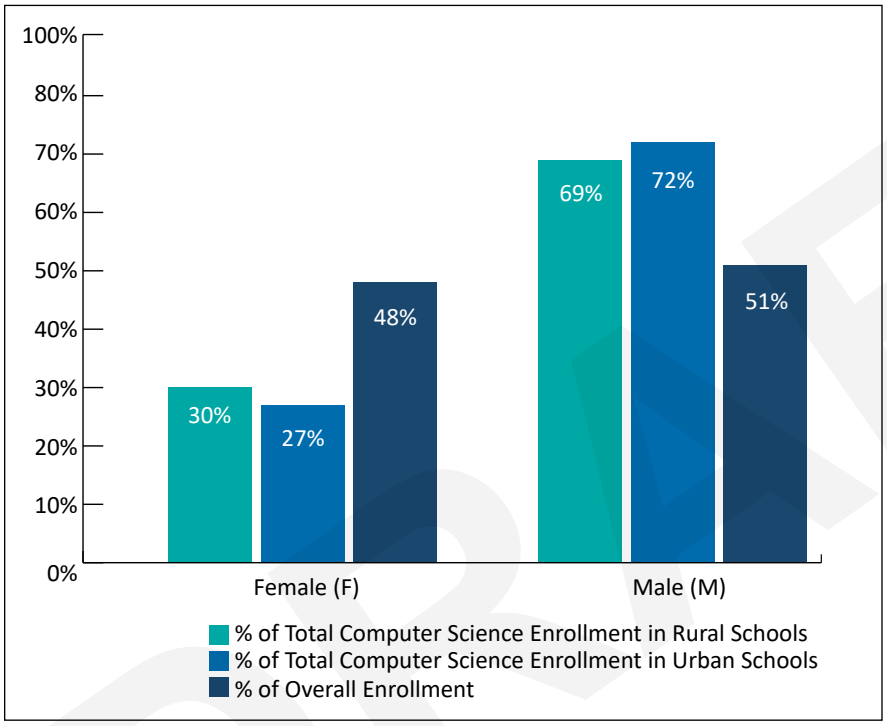
Additional data illustrate the disparities in access and participation in computer science:

- *Approximately 1 in 4 students in a computer science class are female-identifying.*
- *Latino/a/x and Native American/Alaska Native students are less likely than their peers to be enrolled in a computer science course.*
- *Students with disabilities[9] represent 14% of the total student population, but represent only 11% of students in computer science classes.*
- *During the 2021-2022 school year, only 60% of public high schools in Oregon offered a foundational[10] computer science course.*
- *In 2020, only 1 Black/African American student in Oregon took the AP Computer Science exam.*
- *Multilingual students represent 19% of the total student population, but represent only 16% of students in computer science classes.*
- *10.2% of urban students participated in a computer science class compared to 6.5% of students in rural communities.*
- *Among the graduates in the Class of 2022, only approximately 22% took a computer science course at any time during their middle or high school experiences.*

7 J. Margolis, R. Estrella, J. Goode, J. Holme, and K. Nao. 2017. *Stuck in the Shallow End: Education, Race, and Computing*. The MIT Press.
8 Oregon Department of Education Administrative Data (2022)
9 Students with disabilities in this analysis include students participating in an Individualized Education Plan (IEP/IFSP).
10 Per ODE's definition of computer science described in Appendix C - Definition of Computer Science

These disparities are even more distinct when considering students' intersectional identities. The charts below show the disparities in computer science course enrollment when considering gender identity and both locale[11] and race/ethnicity.[12] *Note that gender identity for non-binary students is often underreported and not shown in these charts. This speaks to the need to create safe spaces for students to be willing to share this information.*

CHART 1. Representation in Computer Science Course Enrollment Relative to Overall Enrollment by Gender Identity and School Locale

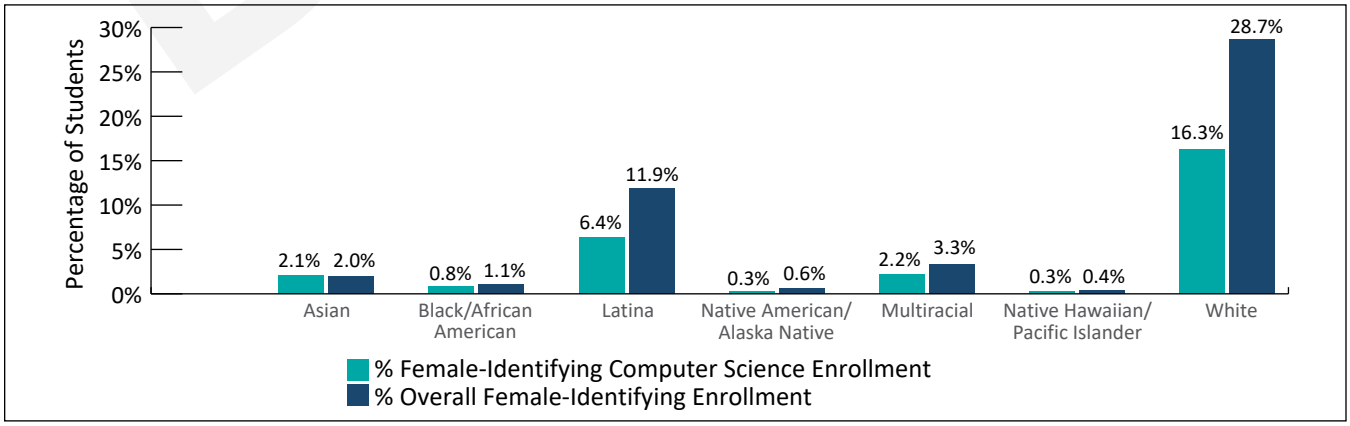


Across Oregon, female-identifying students in rural communities are more likely to be enrolled in computer science than female-identifying students in urban communities, though still at rates much lower than male-identifying students.

Additionally, as shown in Chart 2 below, female-identifying students are underrepresented across almost every race/ethnicity group.

> "There is already a huge barrier for 'normal' students to be part of high-level STEM courses. The barrier for underrepresented students is so large that it is almost impossible for many students."
>
> **- Oregon Student**

CHART 2. Female-Identifying Student Representation in Computer Science Course Enrollment Relative to Overall Enrollment by Race/Ethnicity



11 Based on the 2021 locale classification determined by the National Center for Education Statistics (NCES)

12 Oregon Department of Education Administrative Data (2022)

Although these data are important to understanding the landscape of computer science, it is critical to acknowledge that they represent more than numbers. They reflect lost or delayed opportunities. They reflect students whose identities and stories cannot be adequately communicated through a statistic or summary. These statistics only highlight course enrollment and do not reflect students' experiences in the courses or if the experiences enhanced or inhibited further engagement with computer science.

Further, even when students have access to computer science classes, female-identifying students and students of color may feel unwelcome and underrepresented if the curriculum is not culturally responsive or sustaining and if students do not see "mirrors" of their own identities.[13] These disparities are not only present within K-12 education (nor just in Oregon) - computer science has the most pronounced gaps in participation amongst racial groups and female-identifying students across secondary, postsecondary, and industry.[14] These inequities point to the need both to ensure access to computer science learning and to broaden participation in computer science for students.

> "Being a female in technology is not easy - often ignored or overlooked...so your voice is often not heard. It is always a hill to climb for women in technology. Have to work twice as hard, twice as long, do twice as much to get the same recognition."
>
> **- Oregon Industry Professional**

Centering these efforts in equity includes considering the impact of these disparities on students' educational and occupational futures. In the spring of 2023, Oregon had more than 6,000 open computing positions, while in 2020, there were just over 1,100 computer science graduates.[15] These data demonstrate that if all Oregon students are not given the opportunity to learn computer science during their K-12 education, their potential to pursue these readily available, high-growth, high-wage careers is limited. The passage of the CHIPS and Science Act of 2022 at the national level and Senate Bill 4 here in Oregon help ensure that the demand in this career area will remain high and underscores the need to keep equity at the center.[16]

OREGON DEPARTMENT OF EDUCATION EQUITY STANCE

ODE is committed to the anti-racist and equitable implementation of policy, practices, procedures, and legislation that translates into resource allocation, education rigor, and opportunities for historically and currently marginalized youth, students, and families including civil rights protected classes. This means the restructuring and dismantling of systems and institutions that create the dichotomy of beneficiaries and the oppressed and marginalized.

HIGHER EDUCATION COORDINATING COMMISSION EQUITY LENS[17]

For the HECC, postsecondary education equity will be achieved once one's community or characteristic—including but not limited to racial/ethnic identity, socio-economic background, dis/ability status, gender, parental status, veteran status, sexual orientation, and geographic origin or location—no longer predict inequitable access to and success in postsecondary education and training. We will work towards this by addressing the root historical causes of systemic racism and inequities, not just their manifestation. This includes the intentional examination and elimination of policies, practices, attitudes, and cultural messages that perpetuate the stark inequities in postsecondary education and workforce training we see today.

13 A. Ivey, S. R. Johnson, M. Skorodinsky, J. Snyder and J. Goode, "Abolitionist Computer Science Teaching: Moving from Access to Justice," 2021 Conference on Research in Equitable and Sustained Participation in Engineering, Computing, and Technology (RESPECT), Philadelphia, PA, USA, 2021, pp. 1-4, doi: 10.1109/RESPECT51740.2021.9620652.

14 College Board. *AP National Report 2019*. New York, NY, 2019

15 Code.org, "Support K-12 Computer Science Education in Oregon," 2022

16 Oregon Office of Economic Analysis, "Oregon's High-Tech Sector," July 2022

17 Higher Education Coordinating Commission, "Oregon HECC Equity Stance," 2021

Broadening Participation in Computer Science

Given the need to center equity within computer science education, the focus of the Computer Science Education Statewide Implementation Plan is to ensure that each and every K-12 public school student has the opportunity to develop the skills to navigate and use computer science to improve their communities, pursue their career aspirations, and further their education at Oregon's community colleges, four-year colleges, and universities. Achieving this goal will require a strategic focus on removing the barriers for historically and systemically marginalized communities and creating learning spaces that are culturally responsive and sustaining. The Computer Science Education Statewide Implementation plan strives to ensure that:

- All K-12 public **schools** offer culturally responsive and sustaining computer science education opportunities in an equitable and sustainable manner with a focus on creating inclusive conditions for learning for each and every student. This includes correctional, hospital, and treatment schools.
- All computer science **teachers** receive professional learning in computer science education that supports them in planning and implementing culturally responsive and sustaining computer science education learning opportunities for all students.
- All **students** feel a sense of belonging and are empowered to engage in computer science education with learning supports and assistive technology when needed in an environment that is inclusive and welcoming.
- All **families and communities** feel seen, heard, and valued in their school communities and understand the importance of computer science for students' futures across all types of college and career aspirations.

> "The north star has to articulate equity at the center. It is not okay to have gaps in this knowledge based on gender, race, ethnicity."
> **- Oregon Educator**

> "As a student, computer science is often seen as a highly difficult major/career path, that you need to fit a certain profile to be a part of. Not only teach students how to be successful programmers and artists, but that their work is valued even if they struggle or don't fit stereotypical expectations for STEM students."
> **- Oregon Student**

When considering what it looks like to broaden participation in computer science, it is important to move beyond providing general access to computer science and toward a focus on diversifying participation to support including students who have been historically and systemically underrepresented within computer science. Diversifying participation occurs through developing culturally responsive and sustaining pedagogy[18] for students and strengthening a sense of belonging for all students so that they can see themselves represented within the field both within the K-12 setting and beyond. Increasing participation involves talking about how computer science has the potential to solve problems relevant to students' lives, communities, and future opportunities. Opportunities to create equity-based systemic change cannot rely solely on increasing access, but must also focus on diversifying participation and increasing engagement. It is the responsibility of all aspects of K-12 education, postsecondary institutions, and industry to acknowledge and address the barriers to equitable participation in computer science. This will require reconsidering the pedagogy, practices, and environments that have led to the disparities currently seen in the field.

18 J. Grant, "Culturally Responsive and Sustaining Education: What it is, why it matters, and how to do it," NWEA, May 2021

Computer Science and a Well-Rounded Education

"The most important things that I have learned about computer science include thinking outside the box and that there are many different ways to solve one problem."

- Oregon Student

Computer science education is part of a well-rounded educational experience. Computer science provides opportunities for students to experience joy, wonder, problem solving, and critical thinking as part of a well-rounded education. Computer science intersects with many other educational experiences and content areas, from math and science to art and music. The study of computer science develops collaboration and interdisciplinary skills that open doors both to higher education and high-wage, high-demand careers. A poll, conducted by Gallup for the Business-Higher Education Forum, indicated that by now at least 69% of all employers will prefer candidates with data science skills.[19] In fact, the Bureau of Labor Statistics predicts that the need for data scientists will increase by 36% by the year 2031. The American Management Association survey found that 75% of responding executives across all industries indicated a growing need for critical thinking, problem solving, collaboration, communication, and creative innovation in the work environment - the very skills that the study of computer science imparts.[20]

"Eventually computer science education needs to be seen as a core learning requirement for all K-12 students."

- Oregon Educator

Career and Technical Education (CTE)

A wide range of institutions support Computer Science education in Oregon. Within K-12 education, high school participation and access in computer science through Career and Technical Education (CTE) Programs of Study represent a bright spot in computer science education in Oregon. These include:

- 63 Approved Career Technical Education (CTE) Programs of Study in Oregon High Schools across 53 districts
- 18 new Start Up CTE Programs of Study in Computer Science in 2022-2023
- 19,727 high school students participated in a Computer Science CTE Program of Study in the 2020-2021 school year[21]

"It is important to create opportunities for all students to see themselves in these career fields."

- Oregon Educator

Career and Technical Education and Career-Connected Learning play a critical role in providing computer science opportunities for students. Other organizations such as Oregon's STEM[22] Hubs, among other community partners, work to provide support for both in-school and out-of-school opportunities for computer science education.

The learning landscape of computer science at a postsecondary level includes industry partnerships, 2-year degrees and stackable credentials at a community college, a 4-yr degree or advanced degrees at universities, and workforce training initiatives.

19 Business-Higher Education Forum, "Investing in America's data science and analytics talent," April 2019
20 American Management Association, "AMA Critical Skills Survey: Workers Need Higher Level Skills to Succeed in the 21st Century," January 2019
21 Oregon Department of Education Administrative Data (2022)
22 STEM: Science, Technology, Engineering, and Mathematics

Connections to STEM

Computer science education is an integral component of the broader STEM (Science, Technology, Engineering, and Mathematics) framework, serving as the backbone of technological advancements and digital solutions that integrate and propel various disciplines forward. Science explores the natural world, technology implements solutions, engineering designs those solutions, and mathematics provides the logical foundation. Computer science weaves these elements together, providing the tools, algorithms, and computational thinking approaches necessary to solve complex problems. Supporting computer science education is essential not just for meeting the needs of the technology sector, but for fostering a generation of holistic, interdisciplinary thinkers equipped for the challenges in a wide range of career pathways.

Engaging Oregonians

The development of this implementation plan included a robust community engagement process featuring three distinct phases. Phase I took place primarily between December 2022 and March 2023 and included a series of engagement sessions hosted by ODE and HECC and an online survey with the goal of ensuring that all Oregonians had opportunities to share their hopes and priorities for the future of computer science education in Oregon.

Phase II took place primarily in May and June of 2023 and focused on gathering feedback regarding the initial draft outcomes and strategies that were informed by the conversations and research in Phase I. The final phase, Phase III, occurred in October of 2023 wherein a draft preview version of the implementation plan was shared online for public feedback. A summary of the engagements can be found in Appendix B - Engagements and Findings. Detailed reports of the phases of engagement can be found on the Computer Science Initiative website.

OUTCOMES, RECOMMENDED STRATEGIES, AND MEASURES OF PROGRESS

THE OVERARCHING GOAL OF THE COMPUTER SCIENCE EDUCATION STATEWIDE IMPLEMENTATION PLAN IS TO BROADEN ACCESS, PARTICIPATION, AND ENGAGEMENT IN COMPUTER SCIENCE EDUCATION. Achieving this long-term goal requires thoughtful and systemic change. Through listening sessions with Oregon teachers, students, community members, administrators, higher-education representatives, and industry professionals, seven outcomes have been identified. Associated with each outcome are strategies, measures for monitoring progress, and considerations that provide some context and details related to the strategy. Together, these strategies work to ensure access and wider participation in computer science education for all Oregon students. These strategies have synergy. They build upon and complement each other. It would be difficult to implement any of them in isolation. It is hoped that this implementation plan will serve to inform and guide policy makers, education leaders, and industry professionals toward a bright future for all Oregon students.

"Computer Science education should be offered at all grade levels in all Oregon public schools."
- Oregon Community Member

"Porque es la ciencia del presente y no del futuro. Debe ser un derecho y no un privilegio. (Because science is from the present, not from the future. It should be a right and not a privilege.)"
- Padre de Oregón (Oregon Parent)

The following principles guide this work:

- Access to computer science education is a right for all students. A student's race, ethnicity, gender identity, socioeconomic status, language, religion, sexual orientation, cultural affiliation, learning differences, geography, or disability will not be a predictor of participation in computer science learning.
- Students, particularly female-identifying students and students of color who have been historically underrepresented in computer science and technology, receive rigorous, relevant, and relational computer science education that focuses on problem-solving, critical thinking, and creativity to enable them to be active agents in a digital world.
- All students deserve to see themselves represented both in their teachers and the instructional materials implemented within computer science classrooms.
- Every student will learn about computer science through a variety of opportunities and with multiple entry points and clear pathways linking learning to careers, college, and community.

- Teachers have access to high-quality professional learning in computer science education that is consistent, sustained, and focused on both computer science content, skills, and pedagogical approaches to creating culturally responsive and inclusive learning conditions for all students.
- All Oregon schools will have the support that they require to build the infrastructure necessary to offer high-quality computer science education.
- The Oregon Department of Education and the Higher Education Coordinating Commission will engage community partners including, but not limited to, K–12 education, higher education, industry, local communities, parent organizations, policy makers, and students to implement computer science statewide.

This section describes the Outcomes, Strategies, Considerations, and Measures of Progress recommended to achieve the overarching goal of the plan.

- **Outcomes** describe the conditions necessary to achieve.
- **Strategies** describe specific recommended actions to achieve the related Outcome.
- **Entities Responsible for Implementation** indicate the organization or organizations primarily responsible for enacting the strategy.
- **Considerations** provide context and additional details related to the Strategies.
- **Measures of Progress** suggest key indicators to track progress toward the Outcomes.

A potential timeline for implementing these strategies is shared in Appendix E - Implementation Roadmap.

"One of the important things I have learned from computer science is to never give up. There is always a solution to the code so don't just give up trying, which is also an applicable lesson to most situations."

- Oregon Student

COMPUTATIONAL THINKING AND COMPUTER SCIENCE

A number of the Strategies in this section refer to Computational Thinking (CT). Computer Science and Computational Thinking are fast becoming skills that are imperative for students navigating the rapidly evolving complexities of modern life.[23] The global non-profit agency, *Digital Promise*, defines computational thinking as "an interrelated set of skills and practices for solving complex problems, a way to learn topics in many disciplines, and a necessity for fully participating in a computational world."[24]

Computer Science encompasses topics like algorithms, data structures, software design, hardware architecture, networks, artificial intelligence, and more.[25] It is a broader domain of knowledge that uses computational thinking as one of its foundational skills.

Computational Thinking concepts may be taught to children from a young age, even before they learn specific programming languages or dive deep into computer science. Computational Thinking provides students with valuable problem-solving skills that can be applied across many disciplines.

23 A. Yadav, et al., "Computational thinking for teacher education," Communications of the ACM v60, 2017
24 Digital Promise, "What is Computational Thinking"
25 A more detailed definition of Computer Science as it applies to K-12 education in Oregon is in Appendix C - Definition of Computer Science.

Outcome #1: Every Public School Offers Opportunities to Learn Computer Science

In the 2021-2022 school year, approximately 60% of Oregon secondary schools offered computer science courses. Learning opportunities at the elementary level are available in some schools, but not consistently. This outcome ensures that all students have access to computer science learning opportunities.

Recommended Strategies

These strategies strive to ensure that all students have access to computer science education and broaden participation in computer science learning experiences with a focus on both elementary and secondary access and the needs of small schools and rural communities. The importance of school counselors and administrators in creating opportunities for all students to participate in computer science education is also highlighted.

Strategy 1.1

Legislate and fund the statutory requirement that all **elementary schools** offer computer science and computational thinking experiences at all grade levels.

» Entities Responsible for Implementation

This strategy would require legislative action.

» Considerations

This strategy focuses on ensuring that all elementary school students have access to computer science learning opportunities. Starting computer science education early in a student's educational journey is key to establishing the foundation, identity, and interest to continue studies in secondary and postsecondary settings. This strategy intentionally avoids creating instructional minute requirements to provide elementary schools with flexible options to implement this strategy. ODE and supporting partners would provide lessons and modules of instruction that could be incorporated into a variety of instructional settings.

Strategy 1.2

Legislate and fund the statutory requirement that all **secondary schools**[26] offer at least two computer science courses, one of which must be a foundational computer science course.

» Entities Responsible for Implementation

This strategy would require legislative action.

» Considerations

This strategy strives to ensure that all secondary students (students in middle or high school) statewide have access to computer science education opportunities. It is important to note that simply offering a class does not ensure that all students have access given the constraints of school schedules and other factors. Schools would be able to meet this requirement through a variety of ways, including, but not limited to:

- Offering two stand-alone computer science courses from the list of ODE-approved NCES[27] course codes. Stand-alone courses would need to total to a year's worth of instruction. For example, two semester-long courses or three trimester-long courses would meet the requirement. Stand-alone courses would need to be selected from the list of approved NCES computer science course codes maintained by the Oregon Department of Education. At least one course would need to be designated as foundational as determined by the ODE list of approved NCES course codes.

26 For the purposes of this document, the term 'secondary schools' refers to both middle and high schools.
27 NCES: National Center for Education Statistics

- Integrating computer science concepts into an existing course. The amount of computer science material would need to be equivalent to the content of a half-year course.
- Creating a new course that integrates computer science standards with content from other disciplines. Similarly, the amount of computer science material would need to be equivalent to the content of a half-year course.
- Adding, expanding, or creating a CTE computer science Program of Study.
- Offering hybrid and/or remote learning options with in-person labs, as well as remote support for the teacher of record in a manner aligned with Oregon's Online and Remote Learning Guidance.
- Enrolling students directly in college courses in computer science that are included in the Computer Science Major Transfer Map, or any other college computer science degree or certificate. Courses may be taught by college faculty at the high school or on the college campus, through distance education or a combination of those formats.

Strategy 1.3

Establish non-competitive grant funds specifically for small schools and schools in rural[28] communities to engage in local projects related to computer science that emphasize equity and culturally responsive practices.

» Entities Responsible for Implementation

ODE (Contingent upon Legislative Action and Funding)

» Considerations

This strategy provides additional support to small schools and rural communities. It will be important to develop a set of criteria to ensure that grant funds are attentive to equity issues within computer science. Education Service Districts (ESDs), STEM Hubs, culturally-specific organizations, higher education partners (from community colleges, four-year colleges, and universities), and community-based organizations would all be important partners in this work.

Strategy 1.4

Establish grant funds to reinforce and integrate with existing programs that support expanded learning opportunities inclusive of summer learning, after-school learning, and learning on school breaks.

» Entities Responsible for Implementation

ODE (Contingent upon Legislative Action and Funding)

» Considerations

This strategy strives to address some aspects of participation privilege, where some students have access to advantages such as technology in the home, family members involved with the tech industry, and the means to participate in technology-focused clubs, classes, or camps outside of the regular school day. As with the previous strategy, it will be important to develop a set of criteria to ensure that grant funds are attentive to equity issues within computer science. Education Service Districts (ESDs), STEM Hubs, culturally-specific organizations, higher education partners (from community colleges, four-year colleges, and universities), and community-based organizations would all be important partners in this work. To the greatest extent possible, these efforts should integrate with existing programs.

28 Based on the 2021 locale classification determined by the National Center for Education Statistics (NCES)

Strategy 1.5

Communicate with K-12 school counselors and administrators and engage in statewide professional development about inclusive computer science course design, offerings, and recruitment to computer science education.

» Entities Responsible for Implementation

ODE (Contingent upon Legislative Action and Funding)

» Considerations

ODE would work with various entities to develop professional learning opportunities specifically for counselors and administrators that focus on closing equity gaps in computer science in Oregon.

Strategy 1.6

Develop tools and resources to support schools and districts in expanding and improving equitable computer science opportunities.

» Entities Responsible for Implementation

ODE (Contingent upon Legislative Action and Funding)

» Considerations

This resource for schools and districts would include, for example, equity-focused indicators, questions for reflection and self-assessment to identify existing strengths, new potential options, strategies, courses that incorporate national frameworks, and ways to integrate computational thinking into existing courses. ODE would work with K-12 educators, higher education, and industry partners to support the development of the resource as well as to provide professional learning opportunities (as noted in Strategy 1.5) for school and district leaders and administrators to support its use and implementation.

Measures of Progress for Outcome #1

The Measures of Progress for Outcome #1 focus on the number of schools offering computer science classes or learning opportunities as well as the number of courses offered. The measures for Outcome #1 are:

- Number of high schools, disaggregated by locale, that offer a full year of computer science learning either through (1) stand-alone courses as defined by the ODE-approved list of National Center for Education Statistics (NCES) Codes or (2) integrated courses where computer science concepts represent at least 50% of the course content
- Number of computer science courses at each high school disaggregated by (1) course level (for example foundational or advanced) and (2) time offered (for example during the school day or offered as part of an extended learning opportunity during the summer or after school)
- Number of middle and elementary schools offering computer science or computational thinking learning opportunities, disaggregated by grade level
- Number of students participating in computer science learning, disaggregated by race/ethnicity, gender, geographic locale, disability status, and multilingual status

Outcome #2: Systems are Established to Recruit, Prepare, Support and Retain Computer Science Teachers

Ensuring universal access to computer science education will require both new teachers to enter the teaching profession equipped to teach in this area and existing teachers to expand their skill sets to be able to provide computer science instruction with confidence. However, broadening participation requires more than offering computer science courses. It requires teachers to exercise a broad skill set including establishing environments where all students feel valued and respected, encouraging collaboration and active participation from students, and addressing biases or stereotypes that may exist. Strategies to broaden participation include incorporating projects that reflect the experiences and interests of a diverse student body and culturally relevant examples to make computer science concepts relatable to all students. Successful achievement of the previous Outcome #1 (Every Public School Offers Opportunities to Learn Computer Science) will require a sustained, coordinated statewide effort to offer professional development and ongoing support for both pre-service and existing teachers new to computer science education.

Recommended Strategies

These strategies focus on supporting professional development for current teachers of computer science as well as attracting and supporting diverse new computer science teachers. Key to this work will be a coordinated, funded statewide professional development effort that includes sustained support for teachers moving into this area of instruction.

Strategy 2.1

Fund initiatives to support racially, ethnically, culturally and linguistically diverse teacher candidates who are pursuing a teaching license and have interest in teaching computer science.

» Entities Responsible for Implementation

ODE (Contingent upon Legislative Action and Funding)

» Considerations

This work could build upon and leverage current efforts throughout the state that already support the development of culturally and linguistically diverse pre-service teachers (for instance, grow your own initiatives). Culturally-specific organizations would also be important partners in this work.

Strategy 2.2

Fund initiatives to support current teachers to expand their capacity to teach computer science classes and to integrate computational thinking into existing classes.

» Entities Responsible for Implementation

ODE (Contingent upon Legislative Action and Funding)

» Considerations

Key to achieving the goal of broadening participation in computer science education statewide is funding annual professional learning opportunities for current teachers to expand their capacity to teach computer science in a culturally responsive way. Statewide professional development in computer science would emphasize, for example:

- Culturally responsive and sustaining computer science[29]
- Asset-based pedagogies
- Integrating computational thinking into core secondary classes

29 Kapor Center, "Culturally Responsive-Sustaining CS Education: A Framework," 2021

- Integrating computational thinking and computer science learning experience into elementary instruction
- Expanding teachers' knowledge base as technologies evolve
- Universal Design for Learning[30] methods

To offer computer science professional development opportunities statewide, ODE would need to engage partners across the K-20 system, industry, and culturally-specific organizations.

Strategy 2.3

Develop teacher training experiences to help prepare new teachers to include computational thinking in their instruction.

» Entities Responsible for Implementation

Educator Preparation Program Computer Science Working Group

» Considerations

Moving this strategy forward would entail working with Educator Preparation Programs (EPPs) to integrate computational thinking into existing courses for pre-service and CTE teachers new to the field. To achieve this goal, it would be necessary to convene and fund an Educator Preparation Program Computer Science Working Group to bring together representatives from EPPs to explore this possibility.

Strategy 2.4

Develop a computer science micro-credential to support the preparation of current educators to teach computer science concepts.

» Entities Responsible for Implementation

ODE

» Considerations

Other states that have explored creating a specific computer science full endorsement report that moving in this direction has the potential to deepen the shortage of available computer science teachers. However, micro-credentials such as the Computer Science Micro-Credential offered by the National Educator Association (NEA) and CodeVA provide a means by which a teacher may pursue and document additional training in computer science instruction.

Strategy 2.5

Fund regional computer science education instructional coaches to support computer science and CTE instruction, mentor new computer science teachers, and help coordinate regional and statewide professional learning experiences.

» Entities Responsible for Implementation

ODE (Contingent upon Legislative Action and Funding)

» Considerations

Teachers that are new to computer science instruction need ongoing support during the initial transition into this area. One approach to providing this support statewide is creating regional instructional coaches to mentor teachers who are new to computer science education. Research supports the effectiveness of the instructional coaching model.[31]

30 Higher Education Coordinating Commission, "About Universal Design for Learning," 2020
31 D. Quintero, "Instructional coaching holds promise as a method to improve teachers' impact," 2019

Measures of Progress for Outcome #2

The Measures of Progress for Outcome #2 focus on both the current number of computer science teachers statewide and the change in this number over time. The measures for Outcome #2 are:

- Number of new computer science teachers disaggregated by educator race/ethnicity, gender, and geographic locale
- Number of retained computer science teachers over a given school year disaggregated by educator race/ethnicity, gender, and geographic locale
- Number of computer science educators receiving training and support services disaggregated by the type of service
- Number of participants in professional development opportunities statewide disaggregated by region

Outcome #3: Computer Science Education has Stable, Long-Term Funding

Annual stable funding is critical to achieving the goal of broadening participation in computer science education. Many of the key elements of this plan such as professional development, regional coaches, and attracting diverse teachers will require a significant commitment of resources over time. Supporting and coordinating these efforts will require dedicated staff from both ODE and HECC.

Recommended Strategies

The strategies in this outcome are focused on stable, annual funding and establishing permanent positions to support this work at ODE.

Strategy 3.1

Fund efforts to support and expand equitable access to culturally responsive and sustaining computer science education for Oregon students on an annual basis.

» Entities Responsible for Implementation

This strategy would require legislative action.

» Considerations

Funding can come from a variety of sources, including funds allocated by the state legislature, in ways identified more specifically in other strategies described in this plan. Additionally, there are federal funding sources that districts can use to implement computer science learning which the agency can continue to communicate and support.

Strategy 3.2

Fund and authorize permanent positions at the Oregon Department of Education to support computer science education.

» Entities Responsible for Implementation

This strategy would require legislative action.

» Considerations

There are a number of positions that are needed to support this work. For example, a computer science education specialist position would provide the expertise and coordination needed to see the outcomes are achieved. Other positions include a program analyst to support managing grant funds, research analyst support to assist with monitoring and reporting, and administrative support to assist with coordination of programs.

Measures of Progress for Outcome #3

The metric of progress for this outcome will focus on measuring the annual funding dedicated to computer science education from all sources. The measures for Outcome #3 are:

- State funding allocated annually to computer science education disaggregated by program, purpose, source, agency, and grade level
- Federal and other funds allocated and used statewide for computer science education
- Total number of positions or full-time equivalents (FTE) dedicated to computer science education

Outcome #4: Computer Science is Recognized as a Content Area in Rule and Statute

Currently computer science is not recognized as a content area by rule or statute. Establishing computer science as a content area by rule or statute would help facilitate the work of creating content standards, adopting high-quality materials, and developing pre-service teacher training programs.

Recommended Strategies

The strategies for this outcome focus on designating computer science as a content area and moving forward with the opportunities this designation makes possible.

Strategy 4.1

Establish computer science as a content area by amending the related statutes and regulations.

» Entities Responsible for Implementation

Changes to any Oregon Revised Statute (ORS) would require legislative action.

Changes to any Oregon Administrative Rule (OAR) would require the approval of the State Board of Education.

» Considerations

Establishing computer science as a content area is essential to pursuing other goals, such as developing K-12 content standards, moving forward with a materials adoption, and engaging in conversations with EPPs regarding teacher preparation. Any amendments to an existing ORS would require legislative action. Any changes to an existing OAR would require the approval of the State Board of Education. The ORSs and OARs that may have bearing on content area designations include:

- ORS 329.025, 329.045, 329.451
- OAR 581-22-2000

Strategy 4.2

Adopt K-12 content standards and CTE Knowledge and Skill Statements that integrate equity and culturally responsive computer science education throughout grade levels and courses.

» Entities Responsible for Implementation

ODE (Contingent upon Legislative Action and Funding)

» Considerations

As with all new standards development, a Content Standards Work Group composed of computer science faculty, K-12 computer science teachers, and industry partners would develop Oregon standards on the basis of national frameworks. Content standards would align with the evolving needs of industry and prepare students for next steps in college or a university. It will be important to create an adoption cycle that meets the needs of this rapidly changing field.

Strategy 4.3

Engage in a materials adoption process for computer science.

» Entities Responsible for Implementation

ODE

» Considerations

To create additional pathways to ensure that schools and students have access to high-quality instructional materials and to ensure that all Oregon schools across varied sizes can take advantage of the discounts negotiated by the state, it will be important to engage in a materials adoption process. Additionally, given how rapidly this content area changes, it will be important to create a review, renewal, and adoption cycle that can adapt to advances in this field. The adoption criteria must include cultural responsiveness, equity, inquiry, and computational thinking and reflect a broad definition of computer science.

The ORSs and OARs that may have bearing on materials adoption include:

- OAR 581-022-2030

Strategy 4.4

Expand, review, and make available computer science and related instructional materials which are open educational resources on OER Commons, with an emphasis on inclusive curricula that integrate computational thinking into other content areas.

» Entities Responsible for Implementation

ODE (Contingent upon Legislative Action and Funding)

» Considerations

To achieve this strategy, it will be helpful to develop approaches to support the curation of computer science instructional materials and to couple curation events with professional learning opportunities in order to ensure that all materials are culturally responsive, are attentive to Universal Design for Learning principles, and include linguistic supports and scaffolds. A work group composed of teachers, industry partners, and higher education representatives would collectively support the curation of this resource. This would be an important interim step while the materials adoption proceeds.

Measure of Progress for Outcome #4

The Measures of Progress for this outcome focus on the availability of high-quality instructional materials. The measures for Outcome #4 are:

- Inventory of computer science instructional materials available through Oregon Open Learning disaggregated for topic and level

Outcome #5: High School Computer Science Education Aligns with Postsecondary Requirements

These strategies focus on connecting the pathways between high school and postsecondary opportunities. This alignment is critical to bridge the gap between secondary and postsecondary studies, enabling a smooth transition for students into advanced learning environments. By aligning to the rigor and substance of postsecondary curricula, high school computer science education empowers students with the essential skill set needed in today's increasingly digital and technology-driven world.

Recommended Strategies

These strategies focus on incentivizing enrollment in high school computer science classes and connecting students with postsecondary and career-connected learning opportunities.

Strategy 5.1

Incentivize enrollment in high school computer science courses or courses that integrate computer science concepts and computational thinking.

» Entities Responsible for Implementation

ODE (Contingent upon Legislative Action and Funding)

» Considerations

There are different pathways to incentivize enrollment in computer science classes. These include:

- Considering how existing computer science courses could meet a current graduation requirement.
- Creating new courses that integrate computer science and computational thinking into core content areas such as math or science.
- Expanding existing computer science CTE Programs of Study and supporting the creation of new ones.
- Promoting the creation of new computer science dual credit opportunities and other options that provide college credit to students while in high school.[32]

Note: Some participants in the listening sessions raised the idea of making computer science a graduation requirement. While some states have moved in this direction (for example, Nevada and Arizona), legislating this requirement has in some cases worsened the shortage of qualified computer science teachers. While this may be a direction to consider for Oregon at some point, much work must be done beforehand in order to build the capacity to offer universal access to computer science learning experiences. As such, mandating computer science as a graduation requirement is not included as a specific strategy in this plan at this time.

Strategy 5.2

Connect students with opportunities to explore postsecondary options.

» Entities Responsible for Implementation

ODE (Contingent upon Legislative Action and Funding)

» Considerations

There are a variety of pathways to achieve this goal, such as:

- Supporting efforts to provide virtual and in-person visits from computer science faculty, industry professionals, and volunteers to classrooms

32 Dual credit with CTE computer science courses should be prioritized.

- Encouraging K-12 student site visits to community colleges, four-year colleges, universities, and industry organizations involved with computer science education or professions by providing grants to cover the costs of transportation and related expenses
- Encouraging recently graduated CTE students to share their educational experiences with current middle and high school students
- Supporting resources and development of Career-Connected Learning and Work-Based Learning opportunities

Strategy 5.3

Review high school computer science course offerings and create a crosswalk with introductory computer science courses at Oregon community colleges, four-year colleges, universities, and workforce opportunities.

» Entities Responsible for Implementation

ODE and HECC (Contingent upon Legislative Action and Funding)

» Considerations

The purpose of this strategy is both to help ensure that computer science courses offered in high school prepare students for next steps in college and university level classes and to help students with their planning for postsecondary learning. Collaborative meetings with educators and instructors from both K-12 and higher education will be needed to create the crosswalk.

Measures of Progress for Outcome #5

The measures for Outcome #5 focus on students earning computer science credit while in high school and if they continue computer science studies in higher education. The measures for Outcome #5 are:

- Number of students earning college credits in high school for computer science
- Number of students who concentrate in an established computer science CTE Program of Study
- Number of students taking advanced computer science coursework in high school
- Number of students taking computer science in college, disaggregated by year in college, level, course taken, race/ethnicity, gender, and geographic locale

Outcome #6: Computer Science Learning is Current, Relevant, and Connected to Career Opportunities

The high-technology field changes rapidly. It is important that computer science learning targets are frequently reviewed and updated to keep pace with the evolving tech landscape. Students need experiences that are reflective of the reality of today's technology ecosystem. These opportunities can be a major motivating factor for students, helping them perceive computer science as a stepping stone to dynamic and rewarding career paths both in technical fields and in other sectors including healthcare, finance, and more.

It is important to note the challenges of providing classroom access to modern technologies and platforms while balancing the need for Internet security. IT departments are encouraged to work with computer science teachers to find strategies that mitigate risk while permitting access to the tools students and teachers need to keep learning apace with changes in the industry.

Recommended Strategies

These strategies focus on ensuring relevance in the computer science learning experiences. Relevance ties learning to practical applications, allowing students to appreciate the real-world implications and utility of their knowledge and providing students with a clear trajectory from their classroom learning to future professional endeavors.

Strategy 6.1

Develop, cultivate, post publicly, and share with school districts a list of industry partners that offer work-based learning opportunities for computer science.

» Entities Responsible for Implementation

ODE (Contingent upon Legislative Action and Funding)

» Considerations

Work-based learning (WBL) is a key requirement of CTE programs. It can be difficult for districts to cultivate these partnerships with industry. It will be important to identify and uplift other organizations already involved in this work.

Strategy 6.2

Support the creation of regional advisory committees to support CTE programs.

» Entities Responsible for Implementation

ODE (Contingent upon Legislative Action and Funding)

» Considerations

CTE programs are required to regularly meet with industry-based advisory committees to review curriculum and program offerings. It can be challenging for schools to create such a committee. The creation of regional advisory committees will help CTE Programs of Study meet this requirement.

Strategy 6.3

Work with an industry, postsecondary, and secondary panel to ensure that computer science content standards and skill sets are evolving and aligning with technological advancements on an ongoing basis and create a plan to communicate these trends with educators throughout Oregon.

» Entities Responsible for Implementation

ODE (Contingent upon Legislative Action and Funding)

» Considerations

This panel could also assist with reviewing secondary computer science related course offerings in Oregon to determine which should be considered foundational.

Measures of Progress for Outcome #6

The measures for Outcome #6 are:

- Number of new and open computer science jobs in Oregon and percent of these jobs filled
- Number of Work-Based Learning opportunities in the area of computer science
- Number of school districts partnering with industry or community-based organizations to introduce students to careers in computer science
- The number of students graduating with a computer science degree from a community college, four-year college, or university
- Number of regional advisory committees created to support CTE programs

It is important to note that the number of new and open computer science jobs open in Oregon at any given time is subject to national and global economic and political forces far beyond the scope and impact of computer science education efforts. As such, this metric may not be a reliable indicator of the impact of computer science education investments. However, this measure of progress does provide important context regarding the landscape of the technology sector and is included for reference.

Outcome #7: Progress on Expanding Participation in and Access to Computer Science Education is Monitored and Reported

The outcomes described in this document will require intentional, systemic change spanning many years. It is important to monitor the effectiveness of the implementation strategies and adjust accordingly.

Recommended Strategies

These strategies describe the reporting and monitoring of the strategies implemented.

Strategy 7.1

Develop an ongoing evaluation process of computer science education that is reviewed by the State Board of Education to ensure the statewide plan is sustainable in the long term.

» Entities Responsible for Implementation

ODE

» Considerations

The reporting system would highlight the measures of progress included in this document. Initial conversations suggest an annual report to the State Board of Education for the duration of the implementation plan.

Strategy 7.2

Create public-facing data highlighting disaggregated enrollment in computer science classes statewide.

» Entities Responsible for Implementation

ODE and HECC (Contingent upon Legislative Action and Funding)

» Considerations

The reporting system would include the measures of progress included in this document and include data on CTE participation and concentration in both secondary and postsecondary computer science fields.

Strategy 7.3

Establish a clear list of National Center for Education Statistics (NCES) course codes indicating which classes may be considered as foundational and advanced computer science classes in secondary schools.

» Entities Responsible for Implementation

ODE and HECC

» Considerations

Currently there are nearly 80 courses related to computer science available in Oregon. It is important to determine which of these courses meet the definition of computer science as defined in Appendix C - Definition of Computer Science. This list is used to determine many of the measures of progress described in this plan.

Strategy 7.4

Fund a Technical Advisory Committee (TAC) of expert consultants with a clear commitment to equity, diversity, and inclusive practices to review and provide feedback on implementing the strategies described in the Implementation Plan.

» Entities Responsible for Implementation

ODE (Contingent upon Legislative Action and Funding)

» Considerations

A Technical Advisory Committee (TAC) would be very helpful while implementing strategies in the plan. A TAC would provide specialized expertise, diverse perspectives, a national viewpoint, and additional credibility to the work. It would be important to identify funds to pay experts for their work. The formation of a TAC would be contingent upon funding.

Measures of Progress for Outcome #7

The reporting system for Outcome #7 is built around the Measures of Progress for all the Outcomes described in this plan, the data shared, and the annual report to the State Board of Education. As such, no specific Measures of Progress for Outcome #7 are noted here as these Strategies themselves are the Measures of Progress.

FUNDING ESTIMATES

Throughout all the phases of engagement, Oregonians expressed the need for stable, long-term funding for computer science education. A frequent theme emerged around the challenges brought by unfunded mandates.

To determine funding estimates, current and historical STEM and CTE funding efforts have been considered, as well as a review of other states' funding allocations for computer science education. The funding level and focus has been applied to the scale and scope of the Outcomes and Strategies described in this plan to determine an approximate funding estimate. It is important to note that while these examples are inclusive of computer science education efforts, STEM and CTE programs include many other academic areas of focus.

> "Budget is always an issue. Often great ideas come along, but districts need funding for materials, programming, training, and new staff. I find it important to keep that at the forefront of all decision making."
>
> **- Oregon Educator**

While these comparisons are helpful in determining the scale and scope of this work, it is important to bear in mind two things. First, while computer science education shares similarities to and connections with CTE and STEM initiatives, they differ in scope, goals and content. As such, the funding estimate for computer science education, while a well-reasoned assessment, is an approximation with an inherent degree of uncertainty. Second, there may be other programs that support similar work not listed here. The inclusion or exclusion of program comparisons is not intended to elevate or diminish their value, rather solely to provide a frame of reference.

In Oregon, previous state funding for STEM-related efforts include approximately $12 million per biennium to support STEM Innovation Grants and Backbone funding for Oregon's 13 STEM Hubs. This funding has included computer science (and other) efforts and has positively impacted districts statewide across a broad range of STEM initiatives and efforts. For instance, in the 2019-20 school year, these funds supported more than 44,000 hours of teacher professional development statewide.[33] More recently, $6 million in one-time, Federal GEER funds have been supporting a two-year effort to increase computer science opportunities statewide through Oregon's 13 STEM Hubs, largely through programming efforts and professional development for teachers. As of this writing, those dollars have reached at least 24,100 students and 316 educators.[34] While, CTE Programs across the state, which include computer science Programs of Study, receive no dedicated state funding to sustain CTE programs, funds through High School Success can be used to sustain and or expand CTE Programs of Study, CTE Revitalization funds, ($7.3 million biennially) to create new programs, and Secondary CTE Career Pathways funds ($8 million biennially) are used to incentivize quality programs. There are 80 Information Technology CTE Programs of Study across the state that reached 46,653 students in the 2021-2022 school year.[35]

When considering the national landscape, investment in computer science education varies widely. Some

33 Higher Education Coordinating Commission, "STEM Investment Council Annual Report to the Legislative Assembly," 2020
34 Oregon Department of Education Administrative Data (2023)
35 Oregon Perkins Federal Report (2022)

states have invested heavily in policies and practices that increase both access and participation in computer science learning. The table below shows the states with the highest investment specifically in computer science education since 2016.[36]

TABLE 1. States with the Highest Investment in Computer Science Education Since 2016[37]

State	Total State Funds Invested in Computer Science Education from 2016 to 2023
Pennsylvania	$76,505,000
Florida	$50,000,000
New York	$36,000,000
California	$35,000,000
Alabama	$28,301,504
Arkansas	$28,000,000
Utah	$26,950,000
Indiana	$18,670,000
Texas	$15,170,200
Washington	$10,000,000
Oregon	**$0**

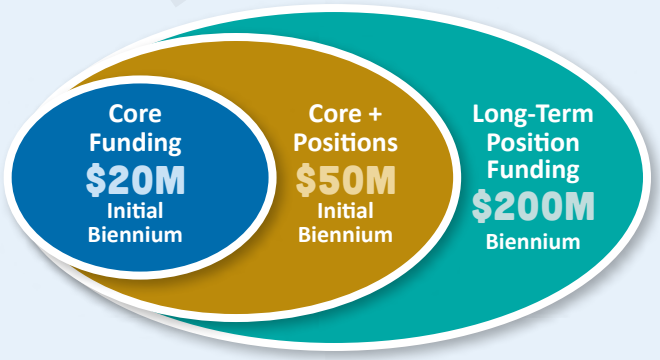
Given that Oregon is relatively new to implementing computer science education policies as compared to other states,[38] it is expected that there will be startup costs associated with establishing the framework needed to meet the goals of this plan and come alongside other states leading in this work.

> "Clear, sustainable, long-term funding is needed for anything that gets started. One big issue with education initiatives in Oregon is that they tend to be un/under funded. This is a big lift and to get districts and organizations to commit long-term, they need to know that their funding will be there long-term."
>
> **- Oregon Educator**

The examples and programs shared above have varying purposes and scopes of work compared to the outcomes and intentions of this plan, often aimed at STEM education efforts that may be inclusive of, but not exclusive to, computer science. However, given the similarities in purpose and scope of the funding initiatives identified above and taking in consideration initial start-up costs that would be exclusive to the first biennium of the implementation, **the estimated funding needed to reach the outcomes described in this plan is approximately $20 million for the first biennium with continued sustained funding thereafter.** It is important to note that the $20 million estimate is the cost required for the State to operationalize the Outcomes and Recommended Strategies and **does not include additional funding that schools or districts might need to direct from their State School Fund or other sources to hire additional staff or purchase materials.**

As shown in Figure 1, the estimate to hire and equip up to 128 new computer science teachers is **$50 million** for the initial biennium of implementation. This estimate would increase incrementally over successive bienniums to approximately **$200 million** to meet the state's current need for additional computer science positions.

FIGURE 1. Computer Science Education Statewide Implementation Plan Funding Models



- **Core Funding:** The estimate for the initial biennium of implementation that includes all the Outcomes and Strategies described in the plan, but does not include hiring and equipping new computer science teachers.
- **Core + Positions:** This estimate includes all aspects of the Core Funding and additional funds to employ and equip up to 128 new computer science teaching positions.
- **Long-Term Position Funding:** This estimate reflects the long-term cost per biennium to hire, equip, and sustain a computer science educator at all Oregon schools that do not currently have one.

36 Code.org, "K–12 Computer Science Policy and Implementation in States," 2023
37 Code.org, "State Tracking 10 Policies" (Funding tab), 2023
38 Code.org, CSTA, & ECEP Alliance, "2022 State of Computer Science Education," 2022

CONCLUSION

Oregon's Computer Science Education Statewide Implementation Plan marks a significant milestone in ensuring equitable outcomes for all students in public K-12 schools. The plan entwines equity with a future-ready vision to prepare students for a world increasingly driven by technology.

And it comes none too soon.

Given the emergence of Artificial Intelligence (AI) which has generated a groundswell of both interest and concern as well as the potential for substantial investment in Oregon's semiconductor industry via the CHIPS and Science Act, computer science has emerged as a foundational literacy crucial for every student.

By prioritizing equitable access early in a student's educational journey, creating relevance through connections with industry and higher education, fostering teacher professional development, and instituting rigorous computer science K-12 content standards, this plan strives to ensure that every student - across broad and diverse backgrounds - can meaningfully engage with computer science. Looking ahead, these Outcomes and Strategies, taken together, have the power to transform the landscape of computer science education in Oregon and bring the state rapidly alongside other states that have already recognized the following:

Computer science learning is foundational to a well-rounded education.

These strategies ensure that all students, irrespective of their socioeconomic background, geographic location, gender, ethnicity, or any other distinguishing factors, have equitable opportunities to acquire essential digital skills. Absent this intention and action, Oregon runs the risk of perpetuating an environment of disparity, deepening divides, and overlooking the potential talent and innovation that resides in every part of the state.

This plan is about amplifying the state's intellectual capital and fostering a diverse tech workforce that mirrors its diverse population. It nurtures thinkers with a broad spectrum of problem-solving methods, creativity, and viewpoints to enrich their communities and workplaces - regardless of their chosen career path. This becomes increasingly important as the lines between what is traditionally considered the "tech sector" and "everything else" continue to blur.

In conclusion, as progress is made with Oregon's Computer Science Education Statewide Implementation Plan, the focus must remain on ensuring equitable access and expanding participation. By championing these priorities, every student will be provided with the foundational knowledge necessary to flourish in a digital world, and Oregon will position itself as a model for inclusive, future-ready education. While it will take time, commitment, and real investment to achieve these goals, given the changes and challenges facing families, the state, and the nation - inaction is not an option.

> "I'm excited that this long overdue approach is being considered for our students Pre-K through postsecondary!"
>
> **- Oregon Parent**

ACKNOWLEDGEMENTS

ODE and HECC deeply appreciate the educators, students, families, community members, and industry partners who dedicated their time in sharing their voice, perspective, and expertise through engagement sessions, surveys, and discussion.

This work would not have been possible without the many organizations that helped support it through their feedback, engagement, and input including:

- American Indian/Alaska Native Student Success Advisory Group
- African American/Black Student Success Advisory Group
- Confederated Tribes of Umatilla Indian Reservation Education Department
- English Learners Advisory Group
- Klamath Tribes Education Department
- Latino/a/x & Indigenous Student Success Advisory Group
- LGBTQ2SIA+ Student Success Advisory Group
- Office of Senator Janeen Sollman
- Oregon Computer Science Teachers Association (OCSTA)
- Oregon Expanding Computer Education Pathways (ECEP) Team
- Oregon Migrant Education Service Center
- State Advisory Council on Special Education

Additionally, the Oregon Department of Education and the Higher Education Coordinating Commission would like to express gratitude to the 45 members of the Computer Science Implementation Plan Consult Group[39] who freely gave of their time and expertise to provide feedback on early drafts of the work.

39 Consult Group members who elected to include their names and organizations are included in Appendix F - Consult Group.

APPENDIX A – COMPUTER SCIENCE DIRECTIVE

In May of 2022, former Governor Kate Brown directed the Oregon Department of Education (ODE) and the Higher Education Coordinating Commission (HECC) to develop a statewide, long-term implementation plan "to provide access to comprehensive computer science education opportunities to every public school student in this state by the 2027-2028 school year." In her letter to ODE and HECC, she writes:

> *Racial, ethnic, and gender disparities in STEM education persist across the state, including gaps in access to computer science and related advanced placement courses…*
>
> *The results of these racial and gender disparities in access to STEM and computer science courses in public schools are clear…In summary, Black, Indigenous, people of color, tribal, and female students have the least access to high-wage, high-demand careers requiring a STEM credential or diploma.*

Furthermore, the directive states that the plan must:

- Identify immediate, practical, and systemic changes to increase students' access to computer science education
- Include an annual, ongoing evaluation process of the state of computer science education in Oregon
- Achieve these goals through ***a robust community engagement process***

In response to the directive, ODE and HECC developed a strategy to ensure that robust community engagement is central to building the implementation plan. This strategy included three phases of engagement. Phase I Engagement focused on listening to Oregonians' experiences with computer science education, their hopes for the future of computer science education, and the priorities to be considered in advance of writing the implementation plan. Phase II Engagement focused on gathering public feedback on the preliminary draft outcomes and strategies to be considered in the implementation plan. Finally, Phase III provided the general public an opportunity to comment on the initial draft of the plan.

In addition to developing a computer science implementation plan, as part of that directive, $6 million of the Governor's Emergency Education Relief (GEER) funds were awarded to the 13 regional STEM Hubs to increase computer science education opportunities for the 2022-2023 and with a recent extension into 2023-2024 school year as well.

APPENDIX B – ENGAGEMENTS AND FINDINGS

The development of the implementation plan included a robust community engagement process featuring three distinct phases.

Phase I Engagement

Phase I engagement, which took place primarily between December 2022 and March 2023, included a series of listening sessions hosted by ODE and HECC and an online survey. The engagement sessions provided information about the computer science directive and the current state of computer science education in Oregon. Session facilitators and presenters from both ODE and HECC were honored to hear the stories and ideas of those invested in creating equitable opportunities for computer science for all students across Oregon. During the synchronous engagement sessions, participants shared both written and spoken feedback transcribed by a note taker. These collected thoughts, experiences, and recommendations are summarized in this engagement report and will inform the writing of the Computer Science Education Implementation Plan scheduled to be released in October 2023.

How We Listened to Oregonians in Phase I

In Phase I, ODE and HECC hosted 18 engagement sessions for families, educators, industry leaders, and culturally-specific organizations between November 2022 and April 2023. These sessions were predominately virtual, with one session held in person. Each session included small group discussions with opportunities for Oregonians to respond to prompts through writing and speaking. In addition to these sessions, ODE and HECC reached out to community groups and were honored to be invited to present and listen at their meetings.

Overall, approximately 550 Oregonians participated in either an engagement session or the online survey. Of these, approximately 235 people joined a live session and shared more than 1,000 items of feedback regarding their experiences with computer science, barriers they have encountered, and hopes for the implementation plan. In the breakout sessions, facilitators from ODE and HECC shared discussion prompts to initiate the conversations. Additionally, 315 individuals engaged through the online survey and submitted more than 550 responses to its optional, open-ended questions. A detailed report of the Phase I engagement finding is available on the Computer Science Initiative website.

What Oregonians Shared in Phase I

Throughout the Phase I engagement sessions, it was clear that Oregon families, educators, community members, and industry professionals care very deeply about the state of computer science education in Oregon's schools. Many of those who engaged expressed significant concern that Oregon as a state lags behind others in adopting computer science policies that proactively increase access, broaden participation, create the conditions for student engagement and success in computer science, and support teacher professional learning. Some common themes from Phase I conversations included:

- The importance of starting computer science education early
- The value of developing a working definition of computer science and K-12 learning standards
- The importance of sustaining computer science education efforts through both funding and state level positions
- The necessity of a culturally responsive and sustaining computer science curriculum
- The need to address pre-service teacher training and professional development for current teachers
- The importance of strong connections between high school courses, post-secondary institutions, and industry
- The urgent need to consider policy recommendations through an equity lens to ensure that the disparities seen in access and participation are addressed in the years ahead

Phase II Engagement

Phase II engagement took place between May 2023 and July 2023. The goal of Phase II engagement was to hold space for feedback from educators, families, education partners, and community members on the draft outcomes and strategies to be considered for inclusion in the Computer Science Implementation Plan. Three general engagement sessions were held which provided an open opportunity for interested participants to join. Additional focused sessions were also held with the specific groups listed in the Acknowledgements section. Approximately, 150 Oregonians participated in a Phase II engagement session, though this number is an estimation as some of these engagements were held asynchronously.

The structure of the engagement session varied based on the needs of the particular group with some sessions occurring fully asynchronously with participants sharing ideas on a shared notetaker and others occurring synchronously with both independent reflection and small group discussion. All of the data shared on the note takers as well as during discussion was then analyzed. This included categorizing each piece of feedback according to the potential revision needed as well as aggregating the feedback according to themes. The following themes arose from Phase II engagement: Funding, Computer Science Access Across K-12, Teacher Recruitment and Retention, Educator Professional Development, Industry and CTE, Supporting Rural Schools and Districts, Secondary and Postsecondary Alignment, Computer Science Content/Instructional Materials, and Instructional Approaches

Funding

Across engagement sessions, participants shared the importance of consistent funding noting that unfunded mandates often fail and as such funding is necessary to build and grow programming. Participants also shared an appreciation for the focus on explicit funding for small and rural school districts given that this will be essential to create more equitable access to computer science for students across the state as well as a need to be explicit in the plan with regards to how funding would be spent so as to ensure equitable participation is possible.

Computer Science Access Across K-12

Across engagement sessions, participants shared the importance of providing access to computer science education and computational thinking starting in elementary school noting that if female-identifying students and students of color are exposed to computer science early in their education, this will have positive impacts on how they see themselves in STEM. They also shared the importance of developing computer science modules to be integrated into core content rather than requiring a certain number of minutes of instructional time.

Teacher Recruitment and Retention

Across engagement sessions, participants shared the importance of both recruiting and retaining computer science teachers – both within K-12 and postsecondary institutions. Many of the participants shared concerns regarding teacher salary noting that it is not practical for industry professionals to seek teaching careers given the salary differential.

Educator Professional Development

Across engagement sessions, participants continually uplifted the importance of educator professional development. This included pre-service teacher education to support an understanding of computer science education prior to entering the classroom, professional development for inservice teachers to learn computer science, and professional development for counselors and administrators with regard to developing systems to ensure that all students have equitable access to computer science education.

Industry and CTE

Across engagement sessions, participants shared the importance of creating strong partnerships between K-12 education and industry. Several strategies were shared including hiring industry professionals to teach computer science courses and providing educators with externships to learn from industry professionals.

Supporting Rural Schools and Districts

Participants shared the importance of supporting rural districts in meeting the needs of their students with regards to

access to computer science with a number of participants noting that rural districts do not have the resources to be able to offer the number of courses included in the draft outcomes and strategies.

Secondary and Postsecondary Alignment

Across engagement sessions, participants shared the importance of aligning secondary and postsecondary requirements and course numbering systems. Needs shared by participants included: the need for universal course numbering at the college level, updating the college map with an equity lens, and ensuring alignment between high school graduation requirements and college admission requirements.

Computer Science Content/Instructional Materials

Across engagement sessions, participants shared the importance of ensuring clarity regarding how computer science is being defined and what content and skills are embedded within that understanding while noting the importance of strong instructional materials with several participants noting a concern regarding mandated curriculum.

Instructional Approaches

Participants across engagement sessions shared a desire to ensure that the instructional approaches embedded within computer science are inclusive and provide students with hands-on project based learning experiences where they can apply their skills and knowledge.

Phase III Engagement

Phase III engagement involved sharing a draft version of the entire plan online for public feedback through a survey during October 2023.

APPENDIX C – DEFINITION OF COMPUTER SCIENCE

Oregon's definition of computer science acknowledges the breadth and depth of the field. It includes areas that some sectors may consider related to computer science rather than part of its core. This expansive view is intentional as the definition informs what courses are considered computer science when collecting the data that describes the landscape of computer science education across the state.

OREGON'S DEFINITION OF COMPUTER SCIENCE

Computer science calls upon students to understand how computing technologies work and their impact on society. It enables students to be active agents in a digital world by learning how to use the power of computers to solve complex problems.

Computer science encompasses many areas of study that continue to evolve rapidly, including: foundational and theoretical computer science; web and software development and design; cybersecurity; information systems; information technology; networking; artificial intelligence (AI) and machine learning; robotics; data science; and databases.

Computer science is distinct from digital literacy in that computer science engages students in computational thinking aimed to empower students to be creators of technology.

Although computer science is sometimes used synonymously with digital literacy, Oregon's Computer Science Implementation Plan makes a distinction between them. Whereas digital literacy focuses on the ability to use and navigate digital technologies, computational thinking and computer science encompass a deeper understanding of how these technologies work and the principles that drive them. While both are important, computer science enables individuals not only to use technology, but also create innovative solutions, harness the power of technology, and adapt to the rapidly evolving digital landscape.

APPENDIX D – DATA COLLECTION

Each Outcome described in this plan includes Measures of Progress which, in general, involve collecting data. The following table shows which Measures of Progress would require a new data collection and which can be part of an existing data collection.

MEASURES OF PROGRESS		
Measures of Progress for Outcome #1	**Strategies for Collection**	**Data Collection Method**
Number of high schools, disaggregated by locale, that offer a full year of computer science learning either through (1) stand-alone courses as defined by the ODE-approved list of National Center for Education Statistics (NCES) Codes or (2) integrated courses where computer science concepts represent at least 50% of the course content.	Data collected through ODE's existing Class Roster Collection	Research using existing ODE data
Number of computer science courses at each high school disaggregated by (1) course level (for example foundational or advanced) and (2) time offered (for example during the school day or offered as part of an extended learning opportunity during the summer or after school)	(1) Course level: Data collected through ODE's existing Class Roster Collection; (2) Time offered: Measuring extended learning opportunities could be accomplished either through a survey or through a new data collection.	(1) Course level: Research using existing ODE data (2) Time offered: New ODE Statewide Data Collection or Survey
Number of middle and elementary schools offering computer science or computational thinking learning opportunities, disaggregated by grade level	Departmentalized Middle Schools: Data collected through ODE's existing Class Roster Collection; Self-Contained Elementary and Middle Schools: Data collected through newly developed survey.	Departmentalized Middle Schools: Research using existing ODE data; Self-Contained Elementary and Middle Schools: New ODE Statewide Data Collection or Survey
Number of students participating in computer science learning, disaggregated by race/ethnicity, gender, geographic locale, disability status, and multilingual status.	Data collected through ODE's Class Roster and Cumulative Average Daily Membership Collections	Research using existing ODE data
Measures of Progress for Outcome #2	**Strategies for Collection**	**Data Collection Method**
Number of new computer science teachers disaggregated by educator race/ethnicity, gender, and geographic locale	Data collected through ODE's Staff Assignment and Staff Position collections	Research using existing ODE data
Number of retained computer science teachers over a given school year disaggregated by educator race/ethnicity, gender, and geographic locale	Data collected through ODE's Staff Assignment and Staff Position data collections	Research using existing ODE data
Number of computer science educators receiving training and support services disaggregated by the type of service	Data collected through ODE sponsored events, grants, contracts, and programs	Data collected from grant recipients
Number of participants in professional development opportunities statewide disaggregated by region	Data collected through ODE sponsored events, grants, contracts, and programs	Data collected from grant recipients

MEASURES OF PROGRESS		
Measures of Progress for Outcome #3	**Strategies for Collection**	**Data Collection Method**
State funding allocated annually to computer science education disaggregated by program, purpose, source, agency, and grade level	Data collected through ODE Fiscal Data Systems	Research using existing ODE data
Federal and other funds allocated and used statewide for computer science education	Data collected through ODE Fiscal Data Systems	Research using existing ODE data
Total number of positions or full-time equivalents (FTE) at ODE dedicated to computer science education	Data collected through ODE HR data systems	Research using existing ODE data
Measures of Progress for Outcome #4	**Strategies for Collection**	**Data Collection Method**
Inventory of computer science instructional materials available through Oregon Open Learning disaggregated by topic and level	Data collected through Oregon Open Learning	Research using existing ODE data
Measures of Progress for Outcome #5	**Strategies for Collection**	**Data Collection Method**
Number of students earning college credits in high school for computer science	AP and IB credit data collected through data sharing agreements; Other high school-based college credit opportunities collected through data sharing agreements with HECC	Research using existing ODE and HECC data collections
Number of students who concentrate in an established computer science CTE Program of Study	Data collected through ODE's CTE data collection	Research using existing ODE data
Number of students taking advanced computer science coursework in high school	Data collected through ODE's Class Roster Collection	Research using existing ODE data
Number of students taking computer science in college, disaggregated by year in college, level, course taken, race/ethnicity, gender, and geographic locale	Data collected through data sharing agreement with HECC	Research using existing HECC data
Measures of Progress for Outcome #6	**Strategies for Collection**	**Data Collection Method**
Number of new and open computer science jobs in Oregon and percent of these jobs filled	Data collected through data sharing agreement with the Oregon Employment Department	Research with existing Oregon Employment Department data
Number of Work-Based Learning opportunities in the area of computer science	Data collected through ODE developed statewide survey	New ODE statewide data collection
Number of school districts partnering with industry or community-based organizations to introduce students to careers in computer science	Data collected through ODE developed statewide survey	New ODE statewide data collection
Number of students graduating with a computer science degree from a community college, four-year college, or university	Data collected through data sharing agreement with HECC	Research using existing HECC data
Number of regional advisory committees created to support CTE programs	Data collected through ODE's CTE data collection	New ODE statewide data collection

APPENDIX E – IMPLEMENTATION ROADMAP

The implementation of these strategies will require focused and coordinated efforts over many years. This table suggests a timeline for the many activities involved in achieving the goal of broadening computer science education statewide.

Potential Timeline for Implementation of Strategies

Indicates a year where work on the strategy is in progress

Indicates the year where the strategy is expected to be fully implemented

IMPLEMENTATION ROADMAP						
Outcome #1: All Schools Offer Opportunities to Learn Computer Science	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
1.1 Legislate and fund the statutory requirement that all elementary schools offer computer science and computational thinking experiences at all grade levels.						
1.2 Legislate and fund the statutory requirement that all secondary schools offer at least two computer science courses, one of which must be a foundational computer science course.						
1.3 Establish non-competitive grant funds specifically for small schools and schools in rural communities to engage in local projects related to computer science that emphasize equity and culturally responsive practices.						
1.4 Establish grant funds to reinforce and integrate with existing programs that support expanded learning opportunities inclusive of summer learning, after-school learning, and learning on school breaks.						
1.5 Communicate with K-12 school counselors and administrators and engage in statewide professional development about inclusive computer science course design, offerings, and recruitment to computer science education.						
1.6 Develop tools and resources to support schools and districts in expanding and improving equitable computer science opportunities.						
Outcome #2: Systems are Established to Recruit, Prepare, Support and Retain Computer Science Teachers	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
2.1 Fund initiatives to support racially, ethnically, culturally and linguistically diverse teacher candidates who are pursuing a teaching license and have interest in teaching computer science.						
2.2 Fund initiatives to support current teachers to expand their capacity to teach computer science classes and to integrate computational thinking into existing classes.						
2.3 Develop teacher training experiences to help prepare new teachers to include computational thinking in their instruction.						
2.4 Develop a computer science micro-credential to support the preparation of current educators to teach computer science concepts.						
2.5 Fund regional computer science education instructional coaches to support computer science and CTE instruction, mentor new computer science teachers, and help coordinate regional and statewide professional learning experiences.						

IMPLEMENTATION ROADMAP						
Outcome #3: Computer Science Education has Stable, Long-Term Funding	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
3.1 Fund efforts to support and expand equitable access to culturally responsive and sustaining computer science education for Oregon students on an annual basis.						
3.2 Fund and authorize permanent positions at the Oregon Department of Education to support computer science education.						
Outcome #4: Computer Science is Recognized as a Content Area in Rule and Statute	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
4.1 Establish computer science as a content area by amending the related statutes and regulations.						
4.2 Adopt K-12 content standards and CTE Knowledge and Skill Statements that integrate equity and culturally responsive computer science education throughout grade levels and courses.						
4.3 Engage in a materials adoption process for computer science.						
4.4 Expand, review, and make available computer science and related instructional materials which are Open Educational Resources, with an emphasis on inclusive curricula that integrate computational thinking into other content areas.						
Outcome #5: High School Computer Science Education Aligns with Postsecondary Requirements	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
5.1 Incentivize enrollment in high school computer science courses or courses that integrate computer science concepts and computational thinking.						
5.2 Connect students with opportunities to explore postsecondary options.						
5.3 Review high school computer science course offerings and create a crosswalk with introductory computer science courses at Oregon community colleges, four-year colleges, universities, and workforce opportunities.						
Outcome #6: Computer Science Learning is Current, Relevant, and Connected to Career Opportunities	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
6.1 Develop, cultivate, post publicly, and share with school districts a list of industry partners that offer work-based learning opportunities for computer science.						
6.2 Support the creation of regional advisory committees to support CTE programs.						
6.3 Work with an industry, postsecondary, and secondary panel to ensure that computer science content standards and skill sets are evolving and aligning with technological advancements on an ongoing basis and create a plan to communicate these trends with educators throughout Oregon.						

IMPLEMENTATION ROADMAP						
Outcome #7: Progress on Expanding Participation in and Access to Computer Science Education is Monitored and Reported	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
7.1 Develop an ongoing evaluation process of computer science education that is reviewed by the State Board of Education to ensure the statewide plan is sustainable in the long term.						
7.2 Create public-facing data highlighting disaggregated enrollment in computer science classes statewide.						
7.3 Establish a clear list of National Center for Education Statistics (NCES) course codes indicating which classes may be considered as foundational computer science classes in secondary schools.						
7.4 Create a Technical Advisory Committee (TAC) of expert consultants with a clear commitment to equity, diversity, and inclusive practices to review and provide feedback on implementing the strategies described in the Implementation Plan.						

APPENDIX F – CONSULT GROUP

Note: Consult Group member names will be added after Phase III Engagement concludes.

The Oregon Department of Education and the Higher Education Coordinating Commission appreciate the dedication of the following individuals who served on the Consult Group.

Name	Organization

OREGON
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