




# Utah State Board of Education

## Utah K-12 Computer Science Initiative

### Cache County School District 4-year Grant Application

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#### TEAM: District Computer Science Leadership

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Higher Education Partner: Bridgerland Applied Technology College (Information Technology)	Trent Stokes	tstokes@btech.edu	435-750-3270
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\*\* We are a very lean district when it comes to our district office staff. Both Mike and Tim hold several positions that are considered separate positions in other districts. That is why there are duplicates for them in the director roles above.

- Mike Liechty's official titles are Deputy Superintendent & Secondary Education Executive Director. He also oversees everything CTE where we do not have a formal CTE director.
- Tim Smith's official titles are Chief Academic Officer, Chief Information Officer, Public Information Officer. He oversees curriculum and technology.

We should actually get bonus points due to the fact that we have many on this committee who believe so strongly in Computer Science that they are willing to add this to the already overscheduled time they have. :)

# VISION: Abstract for K-12 Computer Science Plan

## Overarching Goals & Desired Outcomes

Over the duration of the Computer Science Planning grant, our Computer Science leadership team (along with CS teachers in the district) has met to identify the desired outcomes of implementing a robust Computer Science program in Cache County School District. We then assimilated that knowledge and created an implementation plan specific to the needs of the Cache County students and community at large. We recognize the opportunity that highly skilled computer science jobs can afford our graduates and we want to do our best in preparing them for success. With funding from this grant we will implement Computer Science at each of our 25 schools to directly serve 40+ teachers plus an additional 900+ teachers through in house training and approximately 19,000 students in grades K through 12. Moreover, the results of this grant will accomplish the following goals and outcomes:

- Increase Computer Science Course Offerings and Understanding
- Develop Teaching Capacity
- Integrate Computer Science into Core Subjects
- Establish Key Partnerships
- Implement Diversity and Equity Strategies

Each of the goals are described in more detail within this vision statement. As part of the grant planning process, we ensured that the outcomes we are striving toward are in complete alignment with the Utah State CS Education Master Plan. The Master Plan has helped to guide us to defining outcomes and ultimately structuring the implementation plan such that it meets those shared outcomes. For your purview, the specific alignments for our vision are described in the table below.

Desired Outcome	Master Plan Alignment	Description
Increasing CS Course Offering	Focus Area 3	<u>Section IV. Curriculum and Standards</u> <ul style="list-style-type: none"> <li>● Recommend courses and curriculum aligned to the state standards framework</li> <li>● Prepare and develop teachers to become CS specialists or CS leads to inform and support local LEA implementation of curriculum</li> <li>● Develop courses with adequate CS content such that students spend at least half the course learning and applying fundamental CS concepts in order to receive CS credit</li> </ul>
Developing Teaching Capacity	Focus Area 2	<u>Section V. Teacher Development</u> <ul style="list-style-type: none"> <li>● Providing access to all teachers through bootcamps and workshops</li> <li>● Provide professional development for teachers in Utah to learn the Utah Computer Science Standards/ Framework</li> <li>● Direct additional resources to support rural districts in teacher professional learning</li> </ul>
Integrate CS into Core Subjects	Focus Area 5	<u>Grant Design Recommendations</u> <ul style="list-style-type: none"> <li>● P 49- Evaluating curriculum and resources that will produce desired classroom outcomes and achieve vertical integration through grade levels</li> </ul>

		<ul style="list-style-type: none"> <li>and from middle school, high school, and higher education</li> <li>• P50- Continue the development of continued teacher learning, development of teacher CS specialists, strong local collaborations and cohort support as the process of curriculum integration and course development and implementation continues.</li> <li>• P51- Early adopters will embrace the opportunity to engage their students through the integration of computer science fundamentals in their lessons and will most likely self-identify as being interested in becoming CS Specialists or CS Teacher leads.</li> </ul>
Establish Partnerships	Focus Area 5	<p><u>Section VIII. Outreach &amp; Communication</u></p> <ul style="list-style-type: none"> <li>• Increase awareness with external partners to identify and expand internship/apprentice opportunities for students</li> <li>• Develop communication across sectors (industry, agency, legislature, nonprofits)</li> </ul>
Implement Diversity and Equity Strategies	Focus Area 4	<p><u>Section VII. Diversity</u></p> <ul style="list-style-type: none"> <li>• Expand CS access to schools that serve rural populations and low-income populations</li> <li>• Establish and/or increase the exposure to diverse communities about what CS is and why it matters</li> <li>• Increase numbers of female students, as well as racial and ethnic minorities</li> <li>• Ensure that all curriculum and course content is accessible to people with disabilities</li> </ul>

Above all, we want to provide our students with options beyond high school. By graduating from our schools with the skills and competencies to compete for junior-level programming jobs, they will have the option to earn an above average wage out of high school; the option to deepen their knowledge by attending a CS higher education program; and the option to earn a living to be able to pay their way through college. Furthermore, and maybe more importantly, this level of knowledge will afford them the opportunity to stay in Cache Valley and be able to earn incomes of our neighbors on the Wasatch Front. Partnerships with local industry (Icon, Campbell Scientific, etc.) will help develop and preserve local talent in addition to strengthening our communities and our economy. People who live in Cache Valley want to die in Cache Valley.

## Increase Computer Science Course Offerings and Understanding

In accordance with Governor Herbert’s vision “to give every student access to robust computer science education...”, beginning in the fall semester of 2020, Cache County School district will implement a comprehensive Computer Science sequence in grades K-12.

To accomplish this goal, in the fall of 2020 the elementary school day will increase by 10 minutes to build Computer Science teaching time into the weekly rotation schedule. The fact that our elementary team increased the school day to allow every student to have a Computer Science learning opportunity demonstrates a significant commitment to computer science by our district. A unified elementary Computer Science curriculum will be taught by trained elementary computer specialists across all 17 elementary schools. Students in grades 1-2 will be provided with 60 minutes of coding time each week utilizing curriculum from Code.org. Kindergarten will have 30 minutes of coding time each week. A computer science course sequence will be implemented in grades 3-6, comprising one 40-minute block per week. This course sequence will begin a comprehensive multi-year Software Development Curriculum Pathway sequence utilizing curriculum from our industry partner, TechSmart.

In order to continue providing a Computer Science experience for all students throughout middle school, Computer Science (specifically coding) will be integrated within the required 7th grade College and Career Awareness and 8th grade Digital Literacy courses. This will be accomplished via a three-week coding sequence contained within each course. In addition, two sequential elective coding courses will be offered on the master schedule at each middle school.

Three Computer Science pathways (Programming, Web Design, and Information Technology) at the high schools will allow students to progress seamlessly through a scope and sequence of material to build an in-depth knowledge of computer science concepts along with confidence in their coding skills. Throughout their course work, students will learn algorithmic processes, problem solving, computational thinking, and comprehensive coding skills. All courses align to Utah's new computer science standards and fit within existing Computer Science & IT Career Pathway clusters.

In addition to offering the described Computer Science courses, professional development training will be created and available for all teachers to learn how to incorporate computer science concepts into their courses. Training topics include, but are not limited to, using computational thinking, problem solving, critical thinking, and mathematical reasoning in both core and elective classes. Cache County School District uses Instructure's Learning Management System called Bridge to house all our Professional Development training making it easy to push out training when and where it is needed.

## **Develop Teaching Capacity**

A core component of our strategy will be to increase teaching capacity by providing our existing teaching staff with computer science training and the means to earn Computer Science endorsements. Cache County School District has established a partnership with Utah State University. Working together, we have formulated a plan to help our teachers earn Computer Science endorsements to ensure the courses within the described pathways can be offered and taught by qualified teachers.

Additionally, TechSmart, our industry partner, will deliver computer science professional learning courses based on their Teacher Coding Bootcamps. These courses will immerse our Computer Science teachers (present and future) in the full breadth, depth, and rigor of the curriculum our students will experience. This will enable our teachers to learn computer science concepts, in-depth coding skills, and pedagogy.

## **Integrate Computer Science into Core Subjects**

Cache County School District has a very positive working relationship with Utah State University (USU). We are working with USU's Instructional Technology Department on two projects -- both of which are described in more detail in the curriculum section. The first project is actually funded through a CSforALL:RPP small grant managed by Stanford University. They are studying the effectiveness of RPP and in alignment with the Computer Science Master Plan and in conjunction with CS Grant and Master Plan of integration of CS into core courses, we are using math and computer science integrated teaching as a model for this project.

The second project integrates Computer Science into the 7th and 8th grade Science courses. The overarching goal of this project is for teachers and students to envision a new type of "school-wide science lab" that blends computational thinking with disciplinary science instruction, and makes use of students' schools and communities as spaces for scientific inquiry. USU is developing inquiry curricula and activities incorporating the sensor kits in middle school classrooms with the goal of increasing

engagement in science, computational thinking, and computing education. This is a perfect model for integration of Computer Science in Science curriculum.

We have found that most non-computer science teachers are unaware of the computational thinking strategies used in Computer Science. Computation thinking includes processes such as decomposition, pattern recognition, data representation, generalization/abstraction, algorithms, etc. -- all of which are beneficial in all subject areas, not just computer science. In order to further integrate computer science into the core classes in the secondary schools in increase computational thinking in all subject areas, we will use the "train the trainer" model where our trained Computer Science teachers will hold workshops for core subject teachers to learn how to incorporate computational thinking into their various subject areas. This helps to ensure that all Cache County students are getting CS concepts infused into their learning, regardless of the specific classes they may take.

In addition to the dedicated coding course pathway, our industry partner TechSmart provides Core Content Packs of coding activities for each core subject area. These exercises deepen the student's coding knowledge while exciting their interest in core subjects such as math, language arts, science and social studies. We will utilize those curriculum materials in grades 3-5 by having our Computer Specialists coordinate with our classroom teachers.

## Establish Key Partnerships

Cache County School District has a very positive working relationship with Utah State University (USU). We are working with USU's Instructional Technology Department on two projects mentioned previously. In addition, we have been given permission to offer several Computer Science courses via concurrent enrollment beginning in the Fall of 2020. Thus, we are working closely with USU's Computer Science Department on coordinating the curriculum offered in our schools with that of the university.

We also have partnered with Bridgerland Technology College to offer their IT STEM Academy after school to students who want to dive more deeply in Computer Science. The IT STEM Academy is a cooperative effort between high schools, Bridgerland Technical College, and Utah State University providing IT stackable degrees through a state technology grant. Upon completion of the program, students receive an IT skills certificate and 30 credits toward an AAS degree at Utah State University.

Cache County School District will join several other school districts in the state (including Jordan, Box Elder, Sevier, Morgan County, Beaver County, Kane County, Tintic, and additional potential districts) to form the **Utah Codes** computer science consortium. *Utah Codes* will work collectively with industry partners [TechSmart](#), [Silicon Slopes](#) and [USHE](#) to develop and implement a robust *Software Development Curriculum Pathway Model*. This model will provide students with the following five components by the time they graduate:

- A depth of knowledge (DOK-4) in professional programming languages
- A portfolio of industry-authentic software development projects
- Industry certifications in software development
- Concurrent enrollment credit for high school computer science course completed
- Student Internships and work-based learning opportunities from Utah's tech industry

Moreover the training will be conducted in conjunction with our Utah Codes cohorts as we begin to foster those relationships within the consortium. We will collaborate with our *Utah Codes* district consortium partners to identify common training dates beginning in the Summer 2020. In alignment with Utah's Computer Science Education Master Plan, Cache County School district, along with the Utah

Codes consortium, will work to create a multi-district Computer Science Professional Learning Community that shares common practices and methodologies

Participation in the Utah Codes consortium has helped us to collaborate with other districts throughout the state to share best practices and implementation methodologies for a comprehensive CS course pathway. With the exception of Jordan School District, the districts in the Utah Codes Consortium have similar demographics and rural constraints. It is much easier to address our Computer Science Initiatives as a team and learn from and share with each other. That has become evident as we have all worked together well throughout this grant writing process.

## **Implement Diversity and Equity Strategies**

Cache County School District is 88% caucasian which does not bode well for a diverse district as a whole. Cache is a “donut” district and includes the outside boundaries of Logan City. The majority of Cache Valley’s diverse population lives within the Logan City borders and thus resides in Logan City School District. Cache County School District is comprised of many wealthy suburbs outside Logan City, as well as the rural farmlands. Thus, most of our diversity strategies will focus on recruiting females. However, we will also include the traditionally underrepresented populations whenever possible.

Our first step will be to create a Diversity, Equity & Inclusion (DEI) Task Force whose primary purpose is to increase the numbers of female and traditionally underrepresented populations in computer science classes. This task force will include local industry leaders, parents, school leaders, teachers, counselors, students in regular meetings to formulate and implement outreach programs targeted at these populations. Collectively, this group will bring in female, african american, hispanic and native american industry leaders whenever possible to speak to prospective computer science students, and the student population as a whole to encourage and demystify the stereotypes associated with common demographics within the industry.

In addition, we ensure equity of learning exists within all of our computer science courses. To do this, we will utilize a fully differentiated curriculum (provided by our industry partner, TechSmart). This will ensure students of every ability level are scaffolded and supported appropriately to ensure they are able to achieve similar levels of success. We will also employ curriculum such that every K-8th grade student has required embedded computer science instruction on a weekly basis, and every 7th-12th grade student has a pathway of elective computer science courses at each grade level.



# CURRICULUM AND STANDARDS: Computer Science

## High-Quality Curriculum

Once our goals were clearly defined, and alignment to the Utah State CS Education Plan was made, we started sourcing curriculum and professional learning vendors that had an offering complete enough to match our vision. We surveyed and reviewed several Computer Science Curricular modules. In conversations with TechSmart, we found a partner whose model was fully aligned to our vision and goals for our district. We ran through a process of having district leaders, school leaders and teachers meet with TechSmart to experience the platform and curriculum.

Participants were consistently impressed with the comprehensive nature of the solution. In particular, the modular nature of the curriculum allowed us to customize the curriculum to fit our needs. Through the course of over a dozen meetings, we worked in partnership with our schools to create a custom implementation plan that fit the needs of each school, and their staff and schedule. No other potential partner showed this level of commitment to meeting each school where they are at and working to find the best possible solution for each.

### Curriculum Pathway

With computer science powering many of Utah's fastest-growing companies, the number of jobs requiring computer science skills is rising at a rate that will far outstrip Utah's ability to fill them. This severe deficit of skilled computer science workers is exacerbated by a lack of diversity in the tech workplace. To address these issues, Cache County School District's vision is to establish a rigorous multi-year Software Development Pathway in order to provide every student in the district with the opportunity to develop the depth of knowledge and skills required to compete for Utah's high demand software development jobs after graduation.

The Software Development pathway sequence in grades K-12 utilizing curriculum from our industry partner, TechSmart. This pathway will allow students to progress seamlessly through a scope and sequence of material, build an in-depth knowledge of computer science concepts along with confidence in their coding skills. Students will learn algorithmic processes, problem solving, computational thinking, and comprehensive coding skills. Students learn these skills as they progress from block-based drag-and-drop coding in elementary school to Python coding beginning in middle school and eventually transitioning to industry web software engineering languages, tools and frameworks in high school. The following is a summary of our curriculum pathway:

#### Elementary School

At each of our (17) elementary schools, students will spend 60 minutes each week as "computer time." In grades K-2, Code.org and Scratch curriculum will be presented to students for the full 60 minutes. In grades 3-6, a four-year computer science course sequence will be offered for 40 minutes to accommodate 20 minutes of keyboarding.

#### Middle School

At each of our (3) middle schools, two sequential trimester computer science courses will be offered on the master schedule. In 7th grade, every student will receive 3 weeks of coding embedded in our *College & Career Awareness* course. In 8th grade, every student will receive 3 weeks of coding embedded in our



Digital Literacy course, as well two full trimester elective courses: *Creative Coding* or *Intro to Python 1 & Intro to Python 2*.

### High School

At each of our (4) high schools, a five computer science course sequence will be offered over the course of our four year plan, including: *Computer Programming 1*, *Computer Programming 2*, *Advanced Computer Programming*, *Web Development 1* and *Web Development 2*.

## **Integration of Coding into Core Subjects**

### **Elementary School**

To further the goal of providing access to computer science for all students, Cache County School District will utilize TechSmart's Core Content Pack coding activities in grades 3-5. These coding activities are aligned to USBE computer science standards and are designed to integrate coding into other core subject areas including math, language arts, science and social studies. These exercises allow students to utilize the concepts learned in coding class in order to code programs that excite their interest in their core subjects.

In addition, Cache County School District has a very positive working relationship with Utah State University (USU). We are working with the Instructional Technology Department at USU on a research-practice partnership (RPP) project. The project is actually funded through a CSforALL:RPP small grant managed by Stanford University. They are studying the effectiveness of RPP and in alignment with the Computer Science Master Plan and as part of the CS Grant we are using math and computer science integrated teaching as a model. The project has the following key objectives:

- **Develop professional learning and a CS and mathematics integrated curriculum for paraprofessional educators and their students:** We will collaboratively design (co-design) professional learning experiences for paraprofessional educators to help them learn to enact CS curriculum integrated with district mathematics standards. This curriculum is intended to support CS educators and their students.
- **Develop integrated CS-math curriculum for fifth-grade teachers and their students:** We will co-design professional learning experiences for fifth-grade mathematics teachers to learn to highlight CS concepts in their adapted mathematics curriculum so that integrations with the computer science instruction during computer lab time are made visible.

These objectives directly address a key problem of practice for the Cache County School District to offer high quality and evidence-based computer science instruction that ultimately reaches all of their elementary students. By co-designing professional learning experiences, curricular resources, and lesson plans, we address a need to strive to find ways to provide CS instruction during already full school days and taught by inexperienced educators.

Through this process, Stanford University will examine how to improve the effectiveness of a design-based RPP through real-time monitoring of, analysis of, and feedback on partnership co-design sessions and routines through a systematic parallel study of it. (This part of the study will be conducted by Stanford University and is not part of the CS Grant.) Their research addresses a field-specific need

regarding how to structure and manage RPPs so that they are productive, equitable, and impactful for all parties involved.)

## Secondary School

We have outlined a project with the Instructional Technology Department at Utah State University (USU) which integrates Computer Science into the 7th and 8th grade Science courses. USU has been working with a group of middle school science and STEM teachers in the Denver Public Schools to integrate computational thinking into their lessons. The teachers and researchers have designed several curricular units in which students use sensor kits to explore scientific phenomena. In each of these units, students use programmable sensor kits (micro:bits with attached sensors) to conduct a variety of data-enabled and personally relevant investigations. In 2021-22 we will implement the model in Cache County School District's middle schools. The overarching goal of this project is for teachers and students to envision a new type of "school-wide science lab" that blends computational thinking with disciplinary science instruction, and makes use of students' schools and communities as spaces for scientific inquiry. USU is developing inquiry curricula and activities incorporating the sensor kits in middle school classrooms with the goal of increasing engagement in science, computational thinking, and computing education. This is a perfect model for integration of Computer Science in Science curriculum.

We have found that most non-computer science teachers are unaware of the computational thinking strategies used in Computer Science. Computation thinking includes processes such as decomposition, pattern recognition, data representation, generalization/abstraction, algorithms, etc. -- all of which are beneficial in ALL subject areas, not just computer science. In order to further integrate computer science into the core classes in the secondary schools in increase computational thinking in all subject areas, we will use the "train the trainer" model where our trained Computer Science teachers will hold workshops for core subject teachers to learn how to incorporate computational thinking into their various subject areas. This helps to ensure that ALL Cache County students are getting CS concepts infused into their learning, regardless of the specific classes they may take.

## Partnerships with Higher Education

As mentioned Cache County School District has a very positive working relationship with Utah State University (USU) and Bridgerland Applied Technology College (BTech). These partnerships will continue as part of the grant and beyond in the following capacities:

1. We will work with the Instructional Technology Department at USU in providing models where Computer Science and Course classes are successfully integrated. As we have continued success, we can build on these models and expand to other content areas.
2. We will work with the Computer Science Department at USU in providing courses at a discounted rate which will qualify teachers to obtain the skills and coursework required to be endorsed to teach Computer Science in the state of Utah. **This process will not only benefit the teachers in Cache County School District, but all current and potential Computer Science teachers throughout the state.**
3. We will work with the Information Technology Department at BTech and continue to offer IT STEM after school programs in Information Technology where students earn industry certifications and credits towards an Associate's Degree in Information Technology.

## TechSmart's Rigorous, Differentiated, and Industry Aligned Curriculum

It is important to note that financial concerns played a factor in the decision to select a specific curriculum. We chose to partner with a company that was affordable in the short term, but also sustainable after the term of the grant award. Their commitment to us is further demonstrated by working with us to create a contingency plan to move forward even without grant funding. We are actually using their curriculum in our high schools in the 2020-21 school year without grant funding. More details about their contingency plan can be found in the budget section.

### Complete and rigorous curriculum

The instructional design of the curriculum contains a carefully developed scope and sequence to meet learning objectives, which are aligned with Bloom's Taxonomy. The lesson sequence starts with teacher-led instruction, where the teacher introduces computer science concepts, and skills in an interactive and engaging manner. Students immediately apply what they have learned, which is directly aligned to and controlled by the instructor. Once students have received direct instruction and have practiced working with the teacher in the coding environment, they apply their learning using coding techniques and exercises (Code Writing, Code Debug, Code Comprehension, Code Restructure). These opportunities build students' critical thinking and problem-solving skills, providing access to depth of knowledge levels 3 and 4 of Webb's Depth of Knowledge. As a capstone experience, students are given the opportunity to work together on 'code your own' projects regularly throughout each course. To assess student learning, there are auto-graded formative and summative assessments throughout the curriculum.

Each LESSON contains:	Each UNIT contains:
<ul style="list-style-type: none"><li>2 Interactive Coding Instructions</li><li>4 Instruction Practices</li><li>2 Coding Technique Demos</li><li>4 Coding Technique Practices</li><li>3 Coding Exercises</li><li>1 'Code-Your-Own' Program</li><li>1 Assessment</li></ul> <hr/> <p><b>100+ Lines of code written per lesson</b></p>	<ul style="list-style-type: none"><li>8 Interactive Coding Instructions</li><li>16 Instruction Practices</li><li>8 Coding Technique Demos</li><li>16 Coding Technique Practices</li><li>12 Coding Exercises</li><li>2 Assessments</li><li>1 Research Project</li><li>1 Code Your Own Program</li><li>1 Student-Driven Capstone Project</li></ul> <hr/> <p><b>500+ Lines of code written per unit</b></p>

### Differentiated: a level for every student

For students, computer science and coding can be challenging, especially as they progress through a sequential pathway of courses. If not scaffolded appropriately, students can become discouraged and give up. To ensure students of all ability levels are able to achieve a similar level of success, we will utilize a full differentiated curriculum provided by our industry partner TechSmart. The curriculum will provide five to six levels of differentiation for each hands-on activity. Teachers will be able to toggle individual students or groups of students to an appropriate level to accommodate their skills. To help teachers determine the appropriate level for each student, lessons have clearly defined sets of learning objectives measured through formative assessments, summative assessments, and hands-on coding projects. The objective of this differentiation is to keep students of all levels highly engaged and gaining competency, with special attention towards supporting underserved populations of students taking computer science courses.

## **Aligns to Utah CS Standards, Courses and CTE Pathways**

All courses offered in the Software Development Pathway are aligned to Utah's K-5 and 6-12 Computer Science Standards and are Utah state approved courses that fit within existing *Programming & Software Development* and *Web Development* Pathway Career Clusters.

## **Portfolio of industry-authentic software development projects**

Over the course of the pathway students will develop a strong depth of knowledge in the skills and concepts required to be successful in professional software development roles. However, in order to get hired in the industry it is essential that they are able to demonstrate to prospective employers that they can be successful. Portfolios are necessary to show the depth of knowledge a computer programmer has and should be considered as part of their professional resume.

Each course at the high school level contains multiple capstone projects in which students create a unique program of their own design, showcasing their knowledge, skills and creativity in employing particular coding techniques. The requirements for these programs are tailored to specific industry-based use cases and practices, with students learning and employing industry skills such as project management and team collaboration. Ultimately, these projects lead students to create a robust body of industry-authentic work that will form the basis of their programming portfolio.

In addition, the *Utah Codes* consortium in collaboration with Silicon Slopes will seek to establish partnerships with the local technology industry to create industry-focused experiences embedded throughout the software development pathway. Through collaboration with these industry partners, the goal will be to create "simulated lab environments" where students create practical real-world projects aligned to the current work of technology teams within these partner organizations.

By the time students graduate high school they will have created 12-15 industry-aligned capstone software development projects to include in their portfolio to share with potential employers, showcasing their ability to successfully enter the workforce in entry-level software development positions.

## **Industry certifications in software development**

Since many software development jobs do not require a 4-year degree, it is necessary for new software developers to be able to demonstrate their body of knowledge and expertise in industry-standard skills, practices, and professional coding languages in order to enter the workforce. For this reason, each high school course in the software development pathway culminates in at least one industry-recognized certification. By the time students graduate they will have had the opportunity to earn a total of four industry certifications:

- [Microsoft Tech Assoc. 98-381 - Introduction to Programming Using Python](#)
- [PCEP – Certified Entry-Level Python Programmer](#)
- [Microsoft Tech Assoc 98-383 - Introduction to Programming Using HTML and CSS](#)
- [Microsoft Tech Assoc 98-382 - Introduction to Programming Using JavaScript](#)

These certifications, in conjunction with a strong portfolio of work, demonstrate to employers that a student graduating from Cache School District's software development pathway has all the necessary skills to directly enter the workforce and contribute successfully to any software development team.

# By Fall 2023 Cache County School District's scope and sequence for computer science will include:

Grade Level	Course	Frequency	Proposed Curriculum	Target Date
Kindergarten	Code.org course A	Full Year  30 min lesson per week	<u>Computer Science Concepts:</u> Digital citizenship, Sequencing, Loops, Events	Fall 2020
	-----  unplugged.org	-----  10% Science integration	-----  An online "binder" will be provided for each classroom teacher containing unplugged activities from unplugged.org and a map for which ones integrate to their Science curriculum. Teachers will be advised to use one of them each month via reminder emails.  In addition, board games such as Littlecodr and Bits and Bytes will also be used.  Additionally, each teacher will have a binder with unplugged activities from unplugged.org and a map for which ones correlate to their Science curriculum.	-----  Fall 2021
1st Grade	Code.org course B	Full Year  60 min lesson per week	<u>Computer Science Concepts:</u> Digital citizenship, Sequencing, Loops, Impacts of Computing, Events	Fall 2020
	-----  unplugged.org	-----  10% Science integration	-----  An online "binder" will be provided for each classroom teacher containing unplugged activities from unplugged.org and a map for which ones integrate to their Science curriculum. Teachers will be advised to use one of them each month via reminder emails.  In addition, board games such as Littlecodr and Bits and Bytes will also be used.	-----  Fall 2021
2nd Grade	Code.org course C	Full Year  60 min lesson per week	<u>Computer Science Concepts:</u> Digital citizenship, Sequencing, Binary, Loops, Events, Data	Fall 2020

	----- unplugged.org	----- 10% Science integration	----- An online "binder" will be provided for each classroom teacher containing unplugged activities from unplugged.org and a map for which ones integrate to their Science curriculum. Teachers will be advised to use one of them each month via reminder emails.  In addition, board games such as Littlecodr and Bits and Bytes will also be used.	----- Fall 2021
<p><b>*3rd Grade</b></p> <p><i>*NOTE:</i> In year 1 (SY2020-21) every 3rd -6th grade student will complete the first half of CS10.</p> <p>In subsequent years this curriculum will be offered to 3rd grade students only..</p>	<p>TechSmart CS10 <i>Intro to Coding 1 (first half)</i></p> <p>----- unplugged.org</p>	<p>Full Year</p> <p>40 min lesson per week</p> <p>----- 10% Science integration</p>	<p><u>Coding Concepts:</u> Events, Frames, Sprites, Variables, Math Operators, Animation, Scale, Input/Output, If-Else Conditionals, Randomness</p> <p>----- An online "binder" will be provided for each classroom teacher containing unplugged activities from unplugged.org and a map for which ones integrate to their Science curriculum. Teachers will be advised to use one of them each month via reminder emails.</p> <p>TechSmart's Core Content Pack of coding activities for math, language arts, science and social studies. These exercises deepen the student's computer science knowledge while exciting their interest in core subjects.</p>	<p>Fall 2020</p> <p>----- Fall 2021</p>
<p><b>*4th Grade</b></p> <p><i>* NOTE:</i> In year 2 (SY2021-22) every 4th, 5th and 6th grade student will complete the second half of CS10.</p> <p>In subsequent years this curriculum will be offered to 4th grade students only.</p>	<p>TechSmart CS10 <i>Intro to Coding 1 (second half)</i></p> <p>----- unplugged.org</p>	<p>Full Year</p> <p>40 min lesson per week</p> <p>----- 10% Science integration</p>	<p><u>Coding Concepts:</u> Events, Frames, Sprites, Variables, Math Operators, Animation, Scale, Input/Output, If-Else Conditionals, Randomness</p> <p>----- An online "binder" will be provided for each classroom teacher containing unplugged activities from unplugged.org and a map for which ones integrate to their Science curriculum. Teachers will be advised to use one of them each month via reminder emails..</p> <p>TechSmart's Core Content Pack of coding activities for math, language arts, science and social studies. These exercises deepen the student's computer science knowledge while exciting their interest in core subjects.</p>	<p>Fall 2021</p> <p>----- Fall 2021</p>

<p><b>*5th Grade</b></p> <p>* <u>NOTE:</u> In year 3 (SY2022-23) every 5th and 6th grade student will complete the first half of CS20.</p>	<p>TechSmart CS20 <i>Intro to Coding 2 (first half)</i></p> <p>-----</p> <p>unplugged.org</p>	<p>Full Year</p> <p>40 min lesson per week</p> <p>-----</p> <p>10% Science integration</p>	<p><u>Coding Concepts:</u> Coordinates, Mouse and Keyboard Input, Sprite Collision, Else-If Conditional Clauses, Boolean Logic, Nested Conditionals.</p> <p>-----</p> <p>An online "binder" will be provided for each classroom teacher containing unplugged activities from unplugged.org and a map for which ones integrate to their Science curriculum. Teachers will be advised to use one of them each month via reminder emails.</p> <p>TechSmart's Core Content Pack of coding activities for math, language arts, science and social studies. These exercises deepen the student's computer science knowledge while exciting their interest in core subjects.</p>	<p>Fall 2022</p> <p>-----</p> <p>Fall 2021</p>
<p><b>6th Grade</b></p>	<p>TechSmart CS20 <i>Intro to Coding 2 (second half)</i></p> <p>-----</p> <p>unplugged.org</p>	<p>Full Year</p> <p>40 min lesson per week</p> <p>-----</p> <p>10% Science integration</p>	<p><u>Coding Concepts:</u> Coordinates, Mouse and Keyboard Input, Sprite Collision, Else-If Conditional Clauses, Boolean Logic, Nested Conditionals.</p> <p>-----</p> <p>An online "binder" will be provided for each classroom teacher containing unplugged activities from unplugged.org and a map for which ones integrate to their Science curriculum. Teachers will be advised to use one of them each month via reminder emails.</p> <p>TechSmart's Core Content Pack of coding activities for math, language arts, science and social studies. These exercises deepen the student's computer science knowledge while exciting their interest in core subjects.</p>	<p>Fall 2023</p> <p>-----</p> <p>Fall 2021</p>
<p><b>7th Grade</b></p>	<p><b>College &amp; Career Awareness</b> (39.01.00.00.001)</p> <p>*For every 7th grade student.</p> <p><u>Curriculum:</u> TechSmart CS100</p>	<p>3 weeks embedded</p> <p>5 days per week</p> <p>50 min per day</p>	<p><u>Coding Concepts:</u> Text Input and Output, Statements, Expressions, Variables, Concatenation, Mathematical Operators, Conditionals, Comparisons, Booleans, Logical Operators, While Loops, Libraries, Randomness, Debugging</p>	<p>Fall 2020 Embedded in College &amp; Career Awareness.</p>

<b>8th Grade</b>	<b>Digital Literacy</b> (32.02.00.00.170)  *For every 8th grade student.  <u>Curriculum:</u> TechSmart CS100	3 weeks embedded  5 days per week  50 min per day	<u>Coding Concepts:</u> Text Input and Output, Statements, Expressions, Variables, Concatenation, Mathematical Operators, Conditionals, Comparisons, Booleans, Logical Operators, While Loops, Libraries, Randomness, Debugging	Fall 2020 Embedded in Digital Literacy.
<b>Middle School Course Offerings</b>	<b>Creative Coding A</b> (35.02.00.00.003)  (to be changed to) <b>Intro to Python 1</b> (35.02.00.00.004)  Middle school Elective  <u>Curriculum:</u> TechSmart CS101	Trimester elective  60 days  50 min per day	<u>Coding Concepts:</u> Text Input and Output, Statements, Expressions, Variables, Mathematical Operators, Conditionals, Booleans, Logical Operators, While Loops, Libraries, Randomness, Debugging, Coordinates, Windows, Drawing Lines and Shapes, RGB Colors, Tuples, Procedural Animation, Event Loops, Mouse and Keyboard Input, Timing and Framerate	Fall 2020
<b>Middle School Course Offerings</b>  continued...	<b>Creative Coding B</b> (35.02.00.00.003)  <b>Intro to Python 2</b> (35.02.00.00.006)  Middle school Elective  <u>Curriculum:</u> TechSmart CS102	Trimester elective  60 days  50 min per day	<u>Coding Concepts:</u> Lists, Indexes, For-Each Loops, For-Range Loops, Sprite Images, Spritesheet Animation, Collision, Writing Functions, Arguments vs Parameters, Return Values, Default Parameters, Passing by Reference	Fall 2021
<b>High School Course Offerings</b>	<b>Computer Science Principles</b> (35.02.00.00.035)	Trimester elective  60 days  60 min per day	<u>Big ideas and concepts include:</u> Computing is a creative activity. Abstraction reduces information and detail to facilitate focus on relevant concepts. Data and information facilitate the creation of knowledge. Algorithms are used to develop and express solutions to computational problems. Programming enables problem solving, human expression, and creation of knowledge. The Internet pervades modern computing. Computing has global impacts.	Fall 2020
<b>High School Course Offerings</b>  continued...	<b>Computer Programming 1</b> (35.02.00.00.030)  * <u>Note:</u> Meets Digital Studies graduation requirement.  <u>Curriculum used in 2020:</u>	Trimester elective  60 days  60 min per day	<u>Coding Concepts:</u> Statements & Variables, Values, Expressions, Import & Using Functions, Conditionals (If, Else if, Else), Randomness & Math, Boolean Logic Boolean Variables, While Loops, Controlling Loops, For-Range, Using Objects(sprites + graphics), Interaction.	Fall 2020



	TechSmart CS201			
<b>High School Course Offerings</b> continued...	<b>Computer Programming 2</b> (35.02.00.00.030)  <u>*Note:</u> Meets Science graduation requirement.  <u>Curriculum used in 2021:</u> TechSmart CS202  <u>Certifications:</u> PCEP - Entry Level Python Programmer	Trimester elective  60 days 60 min per day	<u>Coding Concepts:</u> Lists, For-each Loops, List Operations, String Formatting, Web Scraping/APIs, Tuples, 2D Lists, Dictionaries, Web APIs, Functions, Return Values, Complex Parameters, Cryptography	Fall 2020
<b>High School Course Offerings</b> continued...	<b>Advanced Computer Programming</b> (35.02.00.00.040)  <u>Curriculum used in 2021:</u> TechSmart CS203/CS204.	2 trimester elective  60 min per day	<u>Coding Concepts Included:</u> Reading files, Writing files, File system, Image & Sound files, Error Handling, Advanced Error Handling, Identity vs. Inequality, User Interface, Classes, Class Scope, Inheritance, Class Design, Custom Libraries.	Fall 2021
<b>High School Course Offerings</b> continued...	<b>Advanced Placement Computer Computer Science A</b> (35.02.00.00.041)	Full Year Elective  60 min per day	<u>Coding Concepts Included:</u> Object-oriented programming methodology, Emphasis on problem solving and algorithm development, Includes the study of data structures and abstraction.	Fall 2022
<b>High School Course Offerings</b> continued...	<b>Web Development 1</b> (35.02.00.00.060)  <u>*Note:</u> Meets Digital Studies graduation requirement.  <u>Curriculum used in 2023:</u> TechSmart CS301  <u>Certifications:</u> Microsoft Tech Assoc 98-383 Introduction to Programming Using	Trimester elective  60 min per day	<u>Coding Concepts Included:</u> HTML and CSS Fundamentals Structure Documents Using HTML Present Multimedia Using HTML Style Web Pages Using CSS	Fall 2020

	HTML and CSS			
<b>High School Course Offerings</b> continued...	<b>Web Development 2</b> (35.02.00.00.065)  <u>Certifications:</u> Microsoft Tech Assoc 98-382 Introduction to Programming Using JavaScript  <u>Curriculum used in 2023:</u> TechSmart CS302	Trimester elective  60 days  60 min per day	<u>Coding Concepts Included:</u> Program with JavaScript Operators, Methods, and Keywords, Program with Variables, Data Types, and Functions, Implement and Analyze Decisions and Loops, Interact with the Document Object Model, Interact with HTML Forms	Fall 2022
<b>High School Course Offerings</b> continued...	<b>Web Development Capstone</b> (35.02.00.00.067)	2 trimester elective  60 min per day	<u>Coding Concepts Included:</u> front-end (HTML5, CSS3, Bootstrap, JavaScript, jQuery, jQuery mobile), foundation paradigms (OOPS, Design Patterns, Object Modelling, JSON, AJAX), MEAN Stack (MongoDB, Express Framework, AngularJS, Node.js), data exchange (HTTP, websockets), development environment and tools, DISHA (resume and interview prep package)	Fall 2022
<b>High School Course Offerings</b> continued...	<b>Intro to Information Technology</b> 35.02.00.00.005)  Taught in congruence with the IT STEM Partnership with Bridgerland Technical College	Two year program  75 min per day (after school)  4 days per week	<i>Curriculum is developed and set by Bridgerland Technical College</i>	Fall 2020

# PROFESSIONAL LEARNING: Creating Effective CS Teachers

## BASELINE FOR CURRENT STATE OF TEACHER CS ENDORSEMENTS:

<b>Computer Science Endorsements</b>	<b>Current # of Teachers with Endorsement in LEA</b>
* <b>Exploring Computer Science</b> [now historic (as of Feb 1, 2020)]	7 teachers are endorsed in Exploring Computer Science and all 7 are teaching Exploring Computer Science and/or other Computer Science Courses.
<b>Computer Science 1</b> (updated endorsement to <a href="#">Introduction to Computer Science</a> as of 2/1/2020)	6 teachers are endorsed in Computer Science Level 1 and all 6 are teaching Computer Science Courses.
<b>Computer Science 2</b> (updated endorsement to <a href="#">Programming and Software Development</a> as of 2/1/2020)	8 teachers are endorsed as Computer Science Level 2. None of them are interested or willing to teach Computer Science.
<b>Introduction to Information Technology</b> (updated endorsement to <a href="#">Information Technology</a> as of 2/1/2020)	No teachers are specifically endorsed in Introduction to Information Technology.
<b>Web Development</b> (updated endorsement: <a href="#">Web Development</a> as of 2/1/2020)	No teachers are specifically endorsed in Web Development, but we have several teachers endorsed in Business and Marketing which qualifies them to teach Web Development. Five teachers with Business and Marketing endorsements are teaching Web Development. Two of these teachers also have their Computer Science Level 1 endorsement.

## COMPUTER SCIENCE PROFESSIONAL LEARNING

### Path of Teacher Professional Learning Courses

A core component of our proposal is to develop a sustainable district-wide computer science teaching capacity across the elementary, middle and high school continuum.

Our industry partner, TechSmart, will provide our existing teaching staff with computer science teacher professional learning courses called Teacher Coding Bootcamps. During these professional learning courses, teachers will complete the entire computer science course they are assigned to teach, immersing them in the full breadth, depth, and rigor of the curriculum content the students will experience. During this time they will complete all of the lesson activities in the curriculum, including over one hundred coding exercises and four large coding projects, writing over 2,500 lines of code.

The bootcamp courses are designed to take each teacher through the curriculum step by step. They will first master the curriculum before they can teach it. After completing the content portion of the Coding Bootcamp teachers will shift to the mock teaching phase of the course, learning the necessary pedagogical approaches to teaching computer science. This will enable teachers to develop a depth of knowledge in computer science concepts, coding skills and pedagogy that will increase their confidence and positive self-perception as a computer science teacher allowing them to teach with fidelity and rigor.

These *Teacher Coding Bootcamps* are designed to take any teacher from any background who loves to teach, loves to learn, and has a growth mindset and turn them into a confident Computer Science instructor. This means that we can leverage a pool of our existing teachers, level them up in computer science content and coding skills and immediately begin delivering rigorous computer science courses to our students at all grade levels.

Teachers will complete the *Teacher Coding Bootcamps* as outlined in the tables following this narrative. They will continue to build their knowledge over time by completing the next Coding Bootcamp course in the sequence each year enabling them to teach more advanced courses on the pathway. During the 4 year term of this initiative, elementary teachers will complete three *Teacher Coding Bootcamp* courses, middle school teachers will complete two bootcamp courses, and the high school teachers will complete six bootcamp courses. Since the *Teacher Coding Bootcamp* courses are aligned to USBE approved computer science courses, all teachers participating in the bootcamps will be trained on the strands, standards and course pathways outlined by USBE.

Grant funds would be used to contract with TechSmart to conduct all training. In addition, teachers will be compensated at their hourly rate of pay for training days conducted outside of the school contract time. When the training takes place during the school day, substitutes will be provided by the grant.

### **Bootcamp Warranty**

To further demonstrate our joint commitment to developing the CS knowledge base within the existing pool of our teachers, our industry partner TechSmart, has included a policy such that if any teacher who has completed a Coding Bootcamp leaves the district or is unable or unwilling to teach the computer science class they were trained for during the next school year, then the district can send a replacement teacher to a Coding Bootcamp at no additional cost.

### **Investing in Our Teachers**

Our goal with the CS Professional Learning component of this initiative is to build a sustainable district-wide CS teaching capacity whose foundation is based on teachers developing a Depth of Knowledge 4 (DOK) in Computer Science, not a specific Platform.

The Teacher CS Professional Learning Coding Bootcamps being provided by our industry partner (TechSmart) are focused on teachers learning the CS subject matter (topics, concepts, skills, coding techniques, pedagogy) identified in the USBE strands and standards for the course they are going to be teaching. This is not a PD or training on a vendor platform, Instead, it is a full professional learning experience that will provide teachers with in-depth instruction on CS content and skills.

The CS knowledge and skills acquired by teachers in this professional learning will allow teachers the flexibility to teach any CS curriculum in a platform agnostic manner. This programming knowledge earned by the teachers from an industry partner bootcamp will stay in the district regardless of which delivery platform is used.

The focus of this initiative is to use grant resources to build the requisite knowledge within the existing pool of teachers the most efficient and economical ways possible. This includes hosting CS Integration workshops facilitated by teacher leaders who have participated in coding bootcamps and have a strong understanding of coding concepts and computational thinking. These leaders will convene groups of core content teachers and in a train-the-trainer model, work together to build strategies and content for integrating computer science concepts into the core content areas. They will build upon and customize the core content activities provided by TechSmart to fit the needs of Cache County School District classes.

Our overarching goal is to use our grant funds to invest in our teachers -- to build teacher capacity so we can offer more and deeper computer science courses. Over 66% of the budget outlined in this plan is going to invest in training our teachers -- 33% to cover teacher stipends, benefits and sub-pay and 33% to cover CS teacher professional learning & support.

### **Utah Codes CS Professional Learning Community (PLC)**

As part of our collaboration with *Utah Codes* Cache County School District will actively participate in their Computer Science Professional Learning Community (CS PLC) with teachers from other consortium partner school districts to support continued learning, collaboration, and the sharing of best practices. As part of the *Utah Codes* CS PLC, teachers will be organized into two cohorts: elementary and secondary. CS PLC meetings will be held quarterly providing a structured forum for teachers to share best practices, generate ideas and offer peer support.

Cache District will collaborate with our *Utah Codes* district consortium partners to identify common training dates for the *Teacher Coding Bootcamps* beginning in the Summer 2020.

### **CS Teacher Endorsement: Collaboration with Utah State University**

As the demand for computer science courses in middle and high schools increase, it is imperative we have the teachers qualified to teach those courses. Our overarching plan is to have two teachers at each high school endorsed in Introduction to Computer Science (formerly called a Computer Science Level 1) and one of those teachers endorsed in Programming and Software Development (formerly called Computer Science Level 2).

In the middle schools, our plan is to have one teacher at each middle school endorsed in Introduction to Computer Science and one additional teacher endorsed to teach Creative Coding or Introduction to Python. At this time, neither course has an endorsement requirement.

We have one alternative school in our district and plan to have one teacher with an Intro to Computer Science endorsement at that school.

To meet our endorsement goals, we have established a partnership with Utah State University. By working together, we have formulated a plan to help our teachers earn these endorsements. Utah State will offer six online Computer Science courses to our teachers at a continuing education rate of \$350 per course. Utah State University's current plan is to offer some of these courses on a 7-week block so a teacher can complete two courses in one semester. The proposed schedule for the Utah State courses is as follows:

Fall 2020	Spring 2021	Fall 2021
CS1030 (Foundations of CS) CS1400 (CS1) - 7 weeks CS 1410 (CS2) - 7 weeks	Fall 2020 schedule plus CS2420 (CS3) CS4350 (Teaching Methods)	Spring 2021 schedule plus CS2410 (GUI Programming)

The courses listed above qualify for endorsement under the legacy Computer Science Level 1 and Level 2 endorsements and we are communicating with the state to have the course sequence approved. It is important to note that due to the low rate to take these courses, the courses will not apply towards a degree. Regular tuition and fees apply if teachers want to take a course for degree seeking purposes. The department of Distance Education at Utah State also said teachers can convert the credits to a degree seeking option in the future by paying the difference.

Upon successful completion of a course, grant funds would be used to reimburse teachers for those costs. In addition, a stipend would be paid to the teacher for his/her time spent working on the course.

### Computer Science in Core and Elective Courses

In addition to offering the described Computer Science courses, professional development training will be created and available for all teachers to learn how to incorporate computer science concepts into their courses. Training topics include, but are not limited to, using computational thinking, problem solving, critical thinking, and mathematical reasoning in both core and elective classes. Cache County School District uses Instructure's Learning Management System called Bridge to house all our Professional Development training making it easy to push out training when and where it is needed.

## Elementary Teachers

When	Grade level	# of Projected Participants	Content	Outcome/ Endorsement
<b>Summer 2020</b> 1 day of CS professional learning  1 day in summer	All Elementary Computer Specialists	1 session 20 computer specialists	Code.org courses A-C.	Computer specialists will be able to teach students in grades K-2 the code.org curriculum and students in grades 3-6 TechSmart's CS10 curriculum.
<b>Summer/Fall 2020</b> 7 days of CS professional learning  4 days in summer 3 days in fall	All Elementary Computer Specialists	7 sessions 20 elementary computer specialists	TechSmart CST10 Coding Bootcamp <u>Concepts &amp; Skills:</u> Events, Frames, Sprites, Variables,	Preparation to teach: <i>CS10 Intro to Coding 1</i>

			Math Operators, Animation, Scale, Input/Output, If-Else Conditionals, Randomness	
<b>Summer/Fall 2021</b> 7 days of CS professional learning  4 days in summer 3 days in fall	New Elementary Computer Specialists  <i>Anticipated turnover in elementary computers specialists is two teachers</i>	7 sessions 2 new elementary computer specialists	TechSmart CST10 Coding Bootcamp  <u>Concepts &amp; Skills:</u> Events, Frames, Sprites, Variables, Math Operators, Animation, Scale, Input/Output, If-Else Conditionals, Randomness	Preparation to teach: <i>CS10 Intro to Coding 1</i>
<b>Summer/Fall 2022</b> 7 days of CS professional learning  4 days in summer 3 days in fall	All Elementary Computer Specialists	7 sessions 20 elementary computer specialists	TechSmart CST20 Coding Bootcamp  <u>Concepts &amp; Skills:</u> Coordinates, Mouse and Keyboard Input, Sprite Collision, Else-If Conditional Clauses, Boolean Logic, Nested Conditionals	Preparation to teach: <i>Intro to Coding 2</i>
<b>Summer/Fall 2022</b>  7 days of CS professional learning  4 days in summer 3 days in fall	New Elementary Computer Specialists  <i>Anticipated turnover in elementary computers specialists is two teachers</i>	7 sessions 2 new elementary computer specialists	TechSmart CST10 Coding Bootcamp  and/or  TechSmart CST20 Coding Bootcamp	Preparation to teach: CS10
<b>Summer/Fall 2023</b>  7 days of CS professional learning  4 days in summer 3 days in fall	New Elementary Computer Specialists  <i>Anticipated turnover in elementary computers specialists is two teachers</i>	7 sessions 1 new elementary computer specialist	TechSmart CST10 Coding Bootcamp  and/or  TechSmart CST20 Coding Bootcamp	Preparation to teach: CS10 and/or CS20

# Middle School Teachers

When	Grade level	# of Projected Participants	Content	Outcome/Endorsement
<p><b>Summer 2020</b></p> <p>4 days of CS professional learning</p> <p>4 days in summer</p> <p>-----</p> <p><b>Summer 2021, 22 &amp; 23</b></p> <p>Training repeated each year to accommodate turnover among CCA and DL teachers</p>	<p>7th grade College &amp; Career Awareness teachers</p> <p>8th grade Digital Literacy teachers</p> <p>-----</p> <p>New 7th grade College &amp; Career Awareness teachers</p> <p>New 8th grade Digital Literacy teachers</p>	<p>3 sessions of 12 teachers</p> <p>-----</p> <p>3 sessions of 1 new teacher</p>	<p>TechSmart CST100 Teacher Coding Bootcamp</p> <p><u>Concepts &amp; Skills:</u> Text Input and Output, Statements, Expressions, Variables, Mathematical Operators, Conditionals, Booleans, Logical Operators, While Loops, Libraries, Randomness</p>	<p>Preparation to teach: <i>CS100 Intro to Python Coding</i> embedded in:</p> <p>College &amp; Career Awareness (39.01.00.00.001)</p> <p>Digital Literacy (32.02.00.00.170)</p>
<p><b>Summer/Fall 2020</b></p> <p>10 days of CS professional learning + 20 hrs remote self-paced.</p> <p>5 days in summer 5 days in fall</p> <p>-----</p> <p><b>Summer/Fall 2021</b></p> <p>Training repeated to meet goal of having two teachers per middle school qualified to teach this course and for anticipated turnover in teachers</p>	<p>Existing 7th and 8th grade Coding teachers</p> <p>-----</p> <p>New 7th and 8th grade Coding teachers</p>	<p>10 sessions of 3 teachers</p> <p>-----</p> <p>10 sessions of 3 additional/new teachers (two per middle school)</p>	<p>TechSmart CS101 Teacher Coding Bootcamp</p> <p><u>Concepts &amp; Skills:</u> Text Input and Output, Statements, Expressions, Variables, Mathematical Operators, Conditionals, Booleans, Logical Operators, While Loops, Libraries, Randomness, Debugging, Coordinates, Windows, Drawing Lines and Shapes, RGB Colors, Tuples, Procedural Animation, Event Loops, Mouse and Keyboard Input, Timing and Framerate</p>	<p>Preparation to teach:</p> <p>Creative Coding (35.02.00.00.003)</p> <p>Intro to Python 1 (35.02.00.00.004)</p>
<p><b>Summer/Fall 2021</b></p>	<p>Existing 7-8</p>	<p>10 sessions of 2</p>	<p>TechSmart CS102 Teacher Coding</p>	<p>Preparation to teach:</p>



<p>10 days of CS professional learning + 20 hrs remote self-paced. 5 days in summer 5 days in fall</p> <p>-----</p> <p><b>Summer/Fall 2022</b></p> <p>Training repeated to meet goal of having one teacher per middle school qualified to teach this course and for anticipated turnover in teachers</p> <p>-----</p> <p><b>Summer/Fall 2023</b></p> <p>Training repeated to accommodate turnover</p>	<p>Advanced coding teachers</p> <p>-----</p> <p>New 7th and 8th grade Advanced coding teachers</p> <p>-----</p> <p>New 7th and 8th grade Advanced coding teachers</p>	<p>teachers</p> <p>-----</p> <p>10 sessions of 2 new teachers (one per middle school)</p> <p>-----</p> <p>10 sessions of 1 new teacher</p>	<p>Bootcamp</p> <p><u>Concepts &amp; Skills:</u> Lists, Indexes, For-Each Loops, For-Range Loops, Sprite Images, Spritesheet Animation, Collision, Writing Functions, Arguments vsParameters, Return Values, Default Parameters, Passing by Reference</p>	<p>Intro to Python 2 (35.02.00.00.006)</p>
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## High School Teachers

WHEN	Grade level	# of Projected Participants	Content	Outcome/Endorsement
<p><b>Summer/Fall 2020</b></p> <p>10 days of CS professional learning + 20 hrs remote self-paced</p> <p>5 days in summer 5 days in fall</p> <p>-----</p> <p><b>Summer/Fall 2022</b></p> <p>Training repeated to meet goal of having two teachers per high school qualified to teach Programming 1 and for anticipated turnover in</p>	<p>Existing High School Programming 1 teachers</p> <p>-----</p> <p>New High School Programming 1 teachers</p>	<p>10 sessions of 5 teachers</p> <p>-----</p> <p>10 sessions of 3 additional teachers</p>	<p>TechSmart CST201 Teacher Coding Bootcamp</p> <p><u>Concepts &amp; Skills:</u> Statements &amp; Variables, Values, Expressions, Import &amp; Using Functions, Conditionals (If, Elseif, Else), Randomness &amp; Math, Boolean Logic Boolean Variables, While Loops, Controlling Loops, For-Range, Using Objects(sprites +</p>	<p>Preparation to teach:</p> <p><i>Computer Programming 1</i> (32.02.00.00.30)</p>

teachers			graphics), Interaction.	
<b>Summer/Fall 2021</b> 10 days of CS professional learning + 20 hrs remote self-paced.  5 days in summer 5 days in fall ----- <b>Summer/Fall 2023</b> Training repeated for anticipated turnover in teachers	Existing High School Programming 1 teachers - one per high school  ----- New High School Programming 1 teachers	10 sessions of 4 teachers  ----- 10 sessions of 1 new teacher	TechSmart CST202 Teacher Coding Bootcamp  <u>Concepts &amp; Skills:</u> Lists, For-each Loops, List Operations, String Formatting, Web Scraping/APIs, Tuples, 2D Lists, Dictionaries, Web APIs, Functions, Return Values, Complex Parameters, Cryptography	Preparation to teach: <i>Computer Programming 2</i> (35.02.00.00.032) ----- Pass certification: <i>PCEP Entry Level Python Programmer</i>
<b>Summer/Fall 2022</b> 10 days of CS professional learning + 20 hrs remote self-paced.  5 days in summer 5 days in the fall	High School Programming teachers - one per high school	10 sessions of 4 teachers	TechSmart CST203 Teacher Coding Bootcamp  <u>Concepts &amp; Skills:</u> Reading files, Writing files, File system, Image & Sound files, Error Handling, Advanced Error Handling, Identity vs. Inequality, User Interface	Preparation to teach: <i>Advanced Computer Programming</i> (35.02.00.00.040)
<b>Winter/Spring 22-23</b> 10 days of CS professional learning + 20 hrs remote self-paced.  5 days in winter 5 days in spring	High School Programming teachers - one per high school	10 sessions of 4 teachers	TechSmart CST204 Teacher CodingBootcamp  <u>Concepts &amp; Skills:</u> Classes, Class Scope, Inheritance, Class Design, Custom Libraries, App Libraries	Preparation to teach: <i>Advanced Computer Programming</i> (35.02.00.00.040) ----- Pass certification: <i>Microsoft Tech Assoc. 98-381 Intro to Programming Using Python.</i>
<b>Summer/Fall 2023</b> 10 days of CS professional learning + 20 hrs remote self-paced.  5 days in summer	High School Programming teachers - one per high school	10 sessions of 4 teachers	TechSmart CST301 Teacher CodingBootcamp  <u>Concepts &amp; Skills:</u> HTML Fundamentals CSS Fundamentals	Preparation to teach: Web Development 1 (35.02.00.00.060) ----- Pass certification: <i>MS Tech Assoc 98-383</i>

5 days in the fall			Structure Docs Using HTML Present Multimedia Using HTML Style Web Pages Using CSS	<i>Intro to Programming Using HTML and CSS</i>
<b>Winter/Spring 23-24</b> 10 days of CS professional learning + 20 hrs remote self-paced.  5 days in winter 5 days in spring	High School Programming teachers - one per high school	10 sessions of 4 teachers	TechSmart CST302 Teacher CodingBootcamp  <u>Concepts &amp; Skills:</u> Program with JavaScript Operators, Methods, and Keywords, Program with Variables, Data Types, and Functions, Implement and Analyze Decisions and Loops, Interact with the Document Object Model, Interact with HTML Forms	Preparation to teach: Web Development 2 (35.02.00.00.065) ----- Pass certification: <i>Microsoft Tech Assoc 98-382 Introduction to Programming Using JavaScript</i>



# DIVERSITY: Creating Computer Science for ALL

At the center of our approach lies a comprehensive diversity strategy to ensure computer science is for all students in Cache County School District. The three components of our Computer Science Diversity Strategy include:

- Equity through educational outreach
- Equity of access to computer science courses
- Equity of learning within computer science courses

## **Equity Through Educational Outreach**

The first component of this strategy will be to develop a comprehensive multifaceted “marketing and communication” educational outreach campaign targeted at each of the key stakeholder groups in the district (students, parents, counselors, teachers and principals) . The focus of this campaign will be to inform, inspire and ignite interest across each of the stakeholder groups creating broad-based awareness, support and excitement for the initiative. Particular attention will be paid to ensure messaging and communicating addresses all segments of our student population, including female and traditionally underserved students in computer science. Our goal will be to ensure all of our students and stakeholders understand what computer science is and why it matters. We believe this is the first step toward increasing the numbers of diverse students engaging in computer science in the district.

In addition, personalized letters will be sent to all 7th grade female and underserved students explaining the excitement and benefits of learning coding. Career prospects in coding will be featured with a focus of female and underserved statistics in those careers. These students will be invited to sign up for Creative Coding to ensure they receive the skills necessary for them to compete in the job market and to continue developing knowledge they received in their other courses. In 8th grade, comparable letters will be sent to students and their parents who did not take Creative Coding in the 7th grade inviting them to do so in the 8th grade.

The process of inviting female and underserved students to take coding courses with an explanation of the benefits of learning coding will continue in 9th and 10th grade. The high school letter will include information explaining the high school computer science course offerings and the outcomes and skills obtained in those courses with an emphasis on how these skills translate to obtaining high paying jobs.

Our educational outreach will also focus on educating counselors. Each month, all of the counselors in the district meet together to talk about important aspects relating to their job. When appropriate and close to the time of student registration for the upcoming school year, we will present facts on Computer Science including the needs in the job market, as well as the potential Computer Science course offerings and the known benefits for students taking those courses. Educational material will be disseminated for counselors to use during the registration process.

## **Equity of Access to CS Courses**

Next we will provide equity of access to computer science for all students by embedding computer science as required instruction on a weekly basis for every K - 8th grade student and providing a pathway of elective computer science courses at each grade level for every 7th-12th grade student. As part of our model we will provide the following access to computer science courses for our students:

- Elementary School: All kindergarten students will receive one 30 minute block of computer science instruction per week. All 1st and 2nd grade students will receive computer science instruction in one 60 minute block or two 30 minute blocks per week. All 3rd through 6th grade students will receive computer science instruction in one 40 minute block per week.
- Middle School: Every 7th grade student will receive 3 weeks of required coding instruction embedded in our *College & Career Awareness* course. Every 8th grade student will receive 3 weeks of required coding instruction embedded in our *Digital Literacy* course. Two one-trimester elective coding courses will be available for all students to enroll.
- High School: Every 9-12 grade student will have the choice to enroll in several computer science elective sequences. The software development pathway will be the core path for most students striving to achieve industry quality computer skills. However, additional computer science courses such as Computer Science Principles, Gaming Development Fundamentals 1 & 2, Introduction to Information Technology, Augmented Reality and Virtual Reality, and Web Development.

We believe that providing a progressive sequence of required computer science courses each year for every student through 8th grade will result in our students gaining greater confidence in their computer science and coding skills and building a stronger “CS identity”. We feel this will lead to increased enrollment in our high school computer science electives courses as well as increase numbers of female and traditionally underserved students in computer science achieving the depth of knowledge and skills required to compete for Utah’s high demand software development jobs after graduation.

### **Equity of Learning within CS Courses**

The final component to our *Computer Science Diversity Strategy* will be to ensure equity of learning within all of our computer science courses.

Diversity and inclusion doesn’t stop at increasing the number of female and ethnically diverse students in its classes. Through its partnership with TechSmart, Teachers have a curriculum that can easily align with IEP modifications or accommodations as needed. Specifically, the platform allows for differentiation by task, which allows teachers to decide the amount of work that is given to each student. It can also provide for differentiation in support, which uses the various difficulty levels within and activity to scaffold learners with the support they need. Students of multiple levels can work on the same activity, but some may have more help and support embedded in the lesson than others depending on their individual needs.

Thus, we will utilize the fully differentiated curriculum (provided by our industry partner, TechSmart) to ensure students of every ability level are scaffolded and supported appropriately so all students are able to achieve similar levels of success. The curriculum will provide five to six levels of differentiation for each hands-on activity. Teachers will be able to toggle individual students or groups of students to an appropriate level to accommodate their skills. To help teachers determine the appropriate level for each student, lessons have clearly defined sets of learning objectives measured through formative assessments, summative assessments, and hands-on coding projects. The objective of this differentiation is to keep students of all levels highly engaged and gaining competency, with special attention towards supporting underserved populations of students taking computer science courses.

### **Equity Support through Utah Codes and Partnerships**

Utilizing our higher education partners, we align our female and underrepresented computer science students with college level female and underrepresented computer science students in mentoring relationships. The college students will come to our schools and provide tutoring, support, advice, etc. to our computer science students in these demographics. In turn, our students can visit the college campuses and see their mentors in action and what is like to be a CS student in higher education.

As part of the Utah Codes consortium, we will promote teacher affinity groups for CS teachers from traditionally underrepresented demographics. We will nominate lead teachers as facilitators of such channels where possible and share the successes of these groups directly with students.

The partnership with TechSmart will also help to provide video examples of females and ethnically diverse people who have demonstrated success in the industry. Over 60% of the TechSmart bootcamp instructors and curriculum development team are female, which further demonstrates diversity within the industry. The TechSmart staff relies on its training and expertise to embed concepts and principles into bootcamps, as well as to provide resources to teachers to help identify and overcome unconscious bias in their classrooms.

We are currently setting up processes to track the demographic data of computer science students, and report regularly to staff, our partners and stakeholders, as well as the various PLCs charged with increasing enrollment. (See details in the Outreach and Communication section of this grant proposal.) As a result, the efficacy of targeted campaigns can be measured and refined over time to optimize for success.



# OUTREACH AND COMMUNICATION

We are excited to share the importance of Computer Science with all of our stakeholders, as well as the progress being made in Cache County School District towards all students having access to robust and varied computer science courses. The first component of this strategy will be to develop a comprehensive multifaceted “marketing and communication” educational outreach campaign targeted at each of the key stakeholder groups in the district (students, parents, counselors, teachers and principals). We will create and implement an extensive communication campaign educating the community on the computer science initiative and we will call it “CCSD Computer Science Initiatives and Implementation.”

## **Computer Science Initiatives and Implementation**

The Computer Science Initiatives and Implementation information for Cache County School District can be found on the district website ([ccsdut.org](http://ccsdut.org)) under Departments and Programs followed by the Grant link. The direct access to this reporting website is linked here and titled [CCSD Computer Science Initiatives and Implementation](#).

The web page will offer insight into the vision as well as serve as a vehicle for feedback from the community. This page is where we will post the details of our CS plan. We will also provide resources for teachers and students. Student work and projects can also be spotlighted on the website. We will also include a description of the Computer Science initiative facilitated through USBE with links to the Computer Science Master Plan, the CSK12 Framework, and the accepted Strands and Standards for elementary and secondary schools. Thus, at a minimum this page will include the following:

- Cache County School District’s Computer Science plan broken down by elementary, middle school, and high school focus areas.
- An up-to-date description of events, achievements, and other happenings in the district with respect to computer science.
- An evaluation and feedback form for parents, students, community members, and other stakeholders to provide suggestions/feedback on the initiatives happening in the district.
- Links to the documents prepared by USBE (CS Master Plan, CS K12 Framework, Elementary CS Standards, Secondary CS Standards, etc.) so we can be properly held accountable by our constituents.
- A subscription option for parents, students, community members, and other stakeholders so they can receive emails with updates on our current events, achievements, and other happenings in the district with respect to computer science. (Note. We have consciously chosen a sign-up opt-in) option instead of a “forced” option to reduce the chances of parents unsubscribing from district communication. They tend to do that when they start receiving too many emails.)
- A place to spotlight students' projects and successes.

As the state of Computer Science in Cache County School District progresses, data illustrating courses offered and enrollments (including demographics) as well as teacher training opportunities will be added to the website.

Our district has put in place district wide social media platforms which will be used to promote and share what is happening.

We will also make the best use of current in-person events such as open houses, STEM Fests, and parent teacher conferences to showcase our CS program. When possible these will include student and faculty presentations, as well as guest speakers from industry to talk about CS careers.

### **Focus on Feedback**

We will establish several listening posts throughout the district specifically to get feedback. We have Qualtrics surveys drafted for all students and parents specifically designed to get feedback on our CS goals. We will have feedback options on our website, and will promote engagement via dedicated CS social media outlets. We will gather face to face feedback from events like STEM Fests, and open house events, but also more targeted campaigns to parents and to the community at large. The CS Committee will create, implement, and measure the effectiveness of these campaigns throughout the year while constantly refining the plan based on feedback received.

### **Focus on Diversity**

An integral part of the outreach throughout the district will be the work done by the Diversity, Equity and Inclusion Task Force whose primary purpose is to increase the numbers of female and traditionally underrepresented populations in computer science classes. They will conduct communication email and in-school campaigns targeting underrepresented populations.

Collectively, this group will bring in female, black, hispanic and native american industry leaders whenever possible to speak to prospective computer science students during the school day and at scheduled extracurricular events. Open houses, STEM Fests, Tech Nights will all feature guest speakers describing the benefits of pursuing computer science while devoting time specifically to discuss the need for increased engagement from these key demographics. Time will be allocated to showcase student coding projects and offer presentations directly from the students. All events will be promoted to parents and the wider community through email campaigns and by posting on the district website. This task force will review and react to all feedback received from parents and community leaders from a variety of sources including the CCSD Computer Science Initiatives and Implementation website.

We are excited to share the importance of Computer Science with all of our stakeholders, as well as the progress being made in Cache County School District towards all students having access to robust and varied computer science courses. We also want to ensure that all teachers and staff are aware of the Computer Science initiatives taking place in the district. Generally, district initiatives materials, outcomes, and plans are communicated to school principals who, in turn, relay the information to their respective faculty. Thus, the LEA communication will be accomplished through the following means with the corresponding stakeholders:

#### **Elementary Principals (Grades K-6)**

Communicating the effectiveness of Computer Science in the elementary schools with the Elementary Principals is essential due to the fact that the elementary school day was lengthened by ten minutes each day to allow for more Computer Science principles being taught to elementary students. Thus, a member of the Computer Science Grant Committee will attend Elementary Principals meeting quarterly and communicate the Computer Science skills and concepts being taught at each grade level during that quarter. We are able to accomplish this because we will be implementing a unified curriculum across all grades K-6. Student projects will be spotlighted and demonstrated for the principals. In addition, Elementary Principals will be provided the opportunity to give input and suggestions based on what they see happening in their schools with regard to Computer Science.

#### **Secondary Principals (Grades 7-12)**



A member of the Computer Science Grant Committee will attend Secondary Principals meeting each trimester and communicate the Computer Science course offerings and enrollments (with gender and underserved percentage breakdowns) for that trimester. A specific course will be highlighted so principals can be more fully aware of the computer science offerings in their schools. Moreover, the skill set obtained by students enrolled in the course will be described as well as how those skills align with the current job market needs. This information will be important to High School Principals as their students are preparing for real world experiences. In addition, Secondary Principals will be provided the opportunity to give input and suggestions based on what they see happening in their schools with regard to Computer Science.

### **Counselors**

As stated previously, each month all of the counselors in the district meet together to talk about important aspects relating to their job. The counselor members of the Computer Science Grant Committee will present in those meetings the facts on Computer Science - including the needs in the job market, as well as the potential Computer Science course offerings and the known benefits for students taking those courses. Student enrollment numbers in secondary Computer Science courses and skills obtained through taking Computer Science will be included in their presentation.

### **School Community Councils**

At least two times in the school year, the School Community Council (SCC) member of the Computer Science Grant Committee will communicate in SCC meetings the ongoing computer science initiatives happening in the district. He/She will refer to the information presented on the CCSD Computer Science Initiatives and Implementation website, include the needs in the job market, and review the skills obtained through taking Computer Science. In addition, School Community Council members will be provided the opportunity to give input and suggestions based on what they see happening in their schools with regard to Computer Science.

### **Utah State Board of Education**

Based on the reporting model of the grant, semi-annual updates will be sent to the Utah State Board of Education (USBE) describing the current state of Computer Science in Cache County Schools. This same information, along with the presentations made to and input received from principals as stated above, will be available on the grant website as noted in the next section.

### **Utah Codes Consortium**

In addition, Cache County School District will join several other school districts in the state (including Jordan, Box Elder, Sevier, Beaver County, Kane County and Tintic) to form the Utah Codes computer science consortium. Utah Codes will work collectively with industry partners TechSmart, Silicon Slopes and USHE to develop and implement a robust Software Development Curriculum Pathway providing students with the following five components by the time they graduate:

- A depth of knowledge (DOK-4) in professional programming languages
- A portfolio of industry-authentic software development projects
- Industry certifications in software development
- College credit for each high school computer science course completed
- Student Internships and work-based learning opportunities from Utah's tech industry

In alignment with Utah's Computer Science Education Master Plan, Cache County School district, along with the Utah Codes consortium, will work to create a multi-district Computer Science Professional Learning Community that shares common practices and methodologies.



# DATA AND REPORTING

## Elementary and Middle Current Computer Science Course Offerings FY 2020

*(Please note that keyboarding and digital literacy are not CS courses.)*

<b>Grade Level</b>	<b>Number of Students Engaged in Computer Science Learning FY 2020</b>	<b>Total Number of Students</b>
PreK (if applicable)	N/A	N/A
Kindergarten	0	1350
First Grade	1376	1376
Second Grade	1378	1378
Third Grade	1436	1436
Fourth Grade	1413	1413
Fifth Grade	1436	1436
Sixth Grade	1402	1402
Seventh Grade	209	1500
Eighth Grade	212	1488

## Elementary and Middle Computer Science Student Demographics:

Grade Level	Female %	Underserved CS Population %	SPED %	ELL %	FRL %
PreK (if applicable)	N/A	N/A	N/A	N/A	N/A
Kindergarten	46%	14%	13%	6%	27%
First Grade	50%	13%	12%	6%	34%
Second Grade	51%	14%	16%	6%	37%
Third Grade	48%	14%	14%	8%	39%
Fourth Grade	49%	13%	12%	6%	36%
Fifth Grade	53%	13%	10%	6%	35%
Sixth Grade	48%	16%	10%	9%	34%
Seventh Grade	22%	9%	15%	1%	39%
Eighth Grade	14%	19%	15%	11%	40%
<b>TOTAL representation in all CS courses currently offered</b>	<b>48%</b>	<b>14%</b>	<b>13%</b>	<b>7%</b>	<b>36%</b>

## High School Current Computer Science Course Offerings FY 2020

<b>Course Code and Title</b>	<b>Number of Sections Offered (FY2020)</b>	<b>Total Students Enrolled FY2020</b>
'35020000037', -- Algorithms and Data Structures	0	0
'35020013037', -- Algorithms and Data Structures CE	0	0
'35020000041', -- AP Computer Science	0	0
'35020000034', -- AP Computer Science Principles	0	0
'35020000030', -- Computer Programming 1	7	182
'35020013030', -- Computer Programming 1 CE	0	0
'35020000040', -- Computer Programming 2	3	50
'35020013040', -- Computer Programming 2 CE	1	11
'35020000035', -- Computer Science Principles	5	125
'35020013035', -- Computer Science Principles CE	0	0
'35020000003', -- Creative Coding A	12	316
'35020000003', -- Creative Coding B	4	130
'35020000007', -- Exploring Computer Science 1	11	311
'35020000008', -- Exploring Computer Science 2	0	0
'35020000045', -- Gaming Development Fundamentals	1	26
'35020000046', -- Gaming Development Fundamentals 2	1	24
'35020000055', -- HTML5 App Development Fundamentals	0	0
'35020000050', -- IB Computer Science SL 1	0	0
'35020000051', -- IB Computer Science SL 2	0	0
'35020000048', -- Mobile Development Fundamentals	0	0

**Secondary Computer Science Student Demographics:**

<b>Course Code</b>	<b>Female %</b>	<b>Underserved CS Population %</b>	<b>SPED %</b>	<b>ELL %</b>	<b>FRL %</b>
'35020000037', -- Algorithms and Data Structures	0%	0%	0%	0%	0%
'35020013037', -- Algorithms and Data Structures CE	0%	0%	0%	0%	0%
'35020000041', -- AP Computer Science	0%	0%	0%	0%	0%
'35020000034', -- AP Computer Science Principles	0%	0%	0%	0%	0%
'35020000030', -- Computer Programming 1	15%	15%	9%	8%	33%
'35020013030', -- Computer Programming 1 CE	0%	0%	0%	0%	0%
'35020000040', -- Computer Programming 2	12%	10%	6%	6%	28%
'35020013040', -- Computer Programming 2 CE	36%	0%	0%	9%	27%
'35020000035', -- Computer Science Principles	32%	20%	10%	5%	47%
'35020013035', -- Computer Science Principles CE	0%	0%	0%	0%	0%
'35020000003', -- Creative Coding A	20%	14%	17%	6%	39%
'35020000003', -- Creative Coding B	11%	16%	11%	9%	39%

'35020000007', -- Exploring Computer Science 1	30%	18%	12%	10%	30%
'35020000008', -- Exploring Computer Science 2	0%	0%	0%	0%	0%
'35020000045', -- Gaming Development Fundamentals	8%	15%	15%	8%	50%
'35020000046', -- Gaming Development Fundamentals 2	8%	21%	0%	13%	33%
'35020000055', -- HTML5 App Development Fundamentals	0%	0%	0%	0%	0%
'35020000050', -- IB Computer Science SL 1	0%	0%	0%	0%	0%
'35020000051', -- IB Computer Science SL 2	0%	0%	0%	0%	0%
'35020000048', -- Mobile Development Fundamentals	0%	0%	0%	0%	0%
<b>TOTAL representation in all CS courses currently offered</b>	<b>21%</b>	<b>16%</b>	<b>12%</b>	<b>8%</b>	<b>36%</b>

# PROPOSED BUDGET

## Proposed K-12 Computer Science Plan Budget Narrative

### A. Salaries and Benefits - Training Costs (100 & 200)

#### Compensation for Teacher Professional Learning - Attending Coding Bootcamps

In conjunction with our goal to build teaching capacity through professional development, grant funds will be used to enable teachers to attend the Computer Science Teacher Professional Learning courses (bootcamps) provided by TechSmart. Refer to the table in the Professional Learning section for a complete breakdown of the number of teachers attending bootcamps, the number of days or training outside of the school year (summer) and the number of days of training during the school year (fall, winter, spring).

The elementary computer specialists are non-certificated staff and will be paid \$160 per day (\$20 per hour) when attending bootcamps. Secondary teachers will be paid \$240 per day (\$30 per hour) when attending bootcamps outside of contract time. Substitute costs for secondary teachers of \$110 per day will be applied when training is conducted during the school year.

Benefits are calculated at the district rate of 31.55% and we have included budgets for 10% turnover in our teaching staff. The budget shown below also assumes that by the end of year 4, all teachers will be trained and training costs for bootcamps will no longer be needed.

**Bootcamp Warranty:** TechSmart has included a policy such that if any teacher who has completed a Coding Bootcamp leaves the district or is unable or unwilling to teach the computer science class they were trained for during the next school year, then the district can send a replacement teacher to a Coding Bootcamp at no additional cost.

	Year 1 (FY2021)	Year 2 (FY2022)	Year 3 (FY2023)	Year 4 (FY2024)	Beyond the Grant
Elementary Computer Specialists' pay for training conducted outside of contract time	22,400	1,960	21,560	980	0
Middle School Teachers' pay for training conducted outside of contract time	13,860	8,400	2,100	2,100	0
High School Teachers' pay for training conducted outside of contract time	6,300	5,040	13,860	11,340	0
Substitute Costs pay for training conducted during contract time	3,520	4,400	5,280	4,400	0
Benefits (calculated for pay, not subs)	13,428	4,859	11,838	4,550	0
	<b>59,508</b>	<b>24,659</b>	<b>54,638</b>	<b>23,370</b>	<b>0</b>

#### Stipends for Obtaining Endorsements

To reach our goal of having two teachers at each high school endorsed with the Introduction to Computer Science endorsement and one of them to have the Programming and Software Development endorsement, this project will provide means and incentives for teachers earning Computer Science endorsements. Teachers will be paid a stipend upon completing each endorsement -- \$750 for Introduction to Computer Science (completing 4 courses) and an additional \$750 for achieving a Programming and Software Development endorsement (completing 2 additional courses). Caveats will be put in place requiring teachers to teach Computer Science in the district for four years upon receipt of reimbursement and/or stipend.

Benefits on stipends are calculated at the district rate of 31.55%.

The budget below assumes 12 Intro to Computer Science Endorsements and 9 Programming and Software Development Endorsements over the four years of the grant. The budget shown below also assumes that by the end of year 4, all teachers will be endorsed and stipends for endorsements will no longer be needed.

	Year 1 (FY2021)	Year 2 (FY2022)	Year 3 (FY2023)	Year 4 (FY2024)	Beyond the Grant
Stipends for Intro to CS Endorsement	2,250	2,250	2,250	2,250	0
Stipends for Programming and Software Dev. Endorsement	0	2,250	2,250	2,250	0
Benefits on Stipends	710	1,420	1,420	1,420	0
<b>Total</b>	<b>2,960</b>	<b>5,920</b>	<b>5,920</b>	<b>5,920</b>	<b>0</b>

### Computer Science Project Director(s)

Grant monies will fund extended contract time for project director(s) to manage, coordinate, conduct, carryout and oversee efforts related to the Computer Science Grant. Benefits are calculated at the district rate of 31.55%. The budget shown below also assumes that by the end of year 4 that all of the grant reporting and oversight will no longer be needed. Thus, the extended contract for the project director will cease.

	Year 1 (FY2021)	Year 2 (FY2022)	Year 3 (FY2023)	Year 4 (FY2024)	Beyond the Grant
CS Lead / Project Director (Salary)	15,000	15,000	15,000	15,000	0
CS Lead / Project Director (Benefits)	4800	4800	4800	4800	0
<b>Total</b>	<b>19,800</b>	<b>19,800</b>	<b>19,800</b>	<b>19,800</b>	<b>0</b>

### B. Purchased & Professional Services (300)

#### Computer Science Teacher Professional Learning - Bootcamps

Cache County School District will contract with industry partner, TechSmart, to conduct CS Teacher Professional Learning. This will include Teacher Coding Bootcamp professional learning courses that will provide teachers with the in-depth computer science subject matter content and pedagogy training. Refer to the table in the Professional Learning section for a complete breakdown of the number of teachers attending bootcamps. Costs for the TechSmart Bootcamps are \$1,400 per elementary teacher per course, \$1,000 per middle school CCA and Digital Literacy teacher, and \$2,500 per middle & high school CS teacher per course. (Our industry partner, TechSmart, will not charge us for bootcamps when a new teacher is hired to replace a trained teacher.)

As a result of this service, 40+ teachers (20 elementary teachers, 15 middle school teachers and 8 high school teachers) will receive professional development in each of the courses they will teach across the computer science



curriculum pathway.

The budget shown below also assumes that by the end of year 4, all teachers will be trained and training costs for bootcamps will no longer be needed.

**Bootcamp Warranty:** TechSmart has included a policy such that if any teacher who has completed a Coding Bootcamp leaves the district or is unable or unwilling to teach the computer science class they were trained for during the next school year, then the district can send a replacement teacher to a Coding Bootcamp at no additional cost.

	Year 1 (FY2021)	Year 2 (FY2022)	Year 3 (FY2023)	Year 4 (FY2024)	Beyond the Grant
Elementary Computer Specialists Curriculum Training	28,000	0	28,000	0	0
CCA and DL Middle School Teachers Curriculum Training	12,000	0	0	0	0
Middle School Coding Teachers Curriculum Training	7,500	15,000	0	0	0
High School Computer Science Teachers Curriculum Training	12,500	10,000	27,500	20,000	0
	<b>60,000</b>	<b>25,000</b>	<b>55,500</b>	<b>20,000</b>	<b>0</b>

**Computer Science Teacher Support Services**

*Live Support, 1:1 Teacher Check-ins 2x/month, PLC Meetings*

To provide continual teaching support, Cache County School District will contract with industry partner, TechSmart, to provide ongoing CS Teacher Support throughout the school year during the year they received training (\$500 per teacher, \$250 per CCA and DL teacher). This will include online technical and teaching support delivered via the live support chat module of the TechSmart Platform and teacher check-ins, scheduled one-on-one web meetings with teachers twice a month. As we build teaching capacity, by the year 2023, 40 teachers (20 elementary teachers, 15 middle school teachers and 8 high school teachers) will be supported.

When the grant ends, a combination of funds from curriculum and CTE will cover the costs for teacher support. NOTE: The only ongoing funds will be \$133,000 (curriculum and teacher support), which may seem like a lot. However, when pricing curriculum materials for any course (math, ELA, science, etc.) it would cost at least that much for only elementary OR secondary schools. (By comparison, we just purchased a high school math curriculum for grades 9-12 and it was about \$600,000 for five years.) The cost of \$133,000 for a K-12 Computer Science curriculum that impacts all students is very reasonable.

	Year 1 (FY2021)	Year 2 (FY2022)	Year 3 (FY2023)	Year 4 (FY2024)	Beyond the Grant
Elementary Computer Specialists Teacher Support	10,000	10,000	10,000	10,000	0
CCA and DL Middle School Teachers Support	3,000	3,000	3,000	3,000	0
Middle School Coding Teachers Support	1,500	3,000	3,000	3,000	0

High School Computer Science					
Teachers Support	2,500	2,500	4,000	4,000	0
	<b>17,000</b>	<b>18,500</b>	<b>20,000</b>	<b>20,000</b>	<b>0</b>

**Implementation Planning & Management**

This includes Implementation setup, planning & management collaboration with district leadership, IT, and school administrators. Weekly monitoring of implementation success and associated interventions. Quarterly partnership review meetings. Travel and expenses.

These costs are for the purposes of the grant only and will not be needed once the grant period is completed.

	Year 1 (FY2021)	Year 2 (FY2022)	Year 3 (FY2023)	Year 4 (FY2024)	Beyond the Grant
Implementation planning & management during grant phases	5,200	5,200	5,200	5,200	0

**G. Supplies/Materials (600)**

*(Supplies in this sense are our curriculum costs. We do not need pens, books, paper, etc. in Computer Science. We need a good curriculum for our “supplies”. And this curriculum contains all of our learning materials and students exercises as well as covers all of our grades. Students will have different, individualized and personalized learning. It makes this curriculum package much better than books, workbooks, and other traditional supplies. The curriculum package is the fountain to building a robust computer science program in our district.)*

**Computer Science Curriculum + Platform**

Site licensing for teachers and students (via TechSmart)  
 Cache County School District will contract with industry partner, TechSmart, to provide Computer Science Curriculum + Cloud-based Platform (\$4,400 per elementary school per year and \$5,500 per middle and high school per year for a total of \$113,300 per year or \$453,200 over the four year grant period). This will include all computer science curriculum needed for the project as well as a teacher and student cloud-based platform. Curriculum will be licensed for 25 schools (17 elementary schools, 3 middle schools, 4 high schools, and 1 alternative high school). NOTE: Because training costs are higher at the beginning of implementation, TechSmart has prorated these amounts within the grant constraints over the four years.

When the grant ends, a combination of funds from curriculum and CTE will cover the costs for teacher support. NOTE: The only ongoing funds will be \$133,000 (curriculum and teacher support), which may seem like a lot. However, when pricing curriculum materials for any course (math, ELA, science, etc.) it would cost at least that much for only elementary OR secondary schools. (By comparison, we just purchased a high school math curriculum for grades 9-12 and it was about \$600,000 for five years.) The cost of \$133,000 for a K-12 Computer Science curriculum that impacts all students is very reasonable.

	Year 1 (FY2021)	Year 2 (FY2022)	Year 3 (FY2023)	Year 4 (FY2024)	Beyond the Grant
Curriculum for (17) Elementary , (3) Middle and (4) High Schools	80,130	143,419	81,443	148,205	113,300

## H. Other (800)

### Tuition Reimbursement for Obtaining Endorsements

To reach our goal of having two teachers at each high school endorsed with the Introduction to Computer Science endorsement and one of them to have the Programming and Software Development endorsement, this project will provide means and incentives for teachers earning Computer Science endorsements. With our partnership with Utah State University, this project will fund tuition reimbursement for teachers completing Utah State University CS courses for their CS endorsement. Tuition costs for the coursework to complete the Introduction to Computer Science Endorsement is \$1400 and \$2100 to complete the Programming and Software Development endorsement.

The budget below assumes 12 Intro to Computer Science Endorsements and 9 Programming and Software Development Endorsements over the four years of the grant. The budget shown below also assumes that by the end of year 4, all teachers will be endorsed and reimbursement for courses will no longer be needed

	Year 1 (FY2021)	Year 2 (FY2022)	Year 3 (FY2023)	Year 4 (FY2024)	Beyond the Grant
Tuition Reimbursement for Intro to CS Courses	4,200	4,200	4,200	4,200	0
Tuition Reimbursement for Programming and Software Dev. Courses	0	2,100	2,100	2,100	0
	<b>4,200</b>	<b>6,300</b>	<b>6,300</b>	<b>6,300</b>	<b>0</b>

Our budget strategy is based on an investment in two key areas: 1) teacher training and endorsements and 2) a comprehensive and robust K-12 computer science curriculum.

The Teacher CS Professional Learning Coding Bootcamps being provided by TechSmart are focused on teachers learning the CS subject matter (topics, concepts, skills, coding techniques) identified in the USBE strands and standards for the course they are going to be teaching. It is a full professional learning experience that will provide teachers with in-depth instruction on CS content and skills. The CS knowledge and skills acquired by teachers in this professional learning will allow teachers the flexibility to teach any CS curriculum in a platform agnostic manner. ***Our goal with the CS Professional Learning component of this initiative is to build a sustainable district-wide CS teaching capacity whose foundation is based on teachers developing their own skills in Computer Science so they can be better Computer Science teachers.***

We have allocated the budget in the following manner:

- 66 % of the budget will be invested in “growing” teachers:
  - 33% to teacher stipends, benefits and sub-pay to allow the training to take place
  - 33% to CS teacher professional learning and support and endorsements
- 34% will be invested in curriculum

Our significant investment in growing teachers (66%) reflects our desire to build a sustainable computer science teaching capacity in the district. Our CS teachers will collaborate actively with other teachers in the Utah Codes consortium. Our investment in CS curriculum (34%) reflects our desire to enable our students to achieve a higher CS depth of knowledge with a focus on industry authentic knowledge, skills and projects.

## Use of Non Grant Funds and Existing LEA Resources

Existing district funds will be used to cover base salaries for Elementary Computer Specialists, Middle School Coding Teachers, and High School Computer Science Teachers. No additional salary monies are needed beyond the grant. The grant will only pay teachers for the extra time they spend in training as it relates to the curriculum described here. District and CTE funds will be used to purchase necessary equipment for schools to teach Computer Science courses.

## Sustaining the Computer Science Program after the Term of the Award

Cache County School District's Computer Science Grant Proposal is completely sustainable because grant funds are only being used to purchase new Computer Science curriculum and training and to pay for teachers' Computer Science endorsements. Once the purchased curriculum proves to be viable and the desired Computer Science outcomes are obtained, professional development, curriculum, and/or CTE funding will be made available to cover curriculum, support, and training costs.

Cache district is committed to sustaining this initiative after the grant period. During years 1-4 the CS grant will provide the funding needed to complete ALL of the CS Teacher Professional Learning and teacher stipends, as well as provide funding for the CS curriculum and teacher support for those years. The grant will also provide stipends and tuition reimbursements for teachers earning Computer Science Endorsements.

Beyond the grant period, the ONLY on-going costs for the district will be \$133,300 per year, broken down as follows: CS curriculum (\$133,300 for the entire district) and teacher support (\$20,000 for all teachers). The district is able to absorb the \$133,300 cost per year as part of our curriculum and CTE operating budgets.

Our industry partner TechSmart, has included a policy such that if any teacher who has completed a Coding Bootcamp leaves the district or is unable or unwilling to teach the computer science class they were trained for during the next school year, then the district can send a replacement teacher to a Coding Bootcamp at no additional cost. This demonstrates our joint commitment to developing the CS skills for Cache County teachers.

## Contingency Plans

Due to uncertainty of CS grant funding we have formalized two contingency plans working with our industry partner TechSmart to move forward regardless of grant funding.

**If the CS Grant is not funded for the 2020-21 school year**, we will begin training our high school teachers regardless. One teacher from each of the four high schools will be trained and be prepared to teach Programming 1 using the CS201 curriculum from TechSmart as outlined. CTE funds will be used to cover the costs for this training -- the \$10,000 for training and the \$8,825 for teacher stipends and substitutes for the teachers to attend the training. TechSmart has agreed to waive \$ 29,200 of the costs, including the \$22,000 for their CS Curriculum/Platform for the four high schools, \$2,000 for teacher support, and the \$5,200 for Implementation Planning & Management.

**In the event that the grant is not fully funded**, our plan is to work with TechSmart to adjust the scope of the project and optimize grant funds provided to achieve our vision. TechSmart has shown that they are flexible to work with us to adjust costs and waive fees to enable us to move forward on a reduced budget. They are currently doing that (as outlined above). When we received notification

that the CS grant funding may not be provided this year, TechSmart collaboratively worked with us to come up with a contingency plan that enabled us to move forward by waiving \$29,200 of their costs. This is the plan we are moving forward with this year. We have discussed the possibility of the CS grant not being funded or partially funded and TechSmart has indicated that they are agreeable to working with us to ensure we are able to deliver on our vision and goals with the budget funds that are provided.

**Bottom line..** We are committed to providing a complete CS education for our students with or without the help of the CS grant. Our partnership with Techsmart will allow us to move forward regardless of the percentage of funds awarded. This is exactly the level of investment and partnership that we need from the industry if we're going to make this program successful.

### Utilizing Additional Funding

In the event that additional K-12 CS funding becomes available at a <50% increase, Cache County School District would use those funds to increase program sustainability by providing more training at the elementary level as well as reimbursements of costs and time for teachers to earn Computer Science endorsements. Increasing teacher professional development and capacity in the secondary schools would be our number one priority.

In the event that additional K-12 CS funding becomes available at a >100% increase, Cache County School District would use those funds to provide additional training opportunities for all teachers to increase their Computer Science knowledge and skills.

### Proposed Budget

Description	Funding Requested – Year One (FY2021)	Funding Requested – Year Two (FY2022)	Funding Requested – Year Three (FY2023)	Funding Requested – Year Four (FY2024)	Funds Needed to Sustain Program – Beyond the Grant
A.(100) Salaries	\$63,330	\$39,300	\$62,300	\$38,320	0
B (200) Employee Benefits	\$18,938	\$11,079	\$18,057	\$10,769	0
C. (300) Purchased Professional & Technical Services	\$82,200	\$48,700	\$80,700	\$45,200	\$20,000
D. (400) Purchased Property Services					
E. (500) Other Purchased Services					
F. (580) Travel					
G.(600) Supplies/Materials	\$80,132	\$143,419	\$81,443	\$148,205	\$113,300
H. (800) Other (Exclude Audit Costs)	\$4,200	\$6,300	\$6,300	\$6,300	0
I. TOTAL DIRECT COSTS (Lines A through H)	\$248,800	\$248,798	\$248,800	\$248,795	0
J. (800) Other (Audit Costs)	\$1,200	\$1,200	\$1,200	\$1,200	0
K. Indirect Cost					

L. Property  
(includes equipment)

**M. TOTAL**  
**(Lines I through L)**                      **\$250,000**   **\$249,998**   **\$250,000**   **\$249,995**   **\$133,300**

## ADDITIONAL INFORMATION

### Process of Evaluation

As stated previously, Cache’s vision is to provide every student in the district with the opportunity to develop the depth of knowledge and skills required to compete for Utah’s high demand software development jobs after graduation. We are not able to achieve this outcome without forming a significant industry partnership with a technology organization. We have chosen to enter into a long term partnership with TechSmart, a Seattle based software company to provide a rigorous, differentiated and industry-aligned curriculum and teacher professional learning.

Prior to this decision, we thoroughly researched and evaluated various options for CS curriculum and investigated their training options. We wanted to select a vendor that aligned with our vision and determined that many would not allow our students to progress to the levels in computer science that we would like. Some of the programs we evaluated are actually being partially used in our schools today, but the costs were higher than the benefits produced. Furthermore, we do not have an “across all schools” adopted curriculum and it was our desire to be cohesive between schools.

We also conducted an analysis of what it would take to build our own curriculum, and determined our current teachers do not have the requisite CS knowledge, skills, or industry experience to develop a robust and full CS curriculum package. In fact, I (Stacie Gomm) actually started developing the elementary curriculum last year. It was a painful task and due to other responsibilities, I cannot maintain that development. The cost of building our own curriculum and continually updating it is significantly more expensive than licensing a curriculum.

As part of our process we conducted a thorough cost analysis to ensure our project costs and the selection of our industry partner were in line with standard industry pricing structure. The following table represents the cost structure of TechSmart as compared to other alternatives that we investigated:

	TechSmart	CodeHS	Project Lead the Way
CS Curriculum  (per school, based on 4 sections of CS being taught)	\$5,500 per school unlimited # sections being taught	\$8,000 per school based upon 4 sections being taught	\$6,239 per school based upon 4 sections being taught
	----- 12 CS courses on pathway grades 3-12	----- High School only 2 courses	\$2,200 participation fee \$4,039 supplies + materials  ----- High School only 3 courses

CS Professional Learning	\$2,500 per teacher	\$1,500 per teacher	\$2,400 per teacher
	100 hrs. In person	30 hrs. Online, self-paced video-based	76 hrs. in person

Note: We also attempted to evaluate edhesive. But due to COVID-19 constraints, we had to cancel those presentations.

Based upon our analysis, we validated the cost for CS Professional Learning and Curriculum for TechSmart was competitive with standard industry pricing and provides significant value in terms of helping us achieve our vision and outcomes. TechSmart provided complete elementary, middle and high school curriculum materials, whereas the other organizations did not. TechSmart's Professional Learning was also found to be much more comprehensive as well. The ability for teachers to bring the information back from the bootcamps and teach in a train the trainer model to share knowledge helped to finalize this decision.



# STATEMENT OF ASSURANCES

Should an award of funds from the K-12 Computer Science Grant Program be made to the applicant in support of the activities proposed in this application, the authorized signature on this page of the application certifies to the USBE that the authorized official will:

1. Upon request, provide the Utah State Board of Education with access to records and other sources of information that may be necessary to determine compliance with appropriate federal and state laws and regulations.
2. Conduct educational activities funded by this project in compliance with the following federal laws:
  - a. Title VI of the Civil Rights Act of 1964
  - b. Title IX of the Education Amendments of 1972
  - c. Section 504 of the Rehabilitation Act of 1973
  - d. Age Discrimination Act of 1975
  - e. Americans with Disabilities Act of 1990
  - f. Improving America's Schools Act of 1994
3. Use grant funds to supplement and not supplant existing funds from all sources.
4. Take into account, during the development of programming, the need for greater access to and participation in the targeted disciplines by students from historically underrepresented and underserved groups.
5. Submit, in accordance with stated guidelines and deadlines, all K-12 Computer Science Grant Program and evaluation reports required by the Utah State Board of Education.
6. The applicant will retain records of the K-12 Computer Science Grant Program for five years and will allow access to those records for purposes of review and audit.
7. Execute all actions defined under the LEA Statement of Assurances outlined below.

Stacie Gomm

Curriculum Specialist



4/30/2020

*(Digital Signatures encouraged, as final submission of plan needs to be a Google Document.)*