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The Honorable Atif Qarni
Secretary of Education
P.O. Box 1475
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The Honorable L. Louise Lucas
President *Pro Tempore*, Senate of Virginia
P.O. Box 700
Portsmouth, VA 23705

The Honorable Rosalyn Tyler
Chairwoman, House Education Committee
25359 Blue Star Highway
Jarratt, VA 23867

October 1, 2020

Secretary Qarni, Senator Lucas, and Chairwoman Tyler:

Pursuant to the budget of the Commonwealth of Virginia (HB 30), "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.

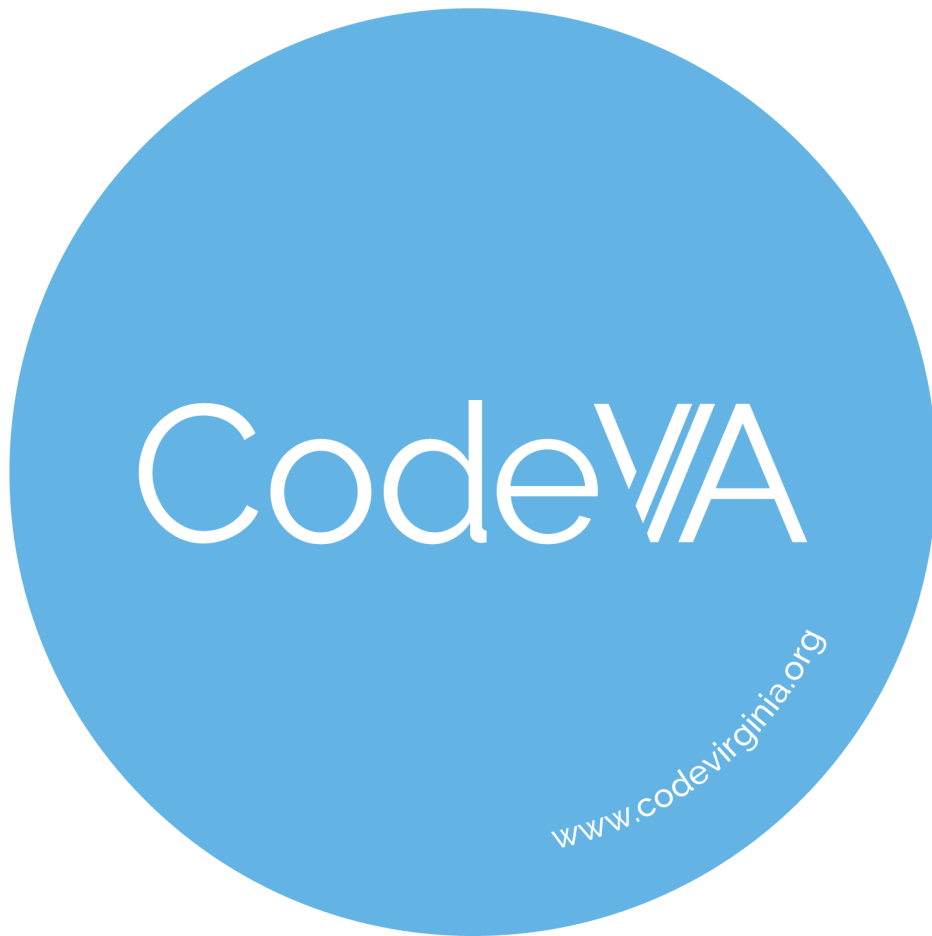
Respectfully,



Chris Dovi
Executive Director, CodeVA



Cc: The Honorable Luke Torian, Chairman, House Appropriations Committee
The Honorable Janet Howell, Chairwoman, Senate Finance and Appropriations Committee



CodeVA 2019-20 State Report



CodeVA 2019-20 State Report

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Four years ago, the Virginia General Assembly passed groundbreaking, first-in-the-nation legislation mandating computer science (CS) literacy as a requirement for all Virginia students. The legislation, and the resulting Virginia Standards of Learning (SOL) for CS, requires CS as an integrated subject for all Virginia students from kindergarten to 8th grade, and establishes mandatory standards for a pathway sequence of elective courses for middle and high school.

This legislation, along with CodeVA's computer science-focused professional development program for K-12 public school teachers and validated awareness by state leaders of the importance of CS to Virginia's present and future economy, have helped define a series of recent successes promoting Virginia as a state that invests in future workforce necessary to high tech industry and advancement. Not the least among these successes have been announcements by companies like Amazon, Microsoft, and others of significant business development investments in the Commonwealth. Amazon explicitly cited the K-12 CS SOL as an influence in its decision to locate its HQ2 in Virginia.

Policy and implementation are two different things: In 2019, the Virginia budget took an important step of providing direct state funding to the state's existing computer science teacher professional development initiative, CodeVA. CodeVA is a nonprofit organization founded in 2013, which in addition to providing statewide scaled teacher professional development at no cost to school divisions and teachers, also has served as an advocacy



resource for the state, and played a role in the 2016 CS SOL mandate legislation by crafting the legislation that was adopted. While the organization is independent in its governance, it works closely with the Virginia Department of Education and other education and industry stakeholders to ensure Virginia has regionally accessible capacity for teacher professional development and school division resources.

In addition to state funding, CodeVA also brings to bear resources from other state agencies, including the Virginia Tobacco Commission, numerous higher education centers in southwest and Southside Virginia, Federal research funding from the National Science Foundation and the U.S. Department of Education, as well as corporate and foundation dollars.

At its core, CodeVA is a comprehensive, scalable, statewide Computer Science teacher training, support and curriculum development nonprofit organization, founded with the intention of ensuring that Virginia students are ready to meet the demands of a 21st century workforce.

CodeVA's combination of funding, public and private partnerships, expertise and capacity provide a path forward to ensuring computer science literacy for all Virginia learners.

A national model for other states also engaged nationally in what is known as CSforALL, CodeVA is a proven and cost-effective means of ensuring high-quality, teacher led Computer Science professional development is available to Virginia classroom teachers. The program also works with national partners, research institutions, and - most importantly - Virginia teachers to develop and iterate curriculum and resources that follow a student from K-5 formative literacy to middle school embedded use of concepts in other subjects like math, science and social studies, and on to high school language-specific standard and advanced-level pathways classes.



Summer 2020 Training Evaluation

During the winter and spring, CodeVA undertook a significant expansion of its statewide faculty from 30 instructors to 42. CodeVA's model for recruiting, evaluating and apprenticing its faculty members relies on a graded rubric utilizing four domains of focus to ensure qualified and quality instructors: knowledge of computer science and adult learning; training session quality; collaboration; and professionalism. This model for facilitator recruitment developed in Virginia is becoming a copied model in other states similarly expanding their CS teacher training initiatives. All CodeVA faculty are Virginia public school classroom teachers, and this criteria is also essential to the training model, in which current Virginia classroom teachers are the audience. Both national research and best practices, as well as CodeVA's own experience, has proven that adult professional learning works best when the instructor is a peer with practical knowledge in addition to the specialized content knowledge in CS.

In response to COVID-19, CodeVA transitioned all of its summer professional development sessions to an innovative online delivery format. In addition to requiring the replatforming of more than 1200 hours of educator-facing content instruction from in-person to online, it also involved replatforming hundreds more hours of faculty-facing content and instruction, as all of CodeVA's faculty needed to be brought up to speed on online delivery of planned professional development. In preparation for summer sessions, and to extend support to educators, CodeVA offered an hour-long "Coffee Break" before each of the trainings for attendees to check their technology, get a chance to meet their facilitators, and interact with fellow participants. The daily virtual format of each course consisted of a two hour synchronous live session, three hour asynchronous work session, and a one hour "office hours" where CodeVA faculty were available to participants for feedback and support. Finally, CodeVA also implemented a live Help Desk for all sessions.

Additionally, several new professional development courses were introduced this summer in response to teacher requests for more hands-on coding experience and understanding of how to blend the Virginia Computer Science SOL's across content areas. CodeVA also offered the "Elementary CS Starter Pack," a week-long training consisting of three of

CodeVA's existing elementary-level stand-alone sessions. As described in the Effectiveness section of this report, participant feedback on all programs has been extremely positive, with teachers expressing statistically significant increases in CS self-efficacy and confidence.

Attendance

CodeVA delivered over 20,000 hours of professional development training to 1,034 educators in 45 separate professional development sessions from April through July with an average 64.1% attendance rate (attend/registrations). Details may be found in Appendix A.

The map in Figure 1 illustrates the over 300 Virginia public schools with teachers who participated in CodeVA's summer 2020 virtual training. This is an interactive Google Map which may be accessed [here](#).



Figure 1: Schools and/or divisions with teachers participating in CodeVA Summer Professional Development.

Figure 2 shows the CodeVA 2020 teacher attendance by Region. Region 2 - Tidewater had the most participation with 32%, followed by Region 4 - Northern Virginia (21%), Region 6 -

Western Virginia (18%), Region 1 - Central Virginia (12%), Region 5 - Valley (6%), Region 8 - Southside (4%), and Region 3 - Northern Neck and Region 7 - Southwest (3%).

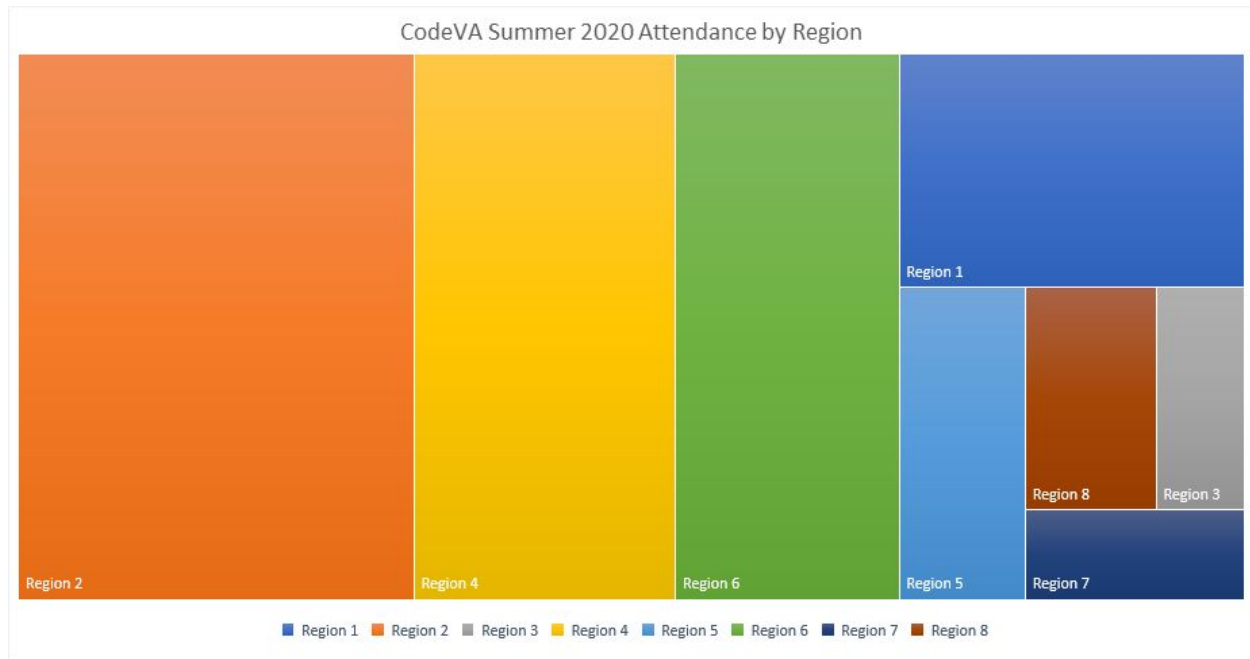


Figure 2: CodeVA Summer 2020 Attendance by Region

Figure 3 breaks down summer attendance by grade-level training. As in 2019, the majority of participants attended elementary level sessions (524). Educators also attended middle school (290), overview (163), and high school level sessions (57).

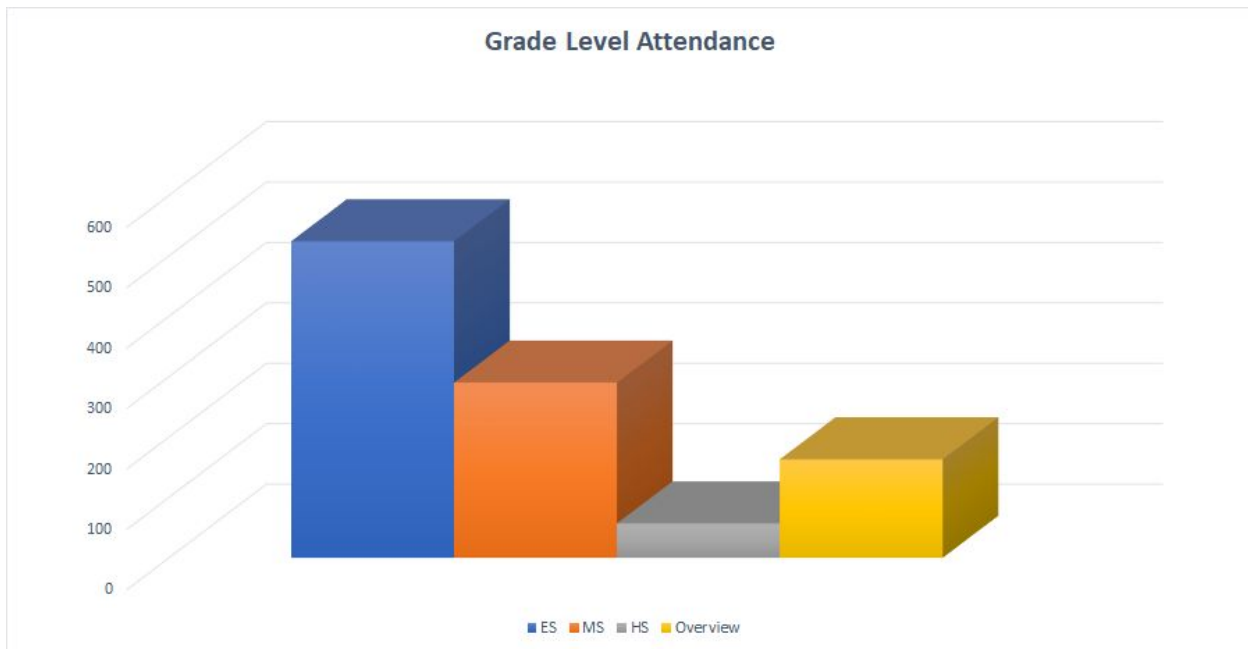


Figure 3: Summer attendance by grade-level training

Summer Training Sessions

CodeVA delivered 45 training sessions during the summer of 2020 (see Appendix A for a complete list of sessions). The specific programs CodeVA delivered virtually are listed below.

- Elementary School Programs
 - Elementary Coaches Academy
 - Launching Computer Science & Google CS First
 - K5 Code - Coding in Scratch*
 - K5 Integration*
 - Virginia Computer Science Standards of Learning (SOL) Deep Dives*
- Middle School Programs
 - Middle School Coaches Academy
 - Middle School Elective (Computer Science Discoveries)
 - Project GUTS
 - Middle School/High School Code - Coding in Python*
 - Middle School Integration*
- High School

- AP Computer Science Principles
- Computer Science Foundations (Exploring Computer Science)

* Denotes new course

Content

"They did an awesome job doing this training online. The experience of being a student in the class was great as we will have the same situation in a month. Projects were connected to class and curriculum...very relevant."

As part of CodeVA's continuing program evaluation, participants were asked to rate various aspects of the training; overall rating; amount of content covered; content rigor; session pacing; and required workload. Because the training this summer was delivered in a new format, questions were also posed about the online experience. Participants responded to statements on a Likert scale from one to five, where five represented the strongest agreement and one represented the strongest disagreement. Across every measure, CodeVA received an average of at least four out of five. See Table 1 below for results.

Table 1. Summer 2020 Survey Results

Question	Average across programs (1=strongly disagree; 5=strongly agree)
Online Experience	
I found online PD just as informative as in-person PD.	4.19
This PD session met my needs as a teacher-learner.	4.15
I felt a relationship with other participants	4.03
I felt part of the learning community	4.20
I felt a relationship with my facilitator	4.13
I am satisfied with my interaction with my peers and facilitator.	4.24
I found the instructional methods (e.g., collaborative google slides, icebreakers, group protocols, reflections) effective.	4.23



I am likely to attend an in-person CodeVA session in the future	4.14
I am likely to use the strategies, resources, curriculum learned about in the session this upcoming year	4.33
CodeVA Experience	
Overall	4.42
Amount of content covered	4.34
Content rigor	4.36
Pacing of session	4.27
Workload	4.39

Delivery

"Great interaction with class and informative."

"I truly enjoyed the facilitators of the training. They made it a comfortable learning environment."

"They were top notch instructors."

Participants were also asked to rate facilitator performance in the following categories: knowledge of content; delivery of content; and preparedness. Respondents rated facilitators on scale of one to five stars, where five stars is the highest rating and one star is the lowest rating. Facilitators received an average of at least 4.53 out of five stars on every measure, while 91 percent of respondents reported that they were very likely (74 percent) or likely (17 percent) to recommend CodeVA training to others.

Table 2. Facilitator Ratings

Question	Average rating across programs (1=lowest; 5=highest)
Facilitators	
Knowledge of content	4.72



Delivery of content	4.53
Preparedness	4.58
How likely are you to recommend CodeVA Training to someone (1=not likely; 5=very likely)	4.60

Effectiveness

One of the most important missions of CodeVA's computer science professional development is to engage and empower educators who may have little or no prior computer science experience. To evaluate how the training is accomplishing that mission, pre- and post-training surveys focused on self efficacy and understanding of content were administered to participants. Respondents reported agreement or disagreement with statements such as "I understand what Computer Science is" and "I am familiar with teaching strategies that are effective at my grade level for teaching computer science." Results showed statistically significant increases in almost every measure across all programs. For detailed analysis, please visit [this site](#).

Amplifying Impact

With funding from **Amazon**, this year CodeVA has begun the **CS Ready Schools** program with a pilot program of up to 20 high needs public schools across Virginia. This program will help schools develop whole-school computer science implementation strategies, and provide computer science professional development and support to students, teachers, counselors, and administrators. After evaluation and improvement of the pilot implementation, the **CS Ready Schools** program will expand to more schools across the commonwealth over the next four years.

To deepen the understanding around student and teacher learning of computer science CodeVA currently participates in several national research grants. These include:

- **CSforAll Ecosystem Grant** supports a team of school divisions and industry in the Gateway Economic Development region to develop a strategic plan for computer science education.
- Two national **Education Innovation and Research Grants** awarded this fall in Virginia use CodeVA's training programs as the foundation of their research



- **Project GUTS (Growing Up Thinking Scientifically)**, in partnership with Massachusetts Institute of Technology, investigates including computer science in middle school science classrooms. This two year project is National Science Foundation funded, and supports programs in Richmond City Public Schools.
- In partnership with GMU and ODU the **National Science Foundation Computer Science for All Grant** explores implementing computer science at the elementary levels for students with high incidence learning disabilities

Additionally, for the first time, CodeVA is the principal awardee of two **National Science Foundation** grants.

- **An Interdisciplinary Approach to Supporting Computer Science in Rural Schools.** Working with national STEM research organization TERC, the University of South Florida, and six rural Virginia school divisions, CodeVA is embarking on increasing participation in computer science by integrating computer science into middle school history and social sciences in this **Discovery Research K-12 Grant**.
- **Computer Science For and By Teachers: An Integrative Toolkit for 3rd-5th Grade Classrooms.** CodeVA partnered with the University of Virginia, Virginia Commonwealth University, Petersburg City Schools, and Chesterfield County Schools on this **CSforAll-Computer Science for All Grant** to increase participation in computer science by developing a computer science integration toolkit for elementary school teachers that layers cultural competency and relevancy into professional development and lesson planning.

These grants not only expand the understanding of best practices in teaching computer science, they also bring additional dollars to Virginia that support teachers and students across the commonwealth.

Conclusion and Summary

Despite the unexpected impact of COVID-19, CodeVA's 2020 summer professional development was successful in its delivery of a breadth of rigorous computer science content to K-12 educators of all grade levels from diverse regions of the Commonwealth of



Virginia. CodeVA summer professional development provided support to 1,034 teachers during the reporting period defined in this report, adding to the 1,001 participants served during the prior year reporting period. Represented in those numbers are teachers from all eight superintendent regions of the state.

This year's cohort of teachers received more than 20,000 hours of PD ranging from integrating CS into elementary instruction to implementing year-long high-school courses. Respondents rated CodeVA highly on both the content and delivery of materials. Participants also found the training as effective in imparting computer science content knowledge, familiarizing the newly adopted VDOE Computer Science SOLs, and sharing effective, grade-level appropriate teaching strategies. Moving forward, CodeVA is poised to respond to school division requests for training utilizing the cohort model as well as on a more limited scope to tailor customized or "off-the-shelf" one-day or multiple-day professional development opportunities.

Parallel to the state-funded training, CodeVA utilizes state, federal and foundation grant awards to develop research and practitioner partnerships with Virginia universities, agencies, and school divisions in order to increase opportunities for teacher professional development and to develop rubrics and resources. These resources will serve as a toolset and foundation for a scaled statewide program. The outcomes of these grant-funded programs are intended to provide the state and school divisions with curricula, resources, and a metrics-driven planning tool to help guide implementation of the computer science K-12 mandate.

While much work remains to be done in support of Computer Science K-12 in the commonwealth, all of these programs, which owe their availability and success to state support, collaboration and continued funding, ensure that the state of the Digital Dominion is strong and growing.



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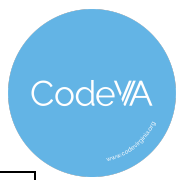


Appendix A - Attendance

Summer 2020 Professional Development session registration and attendance

Not included in the table below, CodeVA Educator Engagement helped facilitate the Maryland-Virginia-DC NCWIT Counselors for Computing three-day event in July, which included 111 counselor registrations, 29 from Virginia.

Training	Date	Registered	Attendance	Show Rate
Computing Systems Deep Dive - Roanoke/Salem Series	27-May-20	20	11	55.0%
CS 101/Foundations - Training Module	27-Apr-20	46	44	95.7%
CS First - Roanoke/Salem Series	22-May-20	21	11	52.4%
Curriculum/Program - Training Module	11-May-20	46	40	87.0%
Cybersecurity Deep Dive - Roanoke/Salem Series	29-May-20	19	10	52.6%
Data and Analysis Deep Dive - Roanoke/Salem Series	25-May-20	19	7	36.8%
Elementary CS Starter Pack	22-Jun-20	51	33	64.7%
Elementary CS Starter Pack - Session 2	22-Jun-20	27	19	70.4%
HS - AP CS Principles	13-Jul-20	41	22	53.7%
HS - CS Foundations - ECS	14-Jul-20	28	19	67.9%
HS - CS Foundations - ECS Session 2	14-Jul-20	29	16	55.2%
Impacts of Computing Deep Dive - Roanoke/Salem Series	1-Jun-20	20	10	50.0%
Introduction to Scratch - Roanoke/Salem Series	20-May-20	18	11	61.1%
K5 - Coaches Academy	14-Jul-20	84	64	76.2%
K5 - Coaches Academy Section 2	14-Jul-20	31	19	61.3%
K5 Coaches Academy - ARCS Cohort	14-Jul-20	76	69	90.8%
K5 Coaching-Franklin County Spring 2020 Online Training	6-May-20	19	12	63.2%
K5 Code - Coding in Scratch Session 1	24-Jun-20	31	19	61.3%
K5 Code - Coding in Scratch Session 2	10-Jul-20	43	21	48.8%
K5 Code - Coding in Scratch Session 3	10-Jul-20	31	7	22.6%
K5 Integration - Beta	4-Jun-20	26	12	46.2%



K5 Integration - Session 1	23-Jun-20	27	13	48.1%
K5 Integration - Session 2	31-Jul-20	46	19	41.3%
K5 Integration - Session 3	31-Jul-20	38	11	28.9%
Launching Computer Science - Session 1	22-Jun-20	26	10	38.5%
Launching Computer Science - Session 2	22-Jun-20	24	21	87.5%
Launching Computer Science - Session 3	10-Jul-20	49	25	51.0%
Launching Computer Science - Session 4	10-Jul-20	32	7	21.9%
Middle School/High School Code - Coding in Python	10-Jul-20	53	31	58.5%
MS - Coaches Academy	13-Jul-20	55	39	70.9%
MS - Elective - CSD	14-Jul-20	24	19	79.2%
MS Elective - CSD - Session 2	14-Jul-20	26	15	57.7%
MS Integration - Section 1	31-Jul-20	59	32	54.2%
MS Integration - Section 2	24-Jul-20	15	3	20.0%
MS Integration - Section 3	31-Jul-20	28	15	53.6%
Networking and Internet Deep Dive - Roanoke/Salem Series	3-Jun-20	19	7	36.8%
Online Delivery - Training Module	25-May-20	46	40	87.0%
Program Facilitator Training	12-Jun-20	41	39	95.1%
Richmond Public Schools PD Blitz: Core Content-Think Like a Model	9-Jun-20	18	18	100.0%
Shenandoah Valley Regional Computer Science Partnership- 2020 Summer Webinar Series	1-Jul-20	118	118	100.0%
SOVA CSTA - Finch Robots - Applications for All Levels	10-Jun-20	41	15	36.6%
SOVA CSTA - Get Started with Scratch	20-May-20	40	22	55.0%
SOVA CSTA - Intro to CS First	6-May-20	42	31	73.8%
Tools of Programming - Roanoke/Salem Series	5-Jun-20	19	8	42.1%
	TOTALS:	1612	1034	64.1%