

Society for Technology Education) Standards as they align with the content standards for Computer Science.

The 5 Core Computer Science concepts:

1. Devices
2. Networks and Communication
3. Data and Analysis
4. Algorithms and Programming
5. Impact of Computing

The 7 Computational Thinking practices:

1. Recognizing and Representing Computational Problems
2. Developing and using Abstractions
3. Creating Computational Artifacts
4. Testing and Iteratively Refining
5. Fostering an Inclusive Computing Culture
6. Communicating about Computing
7. Collaborating around Computing

International Society for Technology Education (ISTE Standards):

1. Creativity and Innovation
2. Communication and Collaboration
3. Research and Information Fluency
4. Critical Thinking, Problem Solving, and Decision Making
5. Digital Citizenship
6. Technology Operations and Concepts

The Purpose of the Standards

Computer Science is a field of study that will help to prepare students for future college and career goals. There are many jobs that require the understanding of Computer Science concepts and skills, however, all Idahoans can benefit from the computational thinking that is incorporated into these standards. The development of the Computer Science standards will move the students from being consumers of technology to being able to understand and create new technologies of the future.

The standards prioritize, clarify, and build upon frameworks developed by professional organizations, educators, and industry. It is not an exhaustive list of everything in Computer Science that can be learned within a K-12 pathway but instead describes what it means to be *literate* in Computer Science.

The standards are not curriculum. Curriculum is determined by the LEA (Local Education Agency). The standards clarify the learning outcomes of students. The standards inform teachers of what students should know, understand, or be able to do. Teachers can create “I can” statements with student friendly language from the standards. These are the minimum standards for Computer Science education. The LEA may include additional standards when writing curriculum depending on course offerings and the needs of students. Educators can use the standards in a variety of creative ways.

Current Status of Computer Science in Idaho

Idaho's current state of Computer Science is unstructured, disjointed, and uneven. As a result of not having a cohesive set of Idaho Computer Science Standards, teachers grasp from various resources and standards, which may not align across the state. This causes a lack of parity and equality for Idaho's students, as well as their access to Computer Science education. Having a uniform set of Computer Science standards will provide continuity of K-12 Computer Science education offerings throughout the state. Benefits will continue through higher education, and ultimately industry, business, and commerce of Idaho as more competent and well-educated graduates fulfill positions throughout the state.

According to the Conference Board (used by the Idaho Department of Labor), there are currently around 1300 unfilled open jobs in the state of Idaho for computer science related professions, many of which can be attributed to a lack of qualified candidates. Not only is this challenging for potential employers, but also affects our state revenues in potential taxes with salaries averaging around \$70,000. For the benefit of our citizens, students' education, as well as the future of computer science and the technology industry in our state, creating these standards is an important step.

The Standards Creation Process

The standards were built on a progression of skills that can be accomplished using a variety of tools and in some cases limited access. Several existing Computer Science and related standards from CSTA (Computer Science Teachers Association), ISTE (International Society for Technology in Education), Florida Department of Education, Idaho CTE Programming Standards, Teacher Preparation Standards for Initial Certification in Computer Science, and Idaho Core Standards were reviewed and considered.

The working group chose the CSTA 2016 Computer Science draft standards as the starting point for the following reasons:

- The working group felt that the CSTA draft standards were the best match for Idaho.
- They were the most up to date standards with input from a variety of educators, industry, and professional organizations.
- The CSTA draft standards were created by the following participants:
 - Several states (MD, CA, IN, IA, AR, UT, ID, NE, GA, WA, NC)
 - Large school districts (NYC, Chicago, San Francisco)
 - Technology companies (Microsoft, Google, Apple)
 - Organizations (Code.org, ACM, CSTA, ISTE, MassCAN, CSNYC), and individuals (higher ed faculty, researchers, K-12 teachers, and administrators)
 - Idaho representation within the CSTA group

The working group evaluated and adapted the 2016 draft of the CSTA K-12 CS Standards with consideration of the following:

- Is the standard appropriate for Idaho?
- Is the standard appropriate for the given grade level?
- Is the standard measureable?
- Are there areas that we want to add that are not covered in the standards?
- Does the standard need an example for clarification?
- What needs to be removed, rewritten, or repositioned?
- Do the standards parallel what occurs in disciplines such as science, mathematics, and language arts?

The working group customized the CTA standards for Idaho using the above questions as a guide. This was done over four days of intense face to face discussion as well as offline email exchanges. The working group made several improvements and changes in the draft CSTA standards. These modifications were also submitted back to the CSTA for incorporation into the national standards.

Once the a draft of the proposed standards was ready, a survey was sent to individuals in industry, elementary, secondary and postsecondary educators, and other interested parties to solicit input. The working group received over fifty surveys. The working group assessed and modified the standards based on the feedback.

Supporting Resources and References

CSTA K-12 CS Standards (2016)

ISTE Standards

<https://labor.idaho.gov/publications/software-occupations-in-demand.pdf>

The K-12 Idaho Computer Science Standards Working Group

Scott Cook, Director of Academic Services, Idaho SDE (**Facilitator**)

Tim Andersen, Computer Science Faculty, Boise State University

Todd Bigelow, Sr. Manager (Product Engineering), ON Semiconductors

Chris Conant, Morley Nelson Elementary School, Boise School District

Ernie Covelli, Program Manager (Software Engineering), HP, Boise (retired, currently Project Coordinator at IDoCode project for training High School teachers in Computer Science)

Marita Diffenbaugh, Professional Development Specialist, Idaho Digital Learning Academy

Allen Hancock, Centennial Elementary School, Lewiston Independent School District

Robert B. Heckendorn, Computer Science Faculty, University of Idaho

Amit Jain, Computer Science Faculty, Boise State University

Ashlee Kolar, Math and Science Teacher, Syringa Middle School, Caldwell School District

Angie Martinez, Director of Curriculum, Teaching, and Learning, Blaine County School District

Heidi Rogers, CEO/Executive Director, [Northwest Council for Computer Education \(NCCE\)](#)

Jesse Ronnow, Senior Vice President, Zions Bank

Robert Schreiber, Physics and Computer Science Teacher, Treasure Valley Math & Science Center

Frederick T. Sheldon, Computer Science Faculty, University of Idaho

Justin Touchstone, Program Manager, Engineering and Technology Ed., Idaho Division of Career and Technical Education