

2-3

Computer Science and Digital Fluency Standard Concept Areas

Impacts of Computing

Computational Thinking

Networks and
Systems Design

Cybersecurity

Digital Literacy

NYS K-12 Computer Science and Digital Fluency Standards

Grades 2-3

Glossary of Terms

Guiding Principles

1. **EQUITY AND ACCESS:** Equity and diversity should be attended to, allowing for engagement by all students and flexibility in how students may demonstrate proficiency. The standards support a cultural view of learning and human development in which multiple expressions of diversity are recognized and regarded as assets for teaching and learning—otherwise referred to as Culturally Responsive-Sustaining Education (CR-S).
2. **INTERDISCIPLINARY CONNECTIONS:** The standards will complement and promote learning across disciplines.
3. **COHERENCE:** The standards will be focused on the most important knowledge and skills that all students need to know. The standards will be clearly written, demonstrate vertical and horizontal alignment, and articulate a clear learning progression.
4. **RELEVANCE AND ENGAGEMENT:** The standards will motivate and empower students, allow for a focus on appropriate real-world challenges, and will prepare students to adapt and prosper in a world that is increasingly influenced and shaped by technological advancements.

Impacts of Computing



Society	Computing can change or reinforce cultural practices and equity within society. Human social structures that support education, work, and communities have been affected by the ease of communication facilitated by computing. Governments enact laws to influence the impact of computing technologies on society.
Ethics	Computing is not done in a vacuum. The question of ethics in computing is for both creators and users of technology. If computer scientists and end users do not take into account biases and ethics of what has been built, algorithms and programs may have unintended impacts on societies.
Accessibility	The development and design of computing systems needs to take into account the needs and wants of diverse end users and purposefully consider potential perspectives of users with different backgrounds and ability levels. Identifying potential personal bias during the design and implementation process maximizes accessibility in product design, and awareness of professionally accepted accessibility standards helps to evaluate computational artifacts for accessibility.
Career Paths	The increased connectivity between people in different cultures and in different career fields has impacted the variety and types of careers that are possible. There are also many possible career paths within computer science itself, as well as different specialties within each field, that make computer science a broad and encompassing opportunity.

Society.1	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics...
IC.1 Identify and analyze how computing technology has changed the way people live and work. Clarifying Statement The focus should be on how advancements in computing technology have changed careers and lives.		
Society.2	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics...
IC.2 Compare and explain rules related to computing technologies and digital information. Clarifying Statement The focus is on having students understand why rules around computing technology can change depending upon the setting.		
Ethics.3	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics...
IC.3 Discuss and explain how computing technology can be used in society and the world. Clarifying Statement The focus is on examples of computing technology that were invented to solve		

broader problems in society, or existing technology platforms that can have many purposes.		
Ethics.4	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics...
IC.4 Identify public and private digital spaces.		
Clarifying Statement The focus is on identifying digital spaces in the context of sharing or accessing information, such as an online platform where students submit work (private) versus public websites that anyone can access.		
Ethics.5	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics...
IC.5 Identify and discuss how computers are programmed to make decisions without direct human input for daily life.		
Clarifying Statement The focus is on describing computing technology that relies on a program, settings, and data to make decisions without direct human involvement.		
Accessibility.6	This can be integrated into my content area(s) in the	This standard applies to the following transdisciplinary

	following ways...	lessons/topics...
IC.6 Identify and discuss factors that make a computing device or software application easier or more difficult to use.		
Clarifying Statement The focus is on identifying choices developers make when designing computing devices and software and considering the pros and cons when making those choices.		
Career Paths.7	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics...
IC.7 Identify a diverse range of roles and skills in computer science.		
Clarifying Statement The focus is not just on jobs in computer science, but also the skills and practices that are important for careers in the field of computer science.		

Computational Thinking



Modeling and Simulation	Modeling is the process of representing a system to allow one to observe, understand, or simulate it. Models can be used to simulate real world phenomena that are not easy to observe or reproduce, and often generate simulated data that can further understanding of the system or make predictions.
Data Analysis and Visualization	Data analysis is the process of cleaning, transforming, organizing, clustering, and categorizing data to discover useful information, draw conclusions, and aid in making decisions. Data can be visualized in a variety of ways (including graphs and charts) to aid in and communicate the results of the analysis.
Abstraction and Decomposition	Abstraction is the process of reducing complexity by focusing on key elements. The study of a complicated system often starts by simplifying it and addressing just the most important parts. Complex computer programs also rely on abstraction to isolate particular routines or tasks, especially if those tasks are common. A programmer can then call on that routine, often written by others, without needing to understand its details. Decomposition is the process of strategically breaking complicated problems or tasks into smaller parts that are simpler to understand, program, and debug.
Algorithms and Programming	An algorithm is a sequence of steps designed to accomplish a specific task. Algorithms can be translated into programs, or code, to provide instructions for computing devices. Algorithms are central to programming. Programming is the process of designing and developing code to perform a specific task. It includes the transformation of an algorithm into a specific language that a computer can read and execute, testing code under controlled conditions to ensure its accuracy, debugging the code to resolve errors, and producing documentation both for end users to understand how to use the program and for other developers to assist in following the logic within the program.

Modeling and Simulation.1	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics...
CT.1 Create a model of an object or computational process in order to identify patterns and essential elements of the object or process.		
Clarifying Statement The emphasis is on data represented in models to portray results and to assist in identifying patterns in the world around us.		
Data Analysis and Visualization.2	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics...
CT.2 Identify and describe data collection tools from everyday life.		
Clarifying Statement The emphasis is on identifying various tools in everyday life that collect, sort and store data, such as surveys, spreadsheets and charts.		
Data Analysis and Visualization.3	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics...
CT.3 Present the same data in multiple visual formats in order to tell a story about the data.		
Clarifying Statement The emphasis is on using the visual		

representation to make the data meaningful. Options for presenting data visually include tables, graphs, and charts.		
Abstraction and Decomposition.4	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics...
CT.4 Identify multiple ways that the same problem could be decomposed into smaller steps		
Clarifying Statement The focus is on identifying how to break apart a problem into smaller steps, while understanding that there can be multiple valid sequences of steps that solve the same problem.		
Abstraction and Decomposition.5	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
CT.5 Identify the essential details needed to perform a general task in different settings or situations.		
Clarifying Statement Some details are essential to performing a task, while others are not (E.g., some may be so common that they don't need to be stated).		
Algorithms and Programming.6	This can be integrated into my content area(s) in the	This standard applies to the following transdisciplinary

	following ways...	lessons/topics. ..
CT.6 Create two or more algorithms for the same task.		
Clarifying Statement The task can be a familiar activity or more abstract. The focus is on finding more than one way to reach the same goal.		
Algorithms and Programming.7	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
CT.7 Name/label key pieces of information in a set of instructions, noting whether each name/label refers to a fixed or changing value.		
Clarifying Statement The focus is on identifying key pieces of information, labelling them with a descriptive name, and observing which labels refer to different values each time the instructions are given, and which values stay the same.		
Algorithms and Programming.8	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
CT.8 Identify steps within a task that should only be carried out under certain precise conditions.		
Clarifying Statement		

The focus should be on recognizing that some steps in a task only get carried out some of the time, and that the conditions can be precisely described.		
Algorithms and Programming.9	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
CT.9 Identify and debug errors within an algorithm or program that includes sequencing or repetition.		
Clarifying Statement The focus should be on having students identify error(s) in an algorithm and suggest changes to fix the algorithm.		
Algorithms and Programming.10	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
CT.10 Develop and document a plan that outlines specific steps taken to complete a project.		
Clarifying Statement The focus should be on developing and documenting a plan in writing, using appropriate tools (such as a storyboard or story map).		

Networks & System Design



Hardware and Software	A computing system is composed of hardware, software, and the individuals who use them. Hardware refers to the physical components that make up a computing device. Software refers to the program instructions that operate on such hardware.
Networks and the Internet	Networks are formed by connecting individual devices in a variety of ways. Data is stored on one or more devices in a network and transferred between devices using a set of protocols or rules. The internet is an example of a global network that transmits data between many devices around the world.

Hardware and Software.1	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
NSD.1 Describe and demonstrate several ways a computer program can receive data and instructions (input) and can present results (output).		
Clarifying Statement The focus is on choosing and demonstrating different computing technologies to receive and present results depending on the task.		
Hardware and Software.2	This can be integrated into my content area(s) in the	This standard applies to the following transdisciplinary

	following ways...	lessons/topics. ..
NSD.2 Explain the function of software in computing systems, using descriptive/precise language Clarifying Statement The focus is on understanding how software helps to complete computing tasks.		
Hardware and Software.3	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
NSD.3 Describe and attempt troubleshooting steps to solve a simple technology problem. Clarifying Statement The focus is on building problem solving techniques for self-help, such as making sure speakers are turned on or headphones are plugged in or making sure that the caps lock key is not on, to narrow down a problem.		
Networks and the Internet.4	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
NSD.4 Recognize that information can be communicated using different representations that satisfy different rules. Clarifying Statement The focus is on understanding that		

information is converted in a special way so it can be sent through wires or waves through the air.		
Networks and the Internet.5	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
NSD.5 Describe and navigate to various locations where digital information can be stored.		
Clarifying Statement The focus is being able to navigate and save a file to a specific location.		

Cybersecurity



Risk	Risk is a combination of a vulnerability, the likelihood that the vulnerability will be exploited, and the severity of consequences if the vulnerability is exploited. It is important to understand why data and resources need to be protected and how they might be compromised so the correct safeguards can be put into place
Safeguards	Programmers and individuals must know how to protect their data and computing resources with common safety measures. When combined, various physical, digital, and behavioral precautions can create a level of digital security.
Response	When a security breach occurs, individuals must decide what actions to take. This takes into account what type of breach occurred and how to improve security moving forward.

RISKS.1	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ...
CY.1 Compare reasons why an individual should keep information private or make information public.		
Clarifying Statement The focus should be on potential effects, both positive and negative, for making information public.		

SAFEGUARDS.2	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
CY.2 Compare and contrast behaviors that do and do not keep information secure. Clarifying Statement The emphasis is on recognizing and avoiding potentially harmful behaviors, such as sharing private information online or not logging off a public computer.		
SAFEGUARDS.3	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
CY.3 Identify why someone might choose to share an account, app access, or devices. Clarifying Statement The focus is on explaining how user habits and behaviors should be adjusted based on who shares a device and/or application.		
SAFEGUARDS.4	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
CY.4 Encode and decode a short message or phrase. Clarifying Statement The focus is on having one student encode a word or message, and a different student, using the same key, decode it. You might		

encourage students to develop their own coding scheme.		
RESPONSE.5	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
CY.5 Identify unusual activity of applications and devices that should be reported to a responsible adult.		
Clarifying Statement The emphasis is on recognizing situations in which students should notify a trusted adult when a device or application does not perform as expected (pop-ups, authentication and/or loading issues).		

Digital Literacy



Digital Use	Computers are a part of everyday life. A variety of digital tools exist to create, revise, and publish digital artifacts, as well as communicate and collaborate with others.
Digital Citizenship	Digital citizenship focuses on empowering learners to use online resources, applications, and spaces to improve communities, make their voice heard, and curate a positive and effective digital footprint. It encourages students to engage respectfully online with people with different beliefs and better determining the validity of online sources of information.

Digital Use.1	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
DL.1 Locate and use the main keys on a keyboard to enter text independently.		
Clarifying Statement Students should be introduced to keyboarding and identify in second grade and begin to receive direct instruction in keyboarding in third grade, with a focus on form over speed and accuracy.		

Digital Use.2	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
DL.2 Communicate and work with others using digital tools to share knowledge and convey ideas.		
Clarifying Statement The focus is on using digital tools to communicate and collaborate in order to expand knowledge and effectively convey ideas.		
Digital Use.3	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
DL.3 Conduct basic searches based on student identified keywords.		
Clarifying Statement Students will identify key words with which to perform an internet search using teacher-approved tool(s), to obtain information.		
Digital Use.4	This can be integrated into my content area(s) in the following ways...?	This standard applies to the following transdisciplinary lessons/topics. ..
DL.4 Use a variety of digital tools and resources to create digital artifacts.		
Clarifying Statement Different digital tools are used for different		

purposes, such as communicating, collaborating, researching, and creating original content.		
Digital Use.5	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
DL.5 * Standard begins in Grade Band 4-6.		
Clarifying Statement		
Digital Citizenship.6	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
DL.6 Describe ways that information may be shared online.		
Clarifying Statement The focus is on how personal information, both public and private becomes available online and understand the ways their information can be shared in various ways.		
Digital Citizenship.7	This can be integrated into my content area(s) in the following ways...	This standard applies to the following transdisciplinary lessons/topics. ..
DL.7 Understand what it means to be part of a digital community and describe ways to keep it a safe, respectful space.		

Clarifying Statement The focus is on describing actions with students and having them discuss whether those actions would be safe, responsible and/or ethical using technology and/or online spaces.		