The Honorable Ghazala F. Hashmi
Chairman, Senate Education and Health Committee
P.O. Box 396
Richmond, VA 23218

The Honorable Sam Rasoul
Chairman, House Education Committee
P.O. Box 13842
Roanoke, VA, 24037

September 25, 2024

Superintendent Coons, Secretary Guidera, Senator Hashmi, and Delegate Rasoul

Pursuant to the budget of the Commonwealth of Virginia, "CodeVA shall report, no later than October 1 each year to the Chairmen of the House Education and Senate Education & Health Committees, Secretary of Education, and the Superintendent of Public Instruction on its activities in the previous year to support computer science teacher training and curriculum development, including on collaboration with other stakeholders to avoid duplication of efforts."

Please see enclosed for our annual report.

Thank you.
Respectfully,

Tina Manglicmot, Ed.D.
Executive Director, CodeVA

Cc: Deputy Secretary of Education Nicholas Kent; Deputy Secretary of Education Emily Gullickson; Senator L. Louise Lucas, Chair, Senate Finance & Appropriations Committee; Delegate Luke Torian, Chair, House Appropriations Committee; Delegate Shelly Simonds, Chair, House K-12 Education Subcommittee; Em Cooper, Deputy Superintendent of Teaching and Learning

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2023-2024 Annual Legislative Report

Executive Summary

CodeVA, a leading nonprofit organization in partnership with the Virginia Department of Education (VDOE), is dedicated to advancing equitable access to high-quality computer science (CS) education across Virginia. Through innovative programs and strategic initiatives, we empower learners with essential CS skills and knowledge, fostering a future-ready workforce and driving internal economic growth throughout the Commonwealth. This report outlines our significant progress during the 2023-2024 fiscal year in advancing CS education through targeted professional development, innovative curriculum resources, and comprehensive support for educators. Our initiatives have successfully integrated CS into K-12 curricula, provided specialized training to move educators toward CS endorsement and deeper capacity for teaching CS, and prepared educators for the upcoming implementation of the updated 2024 Computer Science Standards.

Key accomplishments include delivering 259 hours of professional development to 1,021 educators, engaging 8,500 new users with our instructional and learning materials, and connecting with Virginia's educators through workshops and sessions at numerous conferences to expand our partnerships and connect educators to CodeVA's resources and professional learning courses.

While we have made significant progress, challenges remain, particularly in expanding our educator reach in every division of the Commonwealth and providing consistent, ongoing support for the full integration of CS education across all grade levels. Looking ahead, we aim to focus more directly on student engagement by developing innovative programs, such as developing coursework and resources to support after school coding clubs and other extracurricular activities in high demand by schools, to activate CS knowledge and skills into students' everyday learning experiences.

Our 10+ years of support for the state as a partnering nonprofit has established a strong ecosystem of support, demonstrating the effectiveness of CodeVA's partnerships with educators, school districts, and students. To continue expansion of CS learning opportunities into every school and classroom in Virginia, additional resources will be needed. Reinforcing CodeVA's capacity to reach learners in every school district in Virginia, developing educator-requested curriculum and course materials, and designing direct student engagement initiatives are at the top of the list of priorities. These efforts will ensure that all students are equipped to meet society's evolving needs, particularly in fields such as AI, data science, and cybersecurity, while preparing the next generation for Virginia's technology workforces and supporting the innovation, growth, and retention of businesses within our state.

Introduction

CodeVA, a 501(c)(3) nonprofit, advances equitable access to high-quality computer science (CS) education across Virginia. Through innovative programs and strategic initiatives, we empower learners with essential CS skills, fostering a future-ready workforce and driving economic growth throughout the Commonwealth. In partnership with the Virginia Department of Education (VDOE), CodeVA aligns its initiatives with the state's Computer Science Standards of Learning (SOL), aiming to support educators, students, and schools across the Commonwealth.

The 2023-2024 Scope of Work (SOW) focused on critical areas such as K-8 professional development, specialized computer science content, endorsed-focused training, and the implementation of the new 2024 Computer Science Standards. This report outlines the progress made on the key deliverables and the impact of these efforts on Virginia's educational landscape.

Summary of Deliverables

In the 2023-2024 fiscal year, CodeVA embarked on a mission to elevate computer science (CS) education across Virginia by implementing a comprehensive set of initiatives designed to support educators' capacity building, integrate CS into various K-12 classroom curricula, and prepare the state's educational ecosystem for the upcoming implementation of the 2024 Computer Science Standards. The journey began with a focus on professional development tailored to the unique needs of educators at various experience levels with computer science knowledge and across different regions.

The K-8 professional development initiatives played a central role in this effort, aiming to weave computer science seamlessly into the core subjects taught in schools. Recognizing the importance of early exposure to computational literacy, CodeVA developed and delivered educator workshops, professional development courses, and tailored learning projects focused specifically on the integration of Virginia's CS Standards within content for younger learners. Our

efforts went beyond imparting knowledge; our services and products empowered educators with the skills and confidence to integrate CS into the learning content of their classrooms. Our professional development courses not only strengthened educators' ability to blend CS with traditional subjects but also equipped them with relevant and innovative classroom learning resources and curricula.

Designing specialized professional development was another key focus area of CodeVA's efforts, oriented to deepen educators' expertise in specific knowledge strands of computer science. To support this, CodeVA developed specialized content toolkits, asynchronous professional development courses, and context specific example resources, all designed to provide educators with the skills and knowledge they need to implement high-quality CS learning opportunities for their students.

As the professional development offerings expanded, attention was also given to supporting educators in adding computer science endorsements to their teaching licenses. This endorsement is crucial as it empowers educators to teach more advanced CS concepts and is a designation of deep CS knowledge for an educator. Through this specific initiative, CodeVA is contributing to the state's broader goal of expanding high-quality CS education. Our nationally researched Praxis Prep course, offered twice a year at no cost to educators, became a cornerstone of this strategy.

As the state prepared for the release of the new 2024 Computer Science Standards, CodeVA took proactive steps to ensure that educators would be ready to implement these changes effectively. This would involve a thorough update of existing curricular resources and the development of a new professional development course tailored to the forthcoming standards.

Summary of Impact and Progress

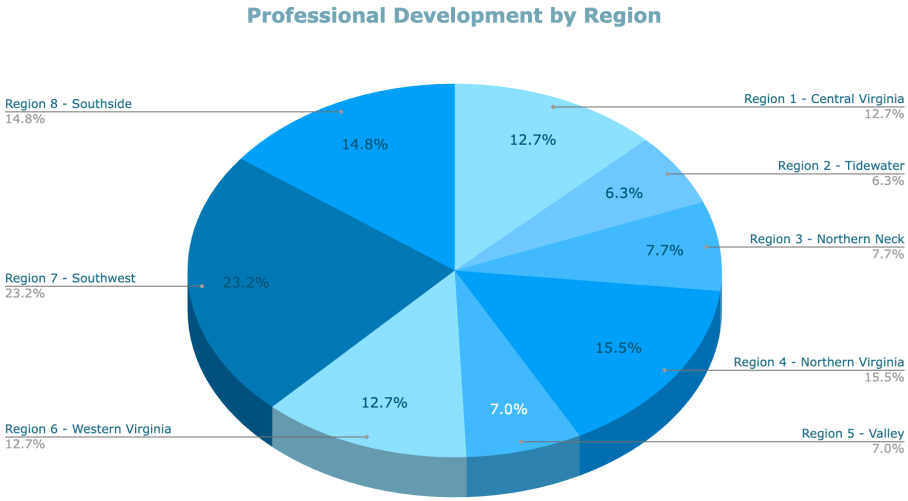
259 hours *of professional development delivered*

1,021 educator participants

8,400 new users *accessed curriculum resources*

Throughout the year, CodeVA's presence at various conferences underscored its role as a leader in CS education. Attending 13 conferences and delivering a total of 31 hours of professional development through hands-on sessions and workshops, CodeVA covered a wide array of topics relevant to current educational needs. The organization's participation in nine state-level conferences not only provided valuable professional development opportunities but also fostered new partnerships with professional organizations, expanding the reach and impact of these initiatives. These efforts culminated in 494 teachers participating in the professional development sessions offered, illustrating the increasing engagement across the state.

In addition to conference-based professional development, CodeVA offered a variety of other opportunities for educators to enhance their skills. A total of 26 hours of asynchronous CS integration professional development was facilitated, alongside 4 hours of live integration sessions. The hybrid professional development offerings, including two Praxis Prep courses and the Project GUTS program, provided an additional 108 hours of instruction. These sessions collectively engaged 145 teachers from various regions, with 28 of those teachers being new to CodeVA.



The demand for tailored professional development was also met with diligence. In response to 19 specific requests from schools and districts, CodeVA delivered 90 hours of customized professional development sessions that catered to the unique needs of educators. These sessions engaged 381 educators across six of the eight superintendent regions. By fulfilling these requests, CodeVA broadened the scope of its impact, ensuring that tailored support reached diverse educational contexts across the state.

The year also saw significant advancements in the development of new curriculum resources and course development. Among these was an asynchronous course titled *Poetry Digital Diorama using Scratch*, which provided an engaging way for students to explore both creative writing and computer science. Additionally, lesson sequences such as *Math + CS* and the *Micro:bit Puzzle Box* further enriched the offerings available to educators. A dedicated digital resource and learning website, curriculum.codevirginia.org, was launched, offering a centralized resource where educators could access a variety of instructional materials, including lesson sequences, learner-operated materials, and tutorials.

CodeVA Curriculum site now hosts:

- *18 lesson sequences or units of study,*
- *71 curricular resources, 10 tutorials, and*
- *approximately 100 lesson plans*

Over the last 12 months, this site has attracted roughly 8,500 new, unique users, reflecting the growing demand for high-quality CS resources. Participation numbers showed strong engagement in previously created content, underscoring the ongoing need for these resources. Access data further revealed that during state and national conferences, there was a marked increase in engagement, sometimes showing a 200-300% spike over normal daily traffic, with a peak increase in website visits of 1,800% at the 2024 Computer Science Teachers Association (CSTA) international conference.

The most-accessed materials include the *Standard Alignment Guides*, *CS Integration Toolkit*, *CS for Social Studies lessons*, *Data Science Project-Based Sequences*, and *Exploring Identity with Scratch*. These resources have proven essential in supporting educators in CS integration, a result of consistent outreach through professional development courses, conference presentations, and targeted email campaigns.

CodeVA's professional learning sessions, workshops, and training programs have been meticulously crafted to ensure the highest standards of educational excellence. Feedback from participants consistently reflects the high quality of the content, delivery, and practical application of these resources, with 84% of surveyed educators feeling more confident in teaching computer science, and 96% expressing confidence that they will teach what they learned in their own classrooms. Developing specialized toolkits and curriculum resources, such as the Poetry Digital Diorama and the Math + CS lesson sequences, has been recognized for its

innovative approach and effectiveness in integrating computer science concepts with core subjects.

As the year progressed, adjustments to the original Scope of Work were necessary to align with the final adoption of the new 2024 CS Standards. CodeVA, in partnership with the Virginia Department of Education, was invited to participate and present at the regional Computer Science division leader meetings, which saw the attendance of 83 leaders across all eight regions of the state. The resource development timeline had to be adjusted to match to the 2024 standards of learning final adoption by the Virginia Board of Education. Some initiatives, such as topics-based webinars, were carried over into the new fiscal year 2024-2025 Scope of Work and will be adapted into learning pages for each CS strand to reach an extended audience. Additionally, alignment guides will be revised to reflect the new standards and a new professional development course will be developed to bridge the gap between the 2017 and 2024 CS Standards.

In addition to the defined deliverables in the FY24 SOW, CodeVA also partnered with the VDOE in the design, planning, and recognition of the CS Educator of the Year award, which celebrates outstanding contributions to CS education and inspires educators across the state.

CodeVA also played a key role in the 2023 Virginia Society for Technology in Education (VSTE) annual conference. VSTE's mission is to promote excellence in education through professional development endeavors supporting the integration of existing and emerging technologies. Each year, their annual conference attracts over 1000 attendees. This year, CodeVA collaborated with VSTE to offer a Computer Science Playground, a new conference initiative that drew approximately 300 participants, vendors, and presenters to participate in various CS related activities. The playground was a vibrant event featuring live demonstrations, interactive exhibitions, and a gallery walk showcasing CodeVA's collaborative projects with educators, districts, and community partners. This new initiative created a dynamic space for CS education enthusiasts to explore, learn, and collaborate.

Through these initiatives, CodeVA met and exceeded its 2023-2024 fiscal year goals, demonstrating a strong commitment to advancing computer science education in Virginia.

Budget Overview

The total budget allocated for the 2023-2024 fiscal year was $550,215.50, covering curriculum development, course implementation, faculty, travel, materials, and conference registrations. Some deliverables will carry over into 2024-2025 fiscal year for completion, and while they are included in the next year's scope of work, no additional charges are associated with these items, as they are already accounted for in this year's budget.

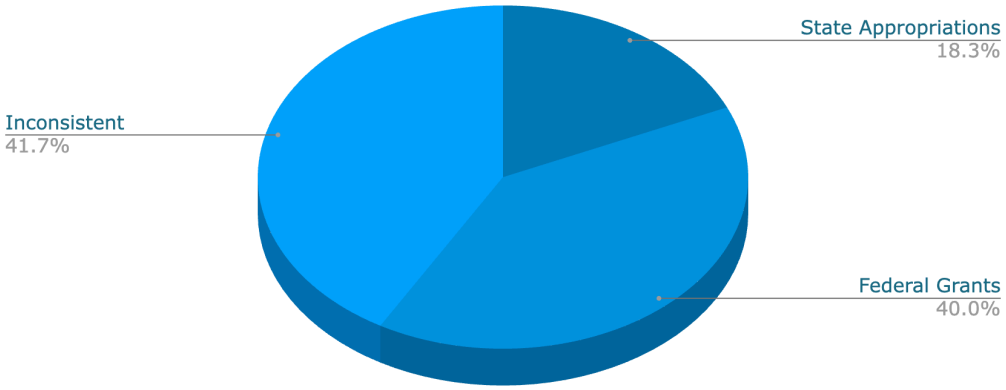
Category	Appropriation Budget	Actual Expenses
K-8 Professional Development related to curriculum integration	$213,244.75	$249,193.50
Specialized CS content strand-focused Professional Development	$145,338.00	$168,693.00
CS Endorsement focused Professional Development	$21,866.25	$31,389.25
Implementation of new 2024 Computer Science Standards	$169,766.50	$98,394.50
Additional Initiatives delivered (not included in the 23-24 SOW)	--	$7,854.00
TOTAL	**$550,215.50**	**$555,524.25**

Beyond the funding received through state appropriations, CodeVA has made significant progress in advancing computer science education across Virginia in 2024. Through partnerships with Virtual Virginia (VVA) and external funders, CodeVA expanded its reach by offering additional e-learning courses, engaging 243 educators through these virtual platforms. They also supported 204 educators through grant-funded, year-long professional development (PD)

programs, which included specialized support for rural areas and CS education in underserved communities.

CodeVA's efforts were further bolstered by three National Science Foundation federal grants, which supported various initiatives aimed at deepening computer science education. In collaboration with community organizations and other external funders, CodeVA provided 661 hours of direct instruction to 756 students and participated in several family and school STEM nights. These activities extended their mission of equitable computer science access to both educators and students statewide.

The chart below displays CodeVA's total expenses, with state appropriations accounting for a portion of the funding, alongside dedicated support for federal grants. However, the largest segment of the expenses is funded through inconsistent and unsustainable sources, highlighting the challenge of relying on unpredictable funding streams to maintain long-term impact.



Challenges and Barriers to Computer Science Education in Virginia

While the work required for the comprehensive implementation of computer science (CS) education in Virginia is significant and multifaceted, CodeVA has encountered challenges and barriers that hinder progress in delivering equitable and robust CS education across the state. Despite the success of the CodeVA and Virginia Department of Education (VDOE) partnership, these obstacles—primarily due to limited funding—impede the full realization of the state's vision for universal computer science literacy.

Limited Educator Training Coverage

With approximately 94,000 full-time teachers in Virginia serving nearly 1.2 million students across 2,100 schools, the challenge of integrating computer science is substantial. While many organizations and local education agencies (LEAs) actively work through state-appropriated grant opportunities to support computer science education, these efforts are often tailored to specific divisions or regions, resulting in varied approaches. CodeVA, in partnership with the Virginia Department of Education, provides a consistent, statewide curriculum and professional learning opportunities. Over the past year, CodeVA has skillfully trained 1,021 educators, provided 8,500 new users access to our curriculum repository, engaged 494 participants through conferences and workshops, and successfully reached at least one educator in 82 of the 131 school divisions across the state. Unfortunately, these numbers represent only 11% of Virginia's teaching population, highlighting the need for continued growth and expansion to ensure all educators have the support and resources to integrate computer science into their curricula. A unified approach is essential to ensure every student has access to foundational computer science education, which is crucial for success in a technology-driven world.

Barrier's to Learner Access in Computer Science Education

The 2023 State of Computer Science Education report, created by the Computer Science Teacher's Association, Expanding Computing Education Pathways Alliance and Code.org's Advocacy Coalition, highlights the limited reach of computer science education across Virginia. In 2022-2023, the report stated only 5.6% of students enrolled in foundational computer science courses, with just 31% of middle schools offering such instruction. While this does not capture student enrollment in other pathways, it speaks to low computer science enrollment, particularly in critical developmental years.

Another significant challenge is that K-8 educators are responsible for integrating computer science into an already packed curriculum. For K-5 teachers who are already juggling the demands of planning for multiple core subjects, finding the time and resources to develop integrated computer science lessons can be particularly difficult. This creates logistical and pedagogical hurdles, making it challenging for teachers to effectively incorporate computer science into their daily instruction.

Without sufficient training and support, teachers struggle to operationalize the standards in a way that ensures computer science is woven into the fabric of everyday learning. This challenge is compounded by the upcoming implementation of the new Computer Science Standards of Learning in Fall 2025, which will require realigning all existing resources and increased teacher professional development.

Without adequate training and support, many teachers find it challenging to meaningfully integrate computer science standards into everyday learning. With the new Computer Science Standards of Learning set to take effect in Fall 2025, there is an urgent need to provide teachers with the professional development and resources needed to ensure a smooth transition.

Ongoing Support and Professional Development

Single-session training alone is insufficient to ensure long-term success in implementing computer science education. Teachers need ongoing professional learning and coaching support to fully integrate the new standards into their teaching practice. The shift toward interdisciplinary instruction, which the standards necessitate, requires sustained support. Educators must not only understand the computer science content but also develop new pedagogical strategies that empower them to effectively and meaningfully combine it with other subjects.

The lack of participation in ongoing, structured support creates a situation where teachers may attend one training session but struggle to implement the lessons in the long term. A one-time touchpoint does not build agency for educators to meaningfully integrate complex topics such as data science and artificial intelligence (AI), which are rapidly becoming foundational components of modern society and are increasingly embedded in the new standards.

Adapting to Emerging Technologies and Evolving Standards

The rapidly evolving nature of computer science demands that educators be equipped to teach emerging fields like AI, Cybersecurity, and data science, which are now essential for preparing students for the future workforce. CodeVA is currently developing a four-module AI and Machine Learning series for high school students, a development initiative not funded through state appropriation. Teachers will be able to adapt these modules,integrating them into their existing computer science courses. If professional development for these resources is funded, these modules would be piloted in Fall 2025, helping to bridge the gap between current student readiness and Virginia's technology-driven economy.

Similarly, while CodeVA has developed K-12 instructional materials through National Science Foundation (NSF) grants, these resources are limited in scope due to the specific research focus required by each grant. Because NSF grants mandate alignment with only specific topics under study, not all state standards are covered, leaving gaps in available instructional resources. Without dedicated funding to create comprehensive lessons that address all K-8 standards, educators are left to develop their materials, further complicating efforts to integrate computer science education into classrooms fully.

Recommendations and Next Steps

These recommendations and next steps are critical for overcoming Virginia's challenges and barriers to computer science (CS) education. Securing additional state appropriations is imperative to scaling these initiatives, achieving long-term impact, and fostering statewide progress. With increased funding, we can broaden educator training, develop comprehensive instructional resources, and provide targeted support to underserved schools, ultimately benefiting all students and preparing them for the demands of an increasingly data-driven and AI-integrated society.

1. Expand Educator Training and Professional Development Opportunities

Recommendation: Increase the reach and depth of professional development programs for K-12 educators across Virginia, ensuring they have the necessary skills and support to integrate computer science into their curricula.

Next Steps:

- **Ongoing Coaching and Support:** Create a system of continuing mentorship and peer-to-peer support, ensuring that teachers who receive initial training have access to resources, coaching, and communities of practice. This comprehensive

strategy would be implemented through a regional network of CS coaches, virtual just-in-time coaching, and/or digital learning platforms.

- **Digital Training Resources:** Expand the availability of asynchronous online training resources so that teachers can access professional development on their own terms: on-demand and tailored to their schedules.

2. Develop and Scale Comprehensive Instructional Resources

Recommendation: Fund the development of a comprehensive repository of high-quality K-12 resources aligned with the new Computer Science Standards of Learning, covering all K-12 grade levels.

The high quality of CodeVA's existing instructional materials, developed with National Science Foundation dollars and input from educators and computer science experts, sets a strong precedent for future curriculum development. As we advance towards creating comprehensive K-12 resources aligned with the new Computer Science Standards of Learning, maintaining and enhancing this level of excellence will be paramount. By leveraging best practices and incorporating feedback from current users, we aim to deliver even more robust and effective teaching tools that support educators in seamlessly integrating computer science into their classrooms.

Next Steps:

- **Full Curriculum Coverage:** Allocate resources to create a comprehensive suite of K-12 instructional materials that align with the upcoming 2024 Computer Science Standards. This curriculum should cover interdisciplinary integration for K-8 and specialized elective course content for high school, with a focus on emerging areas like AI, data science, and cybersecurity.
- **Teacher-Ready Resources:** Ensure that all instructional materials are ready-to-use and easily adaptable by teachers to reduce the planning burden.

This includes lesson plans, assessment tools, and instructional guides for integrating CS with core content areas like math, science, and language arts.

3. Increase Outreach and Engagement with Schools, with Focus on Underserved Schools

Recommendation: Expand CS-Ready School Program to prioritize outreach to schools and districts with lower rates of computer science instruction to ensure equitable access to CS education for all students.

Next Steps:

- **Targeted Support for Low-Access Schools:** Identify schools, particularly in rural and economically disadvantaged areas, where access to CS courses and resources is limited and prior CodeVA presence has been minimal or non-existent. Direct additional support, such as targeted professional development, coaching, and access to digital tools, to these schools to ensure equitable opportunities for all students.
- **CS-Ready Implementation:** Target divisions with a higher proportion of underserved schools to support district and school leaders in developing and executing comprehensive CS education implementation plans. This will ensure that divisions with the greatest need are equipped to integrate computer science across grade levels and subjects.
- **Student Engagement Programs:** Develop extracurricular and enrichment curricula, including coding clubs, hackathons, and after-school initiatives, particularly in middle schools where participation in foundational computer science courses is low. Utilize a train-the-trainer model to equip local school staff and community organization members with the skills to implement these

programs effectively.

4. **Pilot and Scale Innovative Programs in Emerging Fields**

   Recommendation: Leverage state funding to pilot programs in advanced fields such as AI, data science, and cybersecurity, preparing students for the future workforce.

   Next Steps:

   - **AI and Data Science Pilot Programs:** Support the development and piloting of CodeVA's four-module, mastery-based AI series for high schools to pilot by Fall 2025. Pilot programs should be evaluated for effectiveness and scalability, and insights should inform future curriculum development.
   - **Workforce Alignment:** Collaborate with industry partners to ensure that emerging field curricula, such as AI and data science, are aligned with workforce demands, allowing students to graduate with skills that are highly valued in the job market.
   - **Advanced Course Pathways:** Establish clear pathways for students interested in pursuing advanced computer science topics, such as dual-enrollment courses with colleges and partnerships with local tech companies for internships and apprenticeship opportunities.

Conclusion

In conclusion, the past fiscal year has demonstrated CodeVA's remarkable commitment and progress in advancing computer science education throughout Virginia. The extensive professional development efforts, curriculum enhancements, and tailored support have significantly impacted educators and students alike, paving the way for a more integrated and robust approach to computer science education. However, the challenges highlighted, including the limited reach of professional development and the need for comprehensive instructional

resources, underscore the critical need for additional state funding. Addressing these gaps through increased appropriation will enable CodeVA and the Virginia Department of Education to expand their initiatives, enhance teacher training, and provide equitable access to high-quality computer science education across all schools. With increased investment, Virginia will ensure that every student is equipped for the demands of a technology-driven future and position the state as a leader in innovation, workforce readiness, and educational excellence.