CSTEACHERS.ORG
COMPUTER SCIENCE TEACHERS ASSOCIATION

K-12 Computer Science Standards, Revised 2017

Vision: a published national K-12 CS standards of computer science learning objectives **to guide/inform** teachers and administrators in the design and implementation of CS activities integrated in the curriculum and as stand-alone courses….

CSTA K-12 Standards …

- Introduce fundamental concepts of **CS to all students**, beginning at the elementary school level.

- Present CS at the secondary school level in a way that can fulfill a CS, math, or science **graduation credit**.

- Encourage schools to offer additional secondary-level CS courses that will allow interested students to study CS in more depth and prepare for entry into the work force or college.

- Increase availability of **rigorous CS for all students**, especially members of underrepresented groups.

History

- A model curriculum for K-12 CS 2003 ACM/CSTA

- Model curriculum for K-12 CS, revised 2006

- CSTA K-12 CS standards 2011

- CSTA K-12 CS standards 2016, revision

- Revised by K-16 educators

- Released July 2017

CSTA Standards Revision Principles

1. For teachers, by teachers (grounded in teachers' experiences)
2. Informed by research (aligned with student development)
3. Takes into account college and career readiness
4. For all students - broadening participation
5. A step towards something more (considers evolving landscape)

CSTA Standards Revision Inputs

- CSTA K-12 CS standards from 2011
- Feedback on our standards 2011
- Teacher input
- K-12 CS framework (concepts and practices)
- Achieve's input on writing standards
- Other national standards: UK, Germany, etc.
- State standards: MA, AR, etc.
- ACM CS curricula 2013 (higher ed)
- Other standards: CCMS, ISTE, etc.

Revision Task Force

- **Educators with diversity of experience**
  - Three K - 5 classroom CS educators
  - Three 6 - 8 classroom CS educators
  - Three 9 - 12 classroom CS educators
  - One community college CS educator
  - One university CS educator
  - One district-level CS educator (co-chair with K-12 expertise)
  - One state-level CS educator (co-chair with 6 - 12 expertise)
  - CSTA COO and CSTA project manager

- **Reviewers from various states and local school systems**

Revision Process

Revision process:

- **Gap analysis** (CSTA K-12 CS standards 2011 vs. Framework concepts/practices)
- **Evaluate and update** standards in 2011 CS standards
  - Is the standard **still appropriate**? (or more appropriate for IT/Ed Tech standards?)
  - Is the standard appropriate for a different level? (e.g. Move from middle school to elementary school)
  - Is the standard at the appropriate level of **Revised Bloom's Taxonomy**?
  - Is the standard **measureable**?
  - Remove, rewrite, reposition as necessary -> grade specific standard

Revision Process *Continued*

- Consider **new standards** in areas not included in 2011
- Respond to / incorporate **input/feedback** on 2011 standards
- Check for **alignment with K-12 CS framework** statements
- Develop **progressions** from ES-MS-HS that reflect framework statements

Connected to the k12cs.org CSK12 CS Framework

Framework: provides overarching, high-level guidance per grade bands

Standards: provide detailed, measurable student performance expectations

Standards crafted by combining concept statements and practices from the CS Framework

The CS K12 Framework

The **ACM, CSTA, NMSI, CIC, and Code.org** created a high-level framework of computer science **concepts** and **practices** that will empower students to…

- Be informed citizens who can critically engage in public discussion on CS-related topics
- Develop as learners, users, and creators of CS knowledge and artifacts
- Better understand the role of computing in the world around them
- Learn, perform, and express themselves in other subjects and interests

Powerful Ideas, Simply Explained

What is a Framework concept? practice?

- Core Concept (**know**)
  - A big idea/theme that can be used as a bucket for concepts in CS.
  - These concepts are not discrete and will overlap with one another. They are listed separately in order to organize the K-12 body of knowledge.
- Core Practice (**do**)
  - Captures important behaviors that computer scientists engage in.
  - Rest on important "processes and proficiencies" with importance in cs.
  - Required to fully explore and understand the concepts.
  - Helps students coordinate and make sense of knowledge to accomplish a goal.
  - Enables students to engage with the course content by developing artifacts.

Concept + Practice = Standard

Concept		**Practice**		**Standard** (performance)

Programming and Algorithms
By the end of 2nd grade…

A program can be created by selecting instructions from a set of commands and inputting them into a computer as a sequence.

+

Collaboration
By the end of 2nd grade…

Work cooperatively and collaboratively with peers, teachers, and others using technology.

=

Programming and Algorithms (1st grade)

Work collaboratively in clear roles (e.g., pair programming) to construct a problem solution consisting of a sequence of programming commands (e.g., block-based).

From one concept/practice, multiple standards

Concepts

Practices

Framework

	.. .	**Programs and Algorithms**	...
By the end of 2nd grade...		An algorithm uses different types of instructions to solve a problem or perform a task. A program can be created by selecting instructions from a set of commands and inputting them into a computer as a sequence.	

	...	**Recognizing and representing computational problems**	....
By the end of 2nd grade...		Express problems and solutions so a computer can execute the instructions.	
...			

Standards

CPP.L1:3.4 Construct a set of statements to be acted out to accomplish a simple task (e.g., turtle instructions)

CPP.L1:6.5 Construct a program as a set of step-by-step instructions to be acted out (e.g., make a peanut butter and jelly sandwich activity)

CPP.L1:6.6 Implement problem solutions using a block-based programming language.

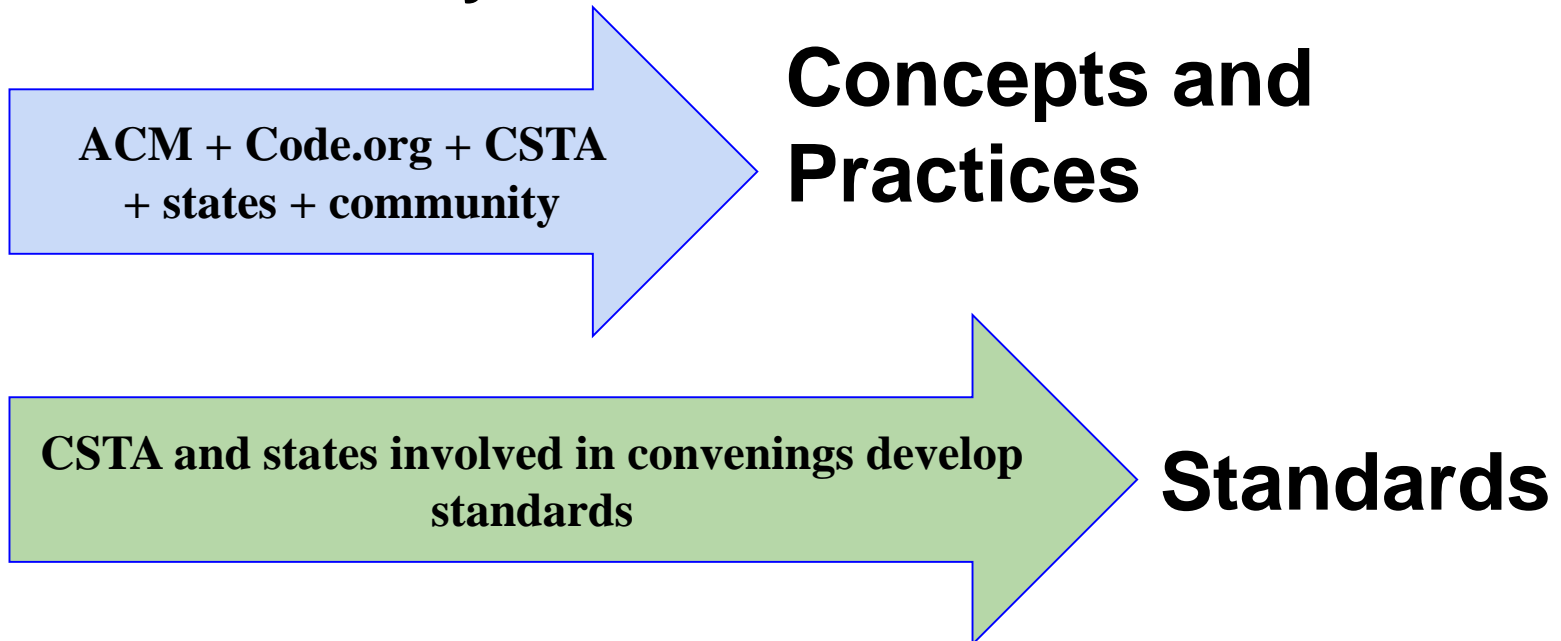CT.L1:3.4 Recognize that software is created to control computer operations

CT.L1:6.2 Develop a simple understanding of an algorithm (e.g., search, sequence of events, or sorting) using computer-free exercises.

The Framework is *not* Standards

- Not as prescriptive or measurable as performance standards.
- Doesn't address individual grade level granularity
- Fewer statements = less content. The framework is a minimum set for CS literacy.
- Concepts/practices are tools in a library -> standards (policy statements)

Who created what?

ACM, Code.org, and CSTA are convening stakeholders to create a framework of concepts and practices, which will inform the development of standards by the CSTA and states.

ACM + Code.org + CSTA + states + community → **Concepts and Practices**

CSTA and states involved in convenings develop standards → **Standards**

For more info:

[CSTA website](http://www.csteachers.org/?page=csta_standards)

http://www.csteachers.org/?page=csta_standards