



West Virginia Computer Science Plan K-12 Summary & Highlights



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2019-2020**

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Current Outlook

Current High School Computer Science Offerings

- West Virginia currently has 1,189 open computing jobs.
- The average salary for a computing occupation in West Virginia is \$71,150, which is significantly higher than the average salary (\$40,250).
- The existing open jobs alone represent an \$82,597,350 opportunity in terms of annual salaries.
- West Virginia had only 202 computer science college graduates in 2017; only 15% were female.

Current High School Computer Science Offerings

Currently, all high schools must offer at least one computer science course. These include, but are not limited to:

- Computer Science in the Modern World
- Computer Science – Introduction to Geographic Information Systems
- AP® Computer Science Principles
- AP® Computer Science A
- Advanced Placement® Computer Science A (as a 4th math credit)
- IB Computing Studies
- Basic Programming
- Computer Graphics
- Computer Science & Information Systems
- Computer Science/Programming
- Computer Systems
- Computer Technology
- Network Technology
- Object-Oriented Language Operation Systems
- Pascal Programming
- Courses from CTE pathways:
- Advanced Careers Informatics
- Computer Science – Project Lead the Way Best Practices 5
- Cisco Networking Academies
- Computer Systems Repair Technology
- Coding, App, and Game Design
- Simulation and Game Development
- Robotics
- Other CTE courses and county-created courses

High School AP® Computer Science Data

- Only 255 exams were taken in AP® Computer Science by high school students in West Virginia in 2018 (101 for AP® Computer Science A and 154 for AP® Computer Science Principles).
- Only 31% were female (27% for AP®CS A and 33% for AP® CSP); only 5 exams were taken by Hispanic or Latino students (3 took AP® CS A and 2 took AP® CSP); only 4 exams were taken by Black students (3 took AP® CS A and 1 took AP® CSP); no exams were taken by American Indian or Alaska Native students; no exams were taken by Native Hawaiian or Pacific Islander students.
- Only 25 schools in WV (20% of WV schools with AP programs) offered an AP Computer Science course in 2017-2018 (10% offered AP CS A and 14% offered AP CSP), which is 10 more than the previous year. There were fewer AP® exams taken in computer science than in any other STEM (Science, Technology, Engineering, and Math) subject area.¹

¹ 2018 State of Computer Science Education. Code.org Advocacy Coalition and the Computer Science Teacher Association, https://code.org/files/2018_state_of_computer_science.pdf

“AP Data – Research – College Board.” Research, 19 Oct. 2018, research.collegeboard.org/programs/ap/data.

Barriers to Offering Computer Science

- Prior to 2019, West Virginia did not yet provide dedicated funding for rigorous computer science professional learning and course support. West Virginia can strengthen its computer science programs by creating specific opportunities to bring computer science to county school systems.
- While a West Virginia certified educator can earn an additional endorsement in Computer Science through a Praxis exam, West Virginia Institutions of Higher Education have not developed a Computer Science in Education major as there is no way for these graduates to gain licensure.
- According to a representative survey from Google/Gallup, school administrators in West Virginia support expanding computer science education opportunities: 64% of principals surveyed think computer science is just as or more important than required core classes. However, one of their biggest barriers to offering computer science is the lack of funds for training educators.²

State Policies

K-12 computer science standards were initially adopted in April 2017. They were recently updated by the West Virginia State Board of Education (WVBE), and the latest iteration became effective in July of 2019.

Policy considerations:

- Some computer science endorsements have been created, but currently no certification is required to teach computer science courses.
- The WVBE updated Policy 2510 requires all high schools to offer a computer science course beginning in the 2016-2017 school year.
- Policy 2520.14 (West Virginia College- and Career-Readiness Standards for Technology and Computer Science), updated in April 2017, allows AP[®] Computer Science A; IB Computer Science Program Courses; and Computer Science and Mathematics to count as a fourth math credit if taught by a certified math educator, and Computer Science – Introduction to Geographic Information Systems to count as a third science credit, if taught by a certified science educator.

² *Pioneering Results in the Blueprint of U.S. K-12 Computer Science Education Google / Gallup Poll*, <https://computer-scienceedu.gallup.com>

Strategic Goals

Overarching Vision Statement for Computer Science Education

By 2022, all schools serving students in grades K-12 will offer opportunities for students to develop age-appropriate computer science skills and have access to an educator trained in computer science. The West Virginia Department of Education envisions a future in which students:

- critically engage in public discussion on computer science topics;
- develop as learners, users, and creators of computer science knowledge and artifacts;
- better understand the role of computing in the world around them; and
- learn, perform, and express themselves in other subjects and interests.³

| Goals | Related Subsection of Plan | Start/End | Responsible Party/Partners |
|--|----------------------------|--|--|
| Secure state-level funding dedicated for high-quality educator professional development. | Funding | Completed | Governor's office, Legislature, WVDE |
| Realign WVEIS course codes to SCED (School Courses for the Exchange of Data) codes to more closely reflect current offerings for tracking implementation of Policy 2510 that requires all high schools to offer at least one computer science course annually. | Outreach, Curriculum | Realign during 2019-20 school year, begin tracking in 2020-21 school year | WVDE, County Chief Instructional Leaders |
| Per policy 2520.14 (West Virginia College- and Career-Readiness Standards for Technology and Computer Science), every student K-5 will receive integrated computer science instruction along with core content. | Equitable Access | Current - 2023 | WVDE, County Chief Instructional Leaders |
| Offer every student in grades 6-8 a computer science course, per policy 2520.14 (West Virginia College- and Career-Readiness Standards for Technology and Computer Science). | Equitable Access | Planning during 2019-20 school year, begin tracking in 2020-21 school year | WVDE, County Chief Instructional Leaders |

³ Hendrickson, Katie. "A Vision for K-12 Computer Science." k12computerscience.org, k12computer-science.org/a-vision-for-k-12-computer-science/.

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|--|-----------------------------|----------------|--|
| Support county school systems in planning K-12 computer science pathways — including recommending courses aligned to the state standards, and integrating computer science content into other disciplines. | Outreach | Current - 2021 | WVDE, County Chief Instructional Leaders |
| Revise policy to integrate computer science education into all pre-service elementary education programs. | Pre-service | Current - 2021 | Institutes of Higher Education |
| Revise policy to develop computer science pre-service programs for secondary educators. | Pre-service | Current - 2021 | Institutes of Higher Education |
| Change policy to allow licensure for a stand-alone computer science certification. | Certification and Licensure | Current - 2021 | WVDE |
| Middle and High schools will have, or will have access to, at least one certified or endorsed computer science educator. | Certification and Licensure | 2022 | WVDE, County Chief Instructional Leaders |
| Elementary schools will have, at each grade level, at least one educator that has received professional learning in computer science. | Professional Learning | 2022 | WVDE, county school systems |

Funding Narrative

Offering the opportunity to learn computer science is absolutely critical for preparing our students to be college and career ready in the 21st century — not just for coding or computing occupations, but for every career. WVDE will support these opportunities for West Virginia’s students to thrive in their home state by enabling every school to offer computer science.

Estimated Costs to Achieve This Goal

WVDE will allocate funding to enable all schools to offer computer science through professional learning of practicing educators. To reach all schools, an annual investment is needed.

In order for West Virginia to compete both nationally and globally, we need to make sure every student in the state has access to this foundational skill.

Detailed Cost Outline

WVDE estimates the cost to provide additional training to one educator for each 6-8 and 9-12 school and 6 educators, one per grade level, for each K-5 school will be \$600,000 per year, totaling \$2,400,000 over the four years of this plan. This assumes that 25% of schools in West Virginia already have computer science educators based on the 2018 State of Computer Science Access Report.

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|---|---------|
| Number of WV public elementary schools | 396 |
| Number of WV public middle schools | 153 |
| Number of WV public high schools | 140 |
| Approximate percentage of schools that don't teach computer science Source: 2018 State of Computer Science Access Report | 75% |
| Number of elementary school educators needing training (1 per grade) | 1,782 |
| Number of middle school computer science educators needing training | 115 |
| Number of high school computer science educators needing training | 105 |
| Approximate cost to an elementary school to train a computer science educator | \$600 |
| Approximate cost to train a middle or high school computer science educator | \$3,500 |

Next Steps and Updates

On February 11, 2019, Senate Bill 267 was signed. Senate Bill 267 is “AN ACT to amend and reenact §18-2-12 of the Code of West Virginia, 1931, as amended, relating to requiring the State Board of Education to adopt a policy detailing the appropriate level of computer science instruction that shall be available to students at each programmatic level; and requiring the West Virginia Department of Education to develop and offer professional development opportunities.”

Senate Bill 267 states that “The West Virginia Department of Education shall develop and offer professional development opportunities to ensure educators are equipped with the requisite knowledge and skill to deliver computer science instruction as outlined in this section. The department may partner with high-quality computer science professional learning providers in developing and offering the professional development opportunities.”

In order to meet the requirements of Senate Bill 267 and to implement the Strategic Goals outlined in this summary, the West Virginia Department of Education (WVDE) worked with an advisory group of state and national computer science experts to develop a computer science plan. WVDE partnered with CodeWV (<https://codewv.wvu.edu>) and funded computer science training for WV educators. CodeWV developed computer science training for WV educators, in conjunction with multiple curriculum providers, such as Code.org and Apple. Computer science endorsements for middle school and high school educators were developed by WVDE. Since the beginning of the WVDE – CodeWV partnership, 89 middle school and high school educators attended week-long intensive training institutes and 239 elementary school educators attended one-day trainings offered throughout the year. WVDE and CodeWV provided follow-up support for these educators as they began implementing computer science in their classrooms.

Moving forward, WVDE will continue working with the Computer Science Advisory Group and with our partner organizations to meet the strategic goals outlined in this document. WVDE is in the process of developing an elementary computer science endorsement. Over the next four years outlined in this plan, WVDE will continue the successful partnerships outlined above, and will seek out additional partnerships to create an environment in which WV students can experience computer science education at its best.



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