ISTE STANDARDS
FOR COMPUTER SCIENCE EDUCATORS

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
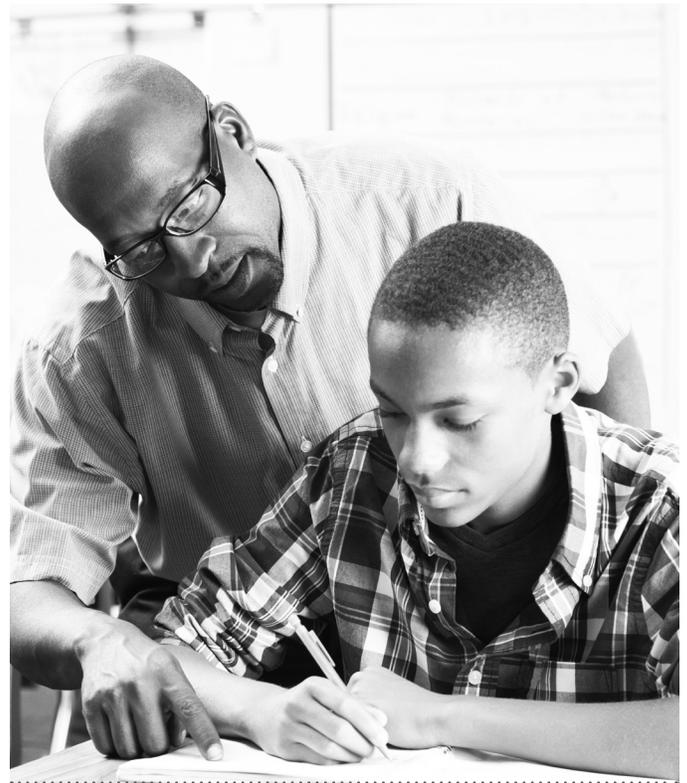
3. Effective learning environments

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 lifelong 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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