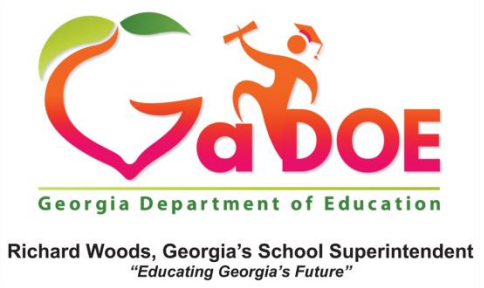
Georgia
Standards of Excellence

Computer Science

Standards

First Grade



Georgia Standards of Excellence for K-8 Computer Science

Georgia Standards of Excellence (GSE) for Computer Science (CS) were created in response to the growing ubiquity of computing devices and their impact on every aspect of society. If Georgia's students are to participate effectively in society, a shift in K-12 education must correspond. In Georgia, Computer Science is understood as the study of computers and algorithmic processes, including their principles, their hardware and software designs, their implementation, and their impact on society. The standards blend the core concepts of computer science (i.e., what students should know) and computer science practices (i.e., what students should do). These core concepts and practices should be taught in an integrated way to provide authentic learning experiences for students.

The GSE for Computer Science immerse students in the practices of Computer Science from Kindergarten through grade 12, effectively transitioning Computer Science from a high school elective to a comprehensive K-12 discipline for all students. Some skills or concepts are emphasized more in particular grade bands in conjunction with research on how students learn and other knowledge and skills taught at those levels. Any curriculum aligned to these GSE should revisit domains and concepts over time as students apply their learning by creating computational artifacts. Creating computational artifacts can be as simple as writing socially responsible electronic messages (e.g., email and social media posts) and as complex as designing an app for a drone or a self-driving vehicle.

The standards are organized in grade bands rather than grade levels to afford schools flexibility in presenting the content while maintaining a structured, developmental progression from one band to another. Teachers can scaffold instruction from simple familiarization in the K-2 grade band to deeper involvement in the 3-5 and more thorough treatment in the 6-8 grade band. In addition, the 6-8 grade band standards are designed to feed directly into the high school CS pathways which are, in turn, designed to meet the dynamic needs of industry and post-secondary study of computer science.

Georgia-owned and Georgia-grown, the GSE for Computer Science relate broadly to national and international frameworks. The grade bands follow the structure set forth by the K12 CS Framework; they develop a comprehensive conceptual framework that grows over the years. The K-8 GSE for Computer Science also correspond to the ISTE standards for students as organizational domains. These domains are intended to be cross-curricular. The ISTE domains (e.g. Empowered Learner) define a high-level perspective on the characteristics of a 21st century student. These characteristics are couched in a digital society but are not restricted to computer science content. Likewise, the GSE for Computer Science can be integrated into other content areas and support enduring characteristics for learning (e.g., collaborative, communicative, creative, and critical thinking). Ultimately, the GSE for Computer Science support and inspire Georgia's students as they grow and learn, empowering students to be successful, responsible, and engaged citizens.

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The Standards are written in the following format:

CSS = Computer Science Standard
EL = Empowered Learner (Domain)
6-8 = Grade band 6 through 8
1 = is the standard number
1… = Element of the standard

Cluster 6-8
Empowered Learner
CSS.EL.6-8.1
Use technology resources to increase self-direction and self-regulation in learning, including for problem solving and collaboration (e.g., using the Internet to access online resources, edit documents collaboratively)

1. Understand the difference between editing a shared document and suggesting edits (e.g. track changes)
2. Use digital tools or platforms to organize, display, annotate, and/or share a curated collection
3. Complete an individual project (e.g., research or design) using technology resources

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Table of Contents

Standards Pg. 5
Glossary of Computer Science Terms Pg. 8

Empowered Learner
CSS.EL.K-2.1
Recognize that technology provides the opportunity to enhance relevance, increase confidence, offer authentic choice, and produce positive impacts in learning.
(*Clarifying statement:* This is a general statement and should not be taught in isolation from the other standards.)

Knowledge Constructor
CSS.KC.K-2.2
Use digital tools (e.g. computers, tablets, cameras, software, 3D printers, etc.…) to build knowledge, produce creative artifacts, and make meaningful learning experiences for themselves and others.

3. Identify and use the home row of the keyboard effectively.
4. Build (use, modify and/or create) collections of digital images and words to communicate learning using a variety of media types.

Digital Citizen
CSS.DC.K-2.3
Identify the rights, responsibilities, and opportunities of living, learning, and working in an interconnected society and model behaviors that are safe, legal, and ethical.

3. Understand shared information on the Internet can be permanent.
4. Recognize and avoid harmful behaviors in online environments (e.g. viruses, in-app purchases, cyber-bullying, etc).
5. Follow safety rules and exhibit responsibility when using a device.
6. Create an artifact that shows the use of positive safe behavior when using technology.

(*Clarifying statement:* For example, students can draw a "selfie" and analyze how others might make assumptions based on what they see. Given that feedback, students can revise their portrait.)

Innovative Designer and Creator
CSS.IDC.K-2.4
Use the Design Process (use, modify, create) with a variety of tools to identify and solve problems by creating new, modified, or imaginative solutions.

4. Recognize that innovation in technology meets a range of needs (3D printing, coding, robotics, drones, etc.).

(*Clarifying statement:* Types of tools that could be used include, but are limited to, photo editing, sound recording, and programming languages like Blockly.)

Computational Thinker
CSS.CT.K-2.5
Develop and employ Computational Thinking strategies (break-down, find patterns, and create algorithms) to identify and solve problems.

2. Identify patterns.
3. Create and use Algorithms (a set of step-by-step instructions) to complete a task.

4. Use Algorithms (a set of step-by-step instructions) to construct programs (using a block-based programming language or unplugged activities) that accomplish a task as a means of creative expression.
6. Analyze and debug (identify and fix) with or without a computing device.

(Clarifying statement: Associating these vocabulary terms with plugged or unplugged instructional activities will build familiarity with the language of computational thinking to prepare students for in-depth application in later grades.)

Creative Communicator
CSS.CC.K-2.6
Use digital tools to creatively share and express ideas.

1. Create a variety of artifacts.
3. Present information using a digital device.

(*Clarifying statement:* Examples of artifacts could include digital images, audio recordings, and storyboards.)

Global Collaborator
CSS.GC.K-2.7
Use digital tools to collaborate with others both locally and globally.

3. Understand features of online environments.

(*Clarifying statement:* Examples of global interaction could include comments on Scratch projects from other students around the world.)

Reflective Researcher
CSS.RR.K-2.8
Select appropriate sources to conduct authentic research to produce a relevant and credible product.

2. Understand that resources on the Internet vary in quality and are found in a variety of places so care is needed in selection.
3. Understand there is an appropriate place to find information to research the answer to a question.

(*Clarifying statement:* In this grade band, research skills should be developed in the context of simple problems, such as how seeds grow in a school garden or how to clean a bedroom. Students can find information from two or three sources. Evaluating the accuracy of sources will be taught in later grade levels.)

Digital Awareness
CSS.DA.K-2.9
Understand how people can use technology.

5. Identify that technological innovation changes how people live and work.
6. Understand that when you are on a networked device you are connected to other people.
7. Practice using a variety of computing hardware and software to achieve personal learning goals.
8. Identify and describe solutions to simple hardware and software problems (ex. volume control).
9. Describe how technology can impact an individual's life positively and negatively.

(*Clarifying statement:* Appropriate hardware and software for this age group could include robots, block-based programming platforms such as Scratch, and digital pictures, audio, and animation.)

Glossary of Computer Science Terms

These terms are used throughout the standards. They are content-specific vocabulary for Computer Science.

Term	Definition	Example
Abstraction	The process of taking away or removing characteristics from something in order to make it less complex. The product should be a new representation of essential characteristics. The new representation hides details that are irrelevant to the problem at hand.	To represent a person, an abstraction may include two arms, two legs, a head, and a torso but no hair or toes. This representation gives enough information to show a person without being too complex.
Algorithm	Detailed, step-by-step instructions for solving a problem or completing a task.	The set of steps used to solve a long division problem is an example of an algorithm.
Analog	A defining characteristic of data; analog data are stored in a continuous transmission of a signal. It is often contrasted with digital, which is how computers store and process data as a set of individual symbols.	A compact disc is digital; a vinyl record is analog.
Artifact (computational)	Anything created by a human using a computer.	A word processing document, an app, and a webpage are all computational artifacts.
Binary	A number system using only on the numerals 0 and 1.	The binary number 01011 converts to 11 in decimal numbers.
Biometric	The measurement and analysis of unique physical or behavioral characteristics (such as fingerprint or voice patterns) especially as a means of verifying personal identity.	Fingerprint scanners utilize a biometric evaluation to grant access.

Block-based programming language	A visual representation of common sets of instructions for coding that can be organized to create computer programs; block-based programing is often used to teach coding to younger or novice learners.	A popular block-based coding language is Blockly.
Coding	Creating a computer program.	Writing directions for a computer using a computer language such as Java, Python, or Blockly.
Computational Thinking	A problem-solving process used to formulate problems in a way that a computer and other tools could be used to help solve.	

Conditional	A programming statement, often starting with "if", in which one half expresses something that depends on the other half.	If student's grade is greater than or equal to 60
		Print "passed"
		else
		Print "failed"
		endif

Curate	Collect, organize, and present information typically using professional or expert knowledge.	Selecting a set of pictures to share or add to a photo album.
Debug	The process of finding and removing errors from computer programs.	Correcting errors.
Decomposition	Specific to computer science, decomposition means breaking a complex problem or system into parts that are easier understand.	To create an app that calculates an ideal heart rate, the program would break down the process to input of information from a patient, calculation of that information, and output of the ideal heart rate.
Design Process	A formal approach used by architects, engineers, and scientists for breaking down a large project into manageable chunks.	

Drone	A remote-controlled pilotless aircraft or missile.	A photographer can use a drone to take aerial pictures.
Event	An action or occurrence recognized by software, often originating from the external environment, that may be handled by the software.	Accepting input from a user is an event that may be followed up by some processing activity.
Hexadecimal (Hex)	Relating to or using a system of numerical notation that has 16 digits rather than 10 as its base.	The number 15 in our common base ten decimal system is represented with the letter 'F' in hexadecimal.
Ideate	The process of generating ideas and solutions.	Sketching, prototyping, or brainstorming can be processes for ideation.
Loop	A sequence of instructions that is continually repeated until a certain condition is reached.	An action that is performed again and again by a computer program.
Model	Constructing a representation of some part of a problem or system.	A budget is a model for how money is spent and earned.
Ordinal	Relating to an ordinal number; representing a position in a series.	1st, 2nd, 3rd, 4th, ...
Phishing	The fraudulent practice of sending emails purporting to be from reputable sources in order to entice individuals to reveal personal information, such as passwords and credit card numbers.	A phishing email is a fake message from a place like the Internal Revenue Service requesting a social security number.
Prototype	A model of something from which other forms are developed or copied.	At an auto show, a "concept car" is a prototype of a car that may go into mass production.
Remix	To change a set of code by adding or rearranging smaller code segments to create a different outcome.	A computer program that uses segments of other programs to solve a problem.

Scratch	A block-based programming platform commonly used for novice programmers.	
Sequence	An ordered, step-by-step process of an action or event proceeding in a pattern.	5, 10, 15, 20 is a sequence that relies on a pattern of +5.
Unplugged	Activities used for teaching computational thinking or computer science without a computing device.	Using playing cards to teach sorting is an unplugged activity to teach how computers sort data.