



Guidance for Implementing the Computer Science Standards

Iowa's academic standards define the grade-level expectations for students in science, social studies, English language arts, mathematics, and 21st Century skills (employability skills; and civic, financial, health and technology literacy). The intent is to give students the skills and knowledge they need to succeed after high school, while giving local school districts the ability to make decisions about curriculum and instruction.

Iowans have recognized students need additional skills beyond the original core content areas that can further strengthen their learning and better prepare them for jobs and life after graduation. One of these skill sets is computer science. Computer science is more than digital literacy; it's more than coding. It's about understanding the theory and practice of computer technology, which has transformed the way we live and communicate, and this is foundational for all students in all fields. The effects and influence of computing are experienced daily from a personal to global level from the medical field to automotive industry and far beyond (taken from the [Computer Science Standards Review Team Final Report](#)).

Recognizing the need for these skills, the Iowa Legislature passed legislation and appropriated funding to work toward the vision that every elementary student in Iowa learns the foundations of computer science; every middle school student participates in an introduction to computer science; and every high school student takes a computer science class. Part of the legislation required the development of computer science standards.

The Standards

This guidance document is designed to support schools and districts implementing Iowa's Computer Science Standards. Iowa's Computer Science Standards are recommended standards and are identical to the [2017 CSTA K-12 Computer Science Standards](#). These standards were written by educators to be coherent and comprehensible to teachers, administrators, and policy makers (<https://www.csteachers.org>). These standards should not be confused with Iowa's required [21st Century Technology Literacy standards](#).

"The CSTA K–12 Computer Science Standards delineate a core set of learning objectives designed to provide the foundation for a complete computer science curriculum and its implementation at the K–12 level. To this end, the CSTA Standards:

- Introduce the fundamental concepts of computer science to all students, beginning at the elementary school level.
- Present computer science at the secondary school level in a way that can fulfill a computer science, math, or science graduation credit.
- Encourage schools to offer additional secondary-level computer science courses that will allow interested students to study facets of computer science in more depth and prepare them for entry into the workforce or college.
- Increase the availability of rigorous computer science for all students, especially those who are members of underrepresented groups." (<https://www.csteachers.org>)

The Computer science standards are guideposts and should be used to develop or determine curriculum, assessment, and professional development. Whether computer science is integrated into existing learning or offered as a separate course, the standards create clear and specific measures. The Computer Science

Standards are correlated to the K12 CS Framework Core Concepts (i.e., what students should know) and Core Practices (i.e., what students should do).

The Concepts and Practices of the K-12 Computer Science Framework

| Core Concepts | Core Practices |
|--|--|
| <ol style="list-style-type: none"> 1. Computing Systems 2. Networks and the Internet 3. Data and Analysis 4. Algorithms and Programming 5. Impacts of Computing | <ol style="list-style-type: none"> 1. Fostering an Inclusive Computing Culture 2. Collaborating Around Computing 3. Recognizing and Defining Computational Problems 4. Developing and Using Abstractions 5. Creating Computational Artifacts 6. Testing and Refining Computational Artifacts 7. Communicating About Computing |

The CSTA Computer Science Standards are organized in grade bands. The grade bands are

| | | |
|-------|------------|---|
| K-2 | ages 5-8 | Level 1A |
| 3-5 | ages 8-11 | Level 1B |
| 6-8 | ages 11-14 | Level 02 |
| 9-10 | ages 14-16 | Level 3A |
| 11-12 | ages 16-18 | Level 3B - intended for students who wish to pursue CS in HS and beyond |

These standards are also presented by a CSTA progression chart. The chart visually groups the standards by grade band, core concepts, and subconcepts.

Each standard has an identifier. The identifier is made up of the grade band, the core concept, and the standard number. For example identifier 1A-DA-06 is a K-2 standard in the core concept of Data Analysis, and is standard number 6. The CSTA Standards also can be filtered and sorted by level, concept, subconcept, and practice. By expanding a standard clarifying statements and examples are visible.

| Identifier | Grades | Standard | Concept | Subconcept | Practice(s) |
|------------|--------|--|-------------------|------------|---------------|
| 1B-CS-01 | 3-5 | <p>Describe how internal and external parts of computing devices function to form a system</p> <p><i>Computing devices often depend on other devices or components. For example, a robot depends on a physically attached light sensor to detect changes in brightness, whereas the light sensor depends on the robot for power. Keyboard input or mouse click could cause an action to happen because the computer has a processor to evaluate what is happening externally and produce corresponding responses. Students should describe how devices and components interact using correct terminology</i></p> <p>Practice(s): Communicating About Computing: 7.2</p> | Computing Systems | Devices | Communicating |

Implementation Considerations

As districts move forward with planning and implementation, there are several important factors to consider:

- The computer science standards are built by grade band. Districts have flexibility when developing a scope and sequence for each grade level, unpacking the standards, and planning integration into existing courses or developing stand-alone courses.
- Districts or schools interested in implementing Iowa's Computer Science Standards should begin by reading the [CSTA Standards](#) and exploring the [K12 CS Framework website](#) and [Code.org's Advocacy Coalition website](#).
- Complete implementation of Iowa's Computer Science Standards includes the development of pathways from kindergarten through 12th grade.
- Modules that show examples of scope and sequence, unpacked standards, and elementary integration will be developed in the near future.
- According to Code.org no universal definition of coding proficiency exists at the K-8 level. Many textbooks and packaged curriculums offer assessments ranging from end of chapter questions to problem sets. There are also currently no widely available assessments that are unaffiliated with specific courses.
- That being said, individual teachers need to develop assessments within their classroom that work for their curriculum. Assessments aligned to the K12 Framework should make use of project-based and portfolio-based assessment methods to authentically measure performance, reflect multiple aspects of computer science as defined by the five core concepts and seven practices of the framework, assess not only the ability to write a program but also the ability to communicate the product's significance and development process, and take advantage of platforms dedicated to computer science that allow students to create programs such as games, apps, and simulations within an environment that also collects data, analyzes achievement, and communicates progress to both students and teachers (K12 Computer Science Framework, p. 156).
- More resources will be added to the [Iowa Department of Education's computer science webpage](#).

Professional Learning

Teaching computer science and computational thinking in our K-12 classrooms requires educators who have the appropriate knowledge and skills to either integrate computational thinking into existing learning opportunities and/or to offer computer science stand-alone courses to their students. Professional learning options include college and university classes, in-person and online coursework, single day or longer workshops, speakers, site visits, and conferences.

The Board of Education Examiners established a [Computer Science endorsement](#) that can be pursued while teaching. Two paths for endorsement exist. Option one is to complete a program of study for required courses through an approved teacher preparation college or university. The program will recommend you directly to the BoEE for the endorsement. Option two is to take required courses and submit your transcripts directly to the BoEE for their review and approval.

Closing

The goal of Iowa's Computer Science Standards is to expand the reach and rigor of computer science in Iowa and to make it more accessible to more students. Computer science is an essential skill and its impact on other fields is rapidly evolving. Relative to other subjects, computer science is newly implemented across K-12. As a result, computer science pedagogy, curricula, and classroom tools are still developing and demand collaboration among school districts and supportive entities to guide implementation.

The adoption of Iowa's Computer Science Standards will drive academic excellence, provide a rigorous framework for computer science instruction and provide a context for creative thinking and analysis around computing principles and theories, computational thinking, computer hardware, software design, coding, analytics, and computer applications.

Iowa Department of Education guidance should be viewed as advisory unless it's specifically authorized by state statute, according to Iowa Code section 256.9A as enacted by Senate File 475. This does not apply to administrative rules, declaratory orders, or materials required by federal law or courts.