

# ISTE Standards

## Computer Science Educators

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### 1. Knowledge of content

Computer Science Educators demonstrate knowledge of Computer Science content and model important principles and concepts.

- a. Demonstrate knowledge of and proficiency in data representation and abstraction
  - i. Effectively use primitive data types
  - ii. Demonstrate an understanding of static and dynamic data structures
  - iii. Effectively use, manipulate, and explain various external data stores: various types (text, images, sound, etc.), various locations (local, server, cloud), etc.
  - iv. Effectively use modeling and simulation to solve real-world problems
- b. Effectively design, develop, and test algorithms
  - i. Using a modern, high-level programming language, construct correctly functioning programs involving simple and structured data types; compound boolean expressions; and sequential, conditional, and iterative control structures
  - ii. Design and test algorithms and programming solutions to problems in different contexts (textual, numeric, graphic, etc.) using advanced data structures
  - iii. Analyze algorithms by considering complexity, efficiency, aesthetics, and correctness
  - iv. Demonstrate knowledge of two or more programming paradigms
    - v. Effectively use two or more development environments
    - vi. Demonstrate knowledge of varied software development models and project management strategies
- c. Demonstrate knowledge of digital devices, systems, and networks
  - i. Demonstrate an understanding of data representation at the machine level
  - ii. Demonstrate an understanding of machine-level components and related issues of complexity
  - iii. Demonstrate an understanding of operating systems and networking in a structured computer system
  - iv. Demonstrate an understanding of the operation of computer networks and mobile computing devices
- d. Demonstrate an understanding of the role computer science plays and its impact in the modern world
  - i. Demonstrate an understanding of the social, ethical, and legal issues and impacts of computing, and attendant responsibilities of computer scientists and users
  - ii. Analyze the contributions of computer science to current and future innovations in sciences, humanities, the arts, and commerce

## 2. Effective teaching and learning strategies

Computer Science Educators demonstrate effective content pedagogical strategies that make the discipline comprehensible to students.

- a. Plan and teach computer science lessons/units using effective and engaging practices and methodologies
  - i. Select a variety of real-world computing problems and project-based methodologies that support active and authentic learning and provide opportunities for creative and innovative thinking and problem solving
  - ii. Demonstrate the use of a variety of collaborative groupings in lesson plans/units and assessments
  - iii. Design activities that require students to effectively describe computing artifacts and communicate results using multiple forms of media
  - iv. Develop lessons and methods that engage and empower learners from diverse cultural and linguistic backgrounds
  - v. Identify problematic concepts and constructs in computer science and appropriate strategies to address them
  - vi. Design and implement developmentally appropriate learning opportunities supporting the diverse needs of all learners
  - vii. Create and implement multiple forms of assessment and use resulting data to capture student learning, provide remediation, and shape classroom instruction

## 3. Effective learning environments

Computer Science Educators apply their knowledge of learning environments by creating and maintaining safe, ethical, supportive, fair, and effective learning environments for all students.

- a. Design environments that promote effective teaching and learning in computer science classrooms and online learning environments and promote digital citizenship
  - i. Promote and model the safe and effective use of computer hardware, software, peripherals, and networks

- ii. Plan for equitable and accessible classroom, lab, and online environments that support effective and engaging learning

## 4. Effective professional knowledge and skills

Computer Science Educators demonstrate professional knowledge and skills in their field and readiness to apply them.

- a. Participate in, promote, and model ongoing professional development and life-long learning relative to computer science and computer science education
  - i. Identify and participate in professional computer science and computer science education societies, organizations, and groups that provide professional growth opportunities and resources
  - ii. Demonstrate knowledge of evolving social and research issues relating to computer science and computer science education
  - iii. Identify local, state, and national content and professional standards and requirements affecting the teaching of secondary computer science

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