

Partnership for 21st Century Skills: Essential Skills for Success
Sample CSTA K-12 Computer Science Standards

Learning and Innovation Skills	Sample CSTA Standards
<p><i>Creativity & Innovation</i> <i>Think Creatively</i></p> <ul style="list-style-type: none"> • Use a wide range of idea creation techniques (such as brainstorming) • Create new and worthwhile ideas (both incremental and radical concepts) • Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts <p><i>Work Creatively with Others</i></p> <ul style="list-style-type: none"> • Develop, implement and communicate new ideas to others effectively • Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work • Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas • View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes <p><i>Implement Innovations</i></p> <ul style="list-style-type: none"> • Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur 	<p>CPP.L2-08: Demonstrate dispositions amenable to open-ended problem solving and programming (e.g., comfort with complexity, persistence, brainstorming, adaptability, patience, propensity to tinker, creativity, accepting challenge).</p> <p>CT.L3A-11: Describe how computation shares features with art and music by translating human intention into an artifact.</p> <p>CL.L3A-03: Describe how computing enhances traditional forms and enables new forms of experience, expression, communication, and collaboration.</p> <p>CT.L3B-03: Critically examine classical algorithms and implement an original algorithm.</p>
<p><i>Critical Thinking & Problem-Solving</i> <i>Reason Effectively</i></p> <ul style="list-style-type: none"> • Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation <p><i>Use Systems Thinking</i></p> <ul style="list-style-type: none"> • Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems <p><i>Make Judgments and Decisions</i></p> <ul style="list-style-type: none"> • Effectively analyze and evaluate evidence, arguments, claims and beliefs • Analyze and evaluate major alternative points of view • Synthesize and make connections between information and arguments • Interpret information and draw conclusions based on the best analysis • Reflect critically on learning experiences and processes <p><i>Solve Problems</i></p> <ul style="list-style-type: none"> • Solve different kinds of non-familiar problems in both conventional and innovative ways • Identify and ask significant questions that clarify various points of view and lead to better solutions 	<p>CPP.L3A-04: Apply analysis, design, and implementation techniques to solve problems (e.g., use one or more software lifecycle models).</p> <p>CI.L3B-03: Summarize how financial markets, transactions, and predictions have been transformed by automation.</p> <p>CT.L2-04: Evaluate ways that different algorithms may be used to solve the same problem.</p> <p>CD.L3A-06: Apply strategies for identifying and solving routine hardware and software problems that occur in everyday life.</p>

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<p>Communication & Collaboration</p> <p>Communicate Clearly</p> <ul style="list-style-type: none"> • Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts • Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions • Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade) • Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact • Communicate effectively in diverse environments (including multi-lingual) <p>Collaborate with Others</p> <ul style="list-style-type: none"> • Demonstrate ability to work effectively and respectfully with diverse teams • Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal • Assume shared responsibility for collaborative work, and value the individual contributions made by each team member 	<p>CD.L2-07: Describe what distinguishes humans from machines, focusing on human intelligence versus machine intelligence and ways we can communicate.</p> <p>CL.L2-02: Collaboratively design, develop, publish, and present products (e.g., videos, podcasts, websites) using technology resources that demonstrate and communicate curriculum concepts.</p> <p>CL.L3A-02: Use collaborative tools to communicate with project team members (e.g., discussion threads, wikis, blogs, version control, etc.).</p>

Information, Media, and Technology Skills	Sample CSTA Standards
<p>Information Literacy</p> <p>Access and Evaluate Information</p> <ul style="list-style-type: none"> • Access information efficiently (time) and effectively (sources) • Evaluate information critically and competently <p>Use and Manage Information</p> <ul style="list-style-type: none"> • Use information accurately and creatively for the issue or problem at hand • Manage the flow of information from a wide variety of sources • Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information 	<p>CI.L2-01: Exhibit legal and ethical behaviors when using information and technology and discuss the consequences of misuse.</p> <p>CI.L3A-05: Describe strategies for determining the reliability of information found on the Internet.</p> <p>CPP.L3B-08: Deploy various data collection techniques for different types of problems.</p>
<p>Media Literacy</p> <p>Analyze Media</p> <ul style="list-style-type: none"> • Understand both how and why media messages are constructed, and for what purposes • Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors • Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media <p>Create Media Products</p> <ul style="list-style-type: none"> • Understand and utilize the most appropriate media creation tools, characteristics and conventions • Understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments 	<p>CI.L2-04: Evaluate the accuracy, relevance, appropriateness, comprehensiveness, and bias of electronic information sources concerning real-world problems.</p> <p>CI.L3A-04: Compare the positive and negative impacts of technology on culture (e.g., social networking, delivery of news and other public media, and intercultural communication).</p>
<p>Information Communication Technology Literacy</p> <p>Apply Technology Effectively</p> <ul style="list-style-type: none"> • Use technology as a tool to research, organize, evaluate and communicate information • Use digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy • Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies 	<p>CPP.L2-03: Design, develop, publish, and present products (e.g., webpages, mobile applications, animations) using technology resources that demonstrate and communicate curriculum concepts.</p> <p>CI.L2-05: Describe ethical issues that relate to computers and networks (e.g., security, privacy, ownership, and information sharing).</p> <p>CI.L3A-06: Differentiate between information access and information distribution rights.</p>

Life and Career Skills	Sample CSTA Standards
<p>Flexibility & Adaptability</p> <p>Adapt to Change</p> <ul style="list-style-type: none"> Adapt to varied roles, jobs responsibilities, schedules and contexts Work effectively in a climate of ambiguity and changing priorities <p>Be Flexible</p> <ul style="list-style-type: none"> Incorporate feedback effectively Deal positively with praise, setbacks and criticism Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments 	<p>CPP.L2-08: Demonstrate dispositions amenable to open-ended problem solving and programming (e.g., comfort with complexity, persistence, brainstorming, adaptability, patience, propensity to tinker, creativity, accepting challenge).</p> <p>CL.L2-04: Exhibit dispositions necessary for collaboration: providing useful feedback, integrating feedback, understanding and accepting multiple perspectives, socialization.</p> <p>CT.L3B-08: Use models and simulations to help formulate, refine, and test scientific hypotheses.</p>
<p>Initiative & Self-Direction</p> <p>Manage Goals and Time</p> <ul style="list-style-type: none"> Set goals with tangible and intangible success criteria Balance tactical (short-term) and strategic (long-term) goals Utilize time and manage workload efficiently <p>Work Independently</p> <ul style="list-style-type: none"> Monitor, define, prioritize and complete tasks without direct oversight <p>Be Self-directed Learners</p> <ul style="list-style-type: none"> Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise Demonstrate initiative to advance skill levels towards a professional level Demonstrate commitment to learning as a lifelong process Reflect critically on past experiences in order to inform future progress 	<p>CPP.L2-02: Use a variety of multimedia tools and peripherals to support personal productivity and learning throughout the curriculum.</p> <p>CPP.L3A-03: Use various debugging and testing methods to ensure program correctness (e.g., test cases, unit testing, white box, black box, integration testing).</p> <p>CT.L3B-08: Use models and simulations to help formulate, refine, and test scientific hypotheses.</p>
<p>Social & Cross-Cultural Skills</p> <p>Interact Effectively with Others</p> <ul style="list-style-type: none"> Know when it is appropriate to listen and when to speak Conduct themselves in a respectable, professional manner <p>Work Effectively in Diverse Teams</p> <ul style="list-style-type: none"> Respect cultural differences and work effectively with people from a range of social and cultural backgrounds Respond open-mindedly to different ideas and values Leverage social and cultural differences to create new ideas and increase both innovation and quality of work 	<p>CI.L3A-01: Compare appropriate and inappropriate social networking behaviors.</p> <p>CI.L3A-04: Compare the positive and negative impacts of technology on culture (e.g., social networking, delivery of news and other public media, and intercultural communication).</p>

Life and Career Skills	Sample CSTA Standards
<p>Productivity & Accountability</p> <p>Manage Projects</p> <ul style="list-style-type: none"> • Set and meet goals, even in the face of obstacles and competing pressures • Prioritize, plan and manage work to achieve the intended result <p>Produce Results</p> <ul style="list-style-type: none"> • Demonstrate additional attributes associated with producing high quality products including the abilities to: <ul style="list-style-type: none"> - Work positively and ethically - Manage time and projects effectively - Multi-task - Participate actively, as well as be reliable and punctual - Present oneself professionally and with proper etiquette - Collaborate and cooperate effectively with teams - Respect and appreciate team diversity - Be accountable for results 	<p>CL.L2-03: Collaborate with peers, experts, and others using collaborative practices such as pair programming, working in project teams, and participating in group active learning activities.</p> <p>CL.L3B-01: Use project collaboration tools, version control systems, and Integrated Development Environments (IDEs) while working on a collaborative software project.</p>
<p>Leadership & Responsibility</p> <p>Guide and Lead Others</p> <ul style="list-style-type: none"> • Use interpersonal and problem-solving skills to influence and guide others toward a goal • Leverage strengths of others to accomplish a common goal • Inspire others to reach their very best via example and selflessness • Demonstrate integrity and ethical behavior in using influence and power <p>Be Responsible to Others</p> <ul style="list-style-type: none"> • Act responsibly with the interests of the larger community in mind 	<p>CI.L2-06: Discuss how the unequal distribution of computing resources in a global economy raises issues of equity, access, and power.</p> <p>CI.L3B-02: Analyze the beneficial and harmful effects of computing innovations.</p> <p>CI.L3B-08: Relate issues of equity, access, and power to the distribution of computing resources in a global society.</p>

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