



# NYS K-12 Computer Science and Digital Fluency Learning Standards

December 2020

# Vision

Every student will know how to live productively and safely in a technology-dominated world. This includes understanding the essential features of digital technologies, why and how they work, and how to communicate and create using those technologies.

# Representation in Authoring, Review, and Revision

Individuals representing the following groups participated in authoring, review, and revision work:



- K-12 Teachers
  - Computer science, math, science, STEM
  - Educational technology, library and media specialists
  - Special Education
  - ELL/MLL Education
  - Early Learning, Elementary (Common Branch)
- K-12 Administrators, District Coordinators, and BOCES staff
- Higher Education
- Business and Industry
- Professional Organizations
- Community and Parent Organizations
- National Experts
- Urban, Suburban, Rural; Regional Representation



# Conditional Approval

NYSED staff directed by the Board of Regents to

- Engage further with early learning experts to ensure the K-2 grade band standards are developmentally appropriate, and that both the clarifying statements and provided examples are helpful and relevant to K-2 teachers.
- Return to the Board of Regents for final adoption of the standards in Spring 2020.
- Begin to develop resources and guidance to aid the field in implementing the standards in accordance with the proposed implementation timeline.

# EARLY LEARNING STANDARDS REVIEW AND REVISION

## CONDITIONAL APPROVAL

The Board of Regents granted Conditional Approval of the Standards at the January 2020 Meeting of the Board of Regents.



Jan 2020

Feb - March 2020



## EARLY LEARNING WORKGROUP

A group of Early Learning and CS Experts was formed to review and revise the Standards. They did an initial review and submitted feedback that was the basis of a set of recommendations for review.

## PAUSE DUE TO COVID-19

Work on the standards was paused due to the COVID-19 pandemic, as the majority of the early learning experts assisting with the revision work were New York State teachers.



March - June 2020

July - Sept 2020



## EARLY LEARNING WORKGROUP RESUMED

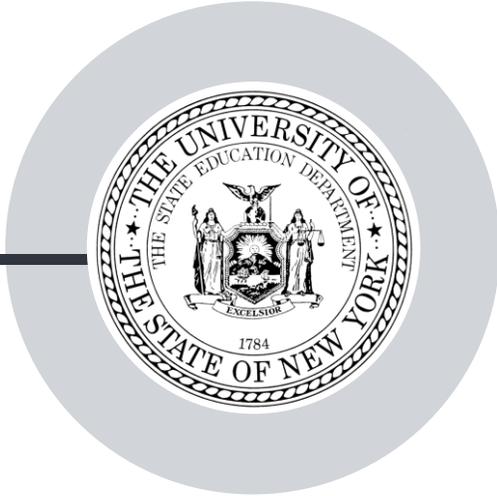
The Early Learning Workgroup met twice weekly for over two months to review and revise each EL standard.

## FINAL REVIEW AND REVISION FOR COHERENCE

CS Experts and the Executive Standards Panel conducted a final review for coherence.



Nov 2020



# Early Learning Standards Revision Workgroup

- Comprised of NYS teachers; subject matter experts in early childhood education, computer science, and instructional technology; and NYSUT Representatives
- Reviewed and revised standards, clarifying statements, and examples



<b>Priority for Revision, Defined by Stakeholder Feedback</b>	<b>Actions Taken by Revision Workgroup, Reflected in December 2020 Draft Standards</b>
<p>More attention needed on the K-2 band</p>	<ul style="list-style-type: none"> <li>Standards revised for developmental appropriateness, flexibility for meeting the standards, and to emphasize thinking, creativity, and problem solving</li> <li>Clarifying language and examples reviewed and revised for relevance</li> </ul>
<p>Include third grade with K-2 grade band</p>	<ul style="list-style-type: none"> <li>Third Grade included with K-2 under the umbrella of Early Learning</li> <li>The middle grade bands (3-5 and 6-8) adjusted to 4-6 and 7-8</li> <li>Required new standards, clarifying statements, and examples to be written</li> </ul>
<p>The K-3 band should be split to reflect developmental needs of young students</p>	<ul style="list-style-type: none"> <li>Grade band (K-3) split into two (K-1 and 2-3) at the recommendation of Early Learning experts</li> </ul>
<p>Ensure the guiding principle of coherence maintained</p>	<ul style="list-style-type: none"> <li>A few adjustments made to the upper grade standards to ensure logical progression and vertical alignment</li> </ul>
<p>Examples included with the standards too limiting</p>	<ul style="list-style-type: none"> <li>Examples pulled out of the full standards document</li> </ul>

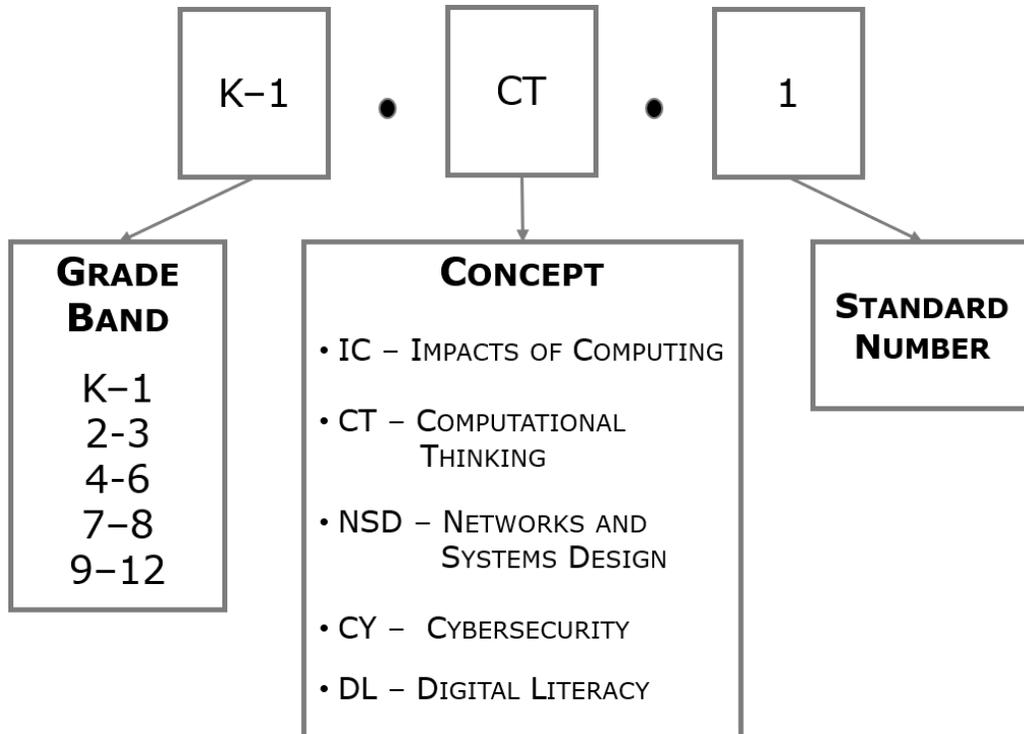
# Overview of the Standards

CONCEPT	SUB-CONCEPTS	STANDARDS
IMPACTS OF COMPUTING	SOCIETY	1, 2
	ETHICS	3, 4, 5
	ACCESSIBILITY	6
	CAREER PATHS	7
COMPUTATIONAL THINKING	MODELING AND SIMULATION	1
	DATA ANALYSIS AND VISUALIZATION	2, 3
	ABSTRACTION AND DECOMPOSITION	4, 5
	ALGORITHMS AND PROGRAMMING	6, 7, 8, 9, 10
NETWORKS AND SYSTEMS DESIGN	HARDWARE AND SOFTWARE	1, 2, 3
	NETWORKS AND THE INTERNET	4, 5
CYBERSECURITY	RISKS	1
	SAFEGUARDS	2, 3, 4
	RESPONSE	5
DIGITAL LITERACY	DIGITAL USE	1, 2, 3, 4, 5
	DIGITAL CITIZENSHIP	6, 7

# Standards at a Glance

The standards are identified by grade band, followed by the concept area, and finally the standard number.

Each standard is presented with an additional clarifying statement



Grade Band	<b>Grades-4-6</b>
Standard Identifier	<b>4-6.CT.3</b>
Standard	Visualize a simple data set in order to highlight relationships and persuade an audience.
Clarifying Statement	<i>The emphasis is on identifying and organizing relevant data to emphasize particular parts of the data in support of a claim.</i>

# Reading the Standards

NYS K-12 Computer Science and Digital Fluency Standards

Concept

Computational Thinking

Standard Identifier Standard

Clarifying Statement

Sub-Concept

	Grades K-1	Grades 2-3	Grades 4-6	Grades 7-8	Grades 9-12
Data Analysis and Visualization	<b>K-1.CT.3</b> Identify ways to visualize data, and collaboratively create a visualization of data.	<b>2-3.CT.3</b> Present the same data in multiple visual formats in order to tell a story about the data.	<b>4-6.CT.3</b> Visualize a simple data set in order to highlight relationships and persuade an audience.	<b>7-8.CT.3</b> Refine and visualize a data set in order to persuade an audience.	<b>9-12.CT.3</b> Refine and visualize complex data sets to tell different stories with the same data set.
	<i>Ways to visualize data include tables, graphs, and charts.</i>	<i>The emphasis is on using the visual representation to make the data meaningful. Options for presenting data visually include tables, graphs, and charts.</i>	<i>The emphasis is on identifying and organizing relevant data to emphasize particular parts of the data in support of a claim.</i>	<i>Refining includes, but is not limited to, identifying relevant subsets of a data set, deleting unneeded data, and sorting and organizing data to highlight trends.</i>	<i>The emphasis is on refining large data sets to create multiple narratives depending upon the audience. Large data sets require use of a software tool or app to cross-reference, analyze, refine, and visualize subsets of the data.</i>
Abstraction and Decomposition	<b>K-1.CT.4</b> Identify a problem or task and discuss ways to break it into multiple smaller steps.	<b>2-3.CT.4</b> Identify multiple ways that the same problem could be decomposed into smaller steps.	<b>4-6.CT.4</b> Decompose a problem into smaller named tasks, some of which can themselves be decomposed into smaller steps.	<b>7-8.CT.4</b> Write a program using functions or procedures whose names or other documentation convey their purpose within the larger task.	<b>9-12.CT.4</b> Implement a program using a combination of student-defined and third-party functions to organize the computation.
	<i>The focus is on identifying a complex (for the age group) task or problem to break apart into smaller steps. The focus should be on understanding why this process is helpful.</i>	<i>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.</i>	<i>The focus is on identifying smaller steps that solve a larger problem, recognizing that some of those steps must be broken down further until each step is manageable.</i>	<i>The focus is on identifying where there is potential to use a function or procedure to create a reusable computation.</i>	<i>The focus is on having students think about how to decompose a programming problem into functions and procedures, including working around the constraints imposed by specific functions or features provided in a library.</i>

# Timetable for Roll-Out and Implementation

Dates	Phase	Activities
<b>Adoption – Aug 2021</b>	Awareness-Building	Roll-out and build awareness of the new standards and timeline for implementation
<b>Sept 2021 – Aug 2023</b>	Capacity-Building	Focus on curriculum development, resource acquisition, professional development
<b>Sept 2023 – Aug 2024</b>	Year 1 Implementation	All credit-bearing Computer Science courses will be aligned with NYS CS&DF Standards
<b>September 2024</b>	Full Implementation	CS&DF Standards implemented in all grade bands K-12



# Next Steps

Upon Approval from the Board of Regents, NYSED Staff will

- Return to the Board of Regents in Fall 2021 with regulatory and policy recommendations related to embedding this new subject area into the K-12 program requirements.
- Engage with partners across the state to develop guidance materials and tools to aid schools in the implementation of the new standards.

# Recommendation

Department staff recommend the Board of Regents adopts the revised NYS K-12 Computer Science and Digital Fluency Standards.





# Discussion and Questions