

# Computer Science/Early Literacy Crosswalk

Grades K-2





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*This document provides alignment of Michigan's Computer Science and ELA Standards for grades K-2. The suggested applications provide classroom integration examples.*

## Computing Systems

CS Standard: 1A-CS-01 Select and operate appropriate software to perform a variety of tasks and recognize that users have different needs and preferences for the technology they use.

ELA Standard: SL.K-2.5 Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details.

Suggested Applications:

- Kindergarten – Begin to understand the transition from paper/pencil multimedia outlets; create RazKid audio recordings; use speech-to-text applications; create a Prezi on a topic.
- 1st Grade – As a prewriting planning tool use SMART board or paper/pencil to organize for a multimedia project; use device to create multimedia content to recount or create stories and poems.
- 2nd Grade – Use multimedia modes to execute all steps of the writing process to communicate thoughts, ideas, and feelings (ex: Prezi, Google Slides, PowerPoint, etc.).

CS Standard: 1A-CS-02 Use appropriate terminology in identifying and describing the function of common physical components of computing systems (hardware).

ELA Standards: L.K-1.5c With guidance and support from adults, explore word relationships and nuances in word meanings. c. Identify real-life connections between words and their use (e.g., note places at school that are colorful). (L.2.5a)

L.K-2.6 Use words and phrases acquired through conversations, reading and being read to, and responding to texts.

RI.K-2.2 With prompting and support, identify the main topic and retell key details of a text.

Suggested Applications:

- Kindergarten – Take an observation tour of a computer/device to identify components and what they are used for; take annotations of the observations with pictures/drawings/checkmarks; present findings with multimedia device; ensure students use appropriate words to describe the aspects of the observations.
- 1st Grade – Take an observation tour of a computer/device to identify components and what they are used for; take annotations of the observations with pictures/drawings/checkmarks; present findings with multimedia device; ensure students use appropriate words to describe the aspects of the observations; guide students in reading a one-page text (example Computer – Parts of Computer <https://goopenmichigan.org/courseware/lesson/1420/overview>) that coincides with the task (have students annotate, plan, write, etc. using appropriate terms and vocabulary).
- 2nd Grade – Researching as a whole group a topic to identify components of a computer/device and what they are used for; take annotations of the observations with pictures/drawings/writing; present findings with multimedia device; ensure students use appropriate words to describe the aspects of the device; teach students about reliable e-sources (have students annotate, plan, write, etc. using appropriate terms and vocabulary).

CS Standard: 1A-CS-03 Describe basic hardware and software problems using accurate terminology.

ELA Standard: L.K-2.4 Determine or clarify the meaning of unknown words and phrases based on grade level reading and content. e. Use glossaries and beginning dictionaries, both print and digital, to determine or clarify the meaning of words and phrases. (L.2.4e)

Suggested Applications:

- Kindergarten – Use picture-based dictionaries or EL dictionaries to determine and clarify meanings of words (ex: Reading Street online words/meanings; create dictionaries of vocabulary words using pictures/words/meanings/basic parts of speech correlations). In addition, students could use similar skills to collaborate as a class to create personal or class dictionaries focusing on the components of a computer/device, basic hardware and software terminology.
- 1st Grade – Use dictionaries that contain both pictures and words or EL dictionaries to determine and clarify the meanings of words (ex: labeling and organizing word structure electronically). In addition, students could use similar skills to collaborate with a partner to create personal or class dictionaries focusing on the components of a computer/device and present them.
- 2nd Grade – Use dictionaries and organizational skills for incorporating and applying new words and meanings into independent writing via technology. In addition, students could use similar skills to collaborate with a partner to create personal or class dictionaries focusing on the components of a computer/device and present them using multimedia modes.

## Networks and the Internet

CS Standard: 1A-NI-04 Explain what passwords are and why we use them and use strong passwords to protect devices and information from unauthorized access.

ELA Standards: W.K-2.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

SL.K-2.1 Participate in collaborative conversations with diverse partners about grade level topics and texts with peers and adults in small and larger groups.

Suggested Applications:

- Kindergarten – Identification of upper- and lower-case letters, simple ending punctuation, stringing letters to form a word. Establish foundational skills for peer collaboration (ex: turn and talk). Students can use their upper- and lower-case letter skills to guess a three-character code, and work with the teacher to build their own.
- 1st Grade – Mastery of upper- and lower-case letter recognition, organization of simple words to convey a thought. Build upon collaborative foundational skills with partners (ex: forming groups of more than two, think-pair-share, etc.). Students can begin to formulate simple codes with a partner and on their own.
- 2nd Grade – Compose short informative/explanatory texts and understand the relationship between two concepts. Continuing to build upon peer collaboration (ex: take notes on peer meetings/discussions and use them to compose written pieces such as an interview). Students can also use their writing skills to compose longer codes and create codes and passwords for partners.

## Data and Analysis

CS Standard: 1A-DA-05 Store, copy, search, retrieve, modify, and delete information using a computing device and define the information stored as data.

ELA Standards: W.K-2.6 With guidance and support from adults, explore a variety of digital tools to produce and publish writing, including in collaboration with peers.

Key Ideas and Details: RI.K-2.3 Describe the connection between two or more events, individuals, ideas, concepts, etc. based on specific information from the text.

Craft and Structure: RI.1-2.5 Know and use various text features (e.g., headings, tables, tables of contents, glossaries, electronic menus, icons, sidebars, hyperlinks, etc.) to locate specific information.

RI.K-2.9 Compare and contrast information from two or more texts on the same topic to write or speak about the subject knowledgeably.

Suggested Applications:

- Kindergarten – Teach foundational skills of compare/contrast (ex: illustrations, recognition of patterns, Venn diagram, t-chart, etc.). Group instruction using texts or online resources and how information is sorted by like/unlike or similar/contrasting qualities. Recognizing the main idea of information gathered and supporting evidence via verbal collaboration. Students can compose findings/stories using a computing device to store, copy, search, retrieve, modify and delete information.
- 1st Grade – Independent use of Venn diagram, charts, etc. to compare and contrast simple concepts. Small groups/partners using texts or online sources to gather basic information by similar/contrasting qualities and sorting the information in a graphic organizer. Recognizing the main idea of information gathered and supporting evidence via verbal and written collaboration. Students can compose findings/stories using a computing device to store, copy, search, retrieve, modify and delete information.
- 2nd Grade – Compare/contrast information interpedently gathered from two texts of the same subject. Interpedently use texts or online sources to navigate research and organize data. Recognizing the main idea of information gathered and supporting evidence via written independent work. Students can compose findings/stories using a computing device to store, copy, search, retrieve, modify and delete information.

CS Standard: 1A-DA-06 Collect and present the same data in various visual formats.

ELA Standards: Integration of Knowledge and Ideas

(RI.K-2.7) Interpret information from print or digital sources presented visually, orally, or quantitatively (e.g., charts, graphs, diagrams, timelines, animations, interactive elements on Web pages, etc.) and explain how the information contributes to an understanding of the text, answers a question quickly or solves a problem efficiently.

RL.K-2.9 With prompting and support, compare and contrast the adventures and experiences of characters in familiar stories.

W.K-2.3 Use a combination of drawing, dictating, and writing to narrate a single event or several loosely linked events, tell about the events in the order in which they occurred, and provide a reaction to what happened.

### Suggested Applications:

- Kindergarten – Data representation may be done through pictures, illustrations, basic word problems. For example, students could measure temperature changes throughout a day. They could then discuss ways to display the data visually. Students could extend the activity by writing different narratives based on collected data, such as a story that begins in the morning when temperatures are low and one that begins in the afternoon when the sun is high and temperatures are higher.
- 1st Grade – Write a short text/response to represent data gathered. Students collect peers' favorite flavor of ice cream and brainstorm differing ways to display the data. In groups, students can choose to display and present the data in a format of their choice.
- 2nd Grade – Use word processing media to represent data gathered – composing independently and using such features as Google Docs to share and gather feedback from peers.

CS Standard: 1A-DA-06 Collect and present the same data in various visual formats.

### ELA Standards: Integration of Knowledge and Ideas

(RI.K-2.7) Interpret information from print or digital sources presented visually, orally, or quantitatively (e.g., charts, graphs, diagrams, timelines, animations, interactive elements on Web pages, etc.) and explain how the information contributes to an understanding of the text, answers a question quickly or solves a problem efficiently.

RL.K-2.9 With prompting and support, compare and contrast the adventures and experiences of characters in familiar stories.

W.K-2.3 Use a combination of drawing, dictating, and writing to narrate a single event or several loosely linked events, tell about the events in the order in which they occurred, and provide a reaction to what happened.

### Suggested Applications:

- Kindergarten – Data representation may be done through pictures, illustrations, basic word problems. For example, students could measure temperature changes throughout a day. They could then discuss ways to display the data visually. Students could extend the activity by writing different narratives based on collected data, such as a story that begins in the morning when temperatures are low and one that begins in the afternoon when the sun is high and temperatures are higher.
- 1st Grade – Write a short text/response to represent data gathered. Students collect peers' favorite flavor of ice cream and brainstorm differing ways to display the data. In groups, students can choose to display and present the data in a format of their choice.
- 2nd Grade – Use word processing media to represent data gathered – composing independently and using such features as Google Docs to share and gather feedback from peers.

CS Standard: 1A-DA-07 Identify and describe patterns in data visualizations, such as charts or graphs, to make predictions

ELA Standard: RI.K-2.7 Explain how specific aspects of a text's illustrations contribute to what is conveyed by the words in a text.

Suggested Applications:

- Kindergarten – Establishing foundational skills for picture/idea relationships (ex: what you draw needs to represent what your ideas are/realistic representation). For example, students could record the number of each color of candy in a small packet. Then, they compare their individual data with classmates. Students could use the collected data to predict how many of each colored candy will be in a full-size bag of like candy.
- 1st Grade – Building on representation of own thoughts as well as interpreting other people's thoughts. Start to incorporate descriptive language and illustration.
- 2nd Grade – Be able to represent own thoughts through multiples of modes of media and interpret data from multiple sources and via multiple modes of communications. For example, students could use a table to associate each text character with a number. Then, they could select a combination of text characters and use mathematical functions (e.g., simple arithmetic operations) to transform the numbers associated with the characters into a secret message. Using inverse functions, a peer could translate the secret message back into its original form.

## Algorithms and Programming

CS Standard: 1A-AP-08 Model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks.

ELA Standard: W.K-2.3 Use a combination of drawing, dictating, and writing to narrate a single event or several loosely linked events, tell about the events in the order in which they occurred, and provide a reaction to what happened.

Suggested Applications:

- Kindergarten – Use beginning/middle/end story planner to teach visual sequencing in a narrative/expository writing. Students could create such planners on a computing device or use a computing device to fill in a blank model planner.
- 1st Grade – Use beginning/middle/end story planner to teach sequencing in a narrative/expository writing and have students use illustrations and written text to convey sequence. For example, students could create algorithms to represent daily routines for getting ready for school, transitioning through center rotations, eating lunch, and putting away art materials. Students could then write a narrative sequence of events.
- 2nd Grade – Use a graduated graphic organizer to plan and write narratives/expository pieces in sequential order, using multiple modes of media to convey meaning.

CS Standard: 1A-AP-09 Model the way programs store and manipulate data by using numbers or other symbols to represent information.

ELA Standard: SL.K-2.5 Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.

Suggested Applications:

- Kindergarten – Add drawings or other visual representations to descriptions in order to provide details. Provide listening center comprised of various student authors. Embed instruction focusing on the concept that programs store and manipulate data the same way students add details through a visual representation.
- 1st Grade – Add drawings or other visual representations to descriptions in order to provide details and represent ideas and thoughts. For example, after identifying symbols on a map and explaining what they represent in the real world, students could create their own symbols and corresponding legend to represent items on a map of their classroom. Embed instruction focusing on the concept that programs store and manipulate data the same way students add details through a visual representation.
- 2nd Grade – Convey own thoughts, and thoughts and ideas of others via multiple modes of technology such as audio recordings, etc. Students could invent symbols to represent beat and/or pitch. Students could then modify symbols within the notation and explain how the musical phrase changes. Embed instruction focusing on the concept that programs store and manipulate data the same way students add details through a visual representation.

CS Standard: 1A-AP-10 Develop programs with sequences and simple loops, to express ideas or address a problem.

ELA Standard: RI.K-2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.

Suggested Applications:

- Kindergarten – In science and social studies teaching and learning about world to text concepts and applications. On a mat with many different CVC words, students could program robots to move to words with a similar vowel sound. Students could look for multiple ways to solve the problem and simplify their solution by incorporating loops.
- 1st Grade – Working on sequencing the events in a science or social studies application (ex: scientific life cycles, cultural studies, timelines, etc.). For example, students could follow simple movements in response to oral instructions. Students could then create a simple sequence of movement commands in response to a given problem (e.g., In how many ways can you travel from point A to point B?) and represent it as a computer program, using loops to repeat commands.
- 2nd Grade – Creating their own scientific hypotheses and historical timelines in a social studies realm. Students can use Scratch to display the scientific hypothesis or timeline.



CS Standard: 1A-AP-11 Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.

ELA Standards: W.K-2.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

W.K-2.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to a sequence of instructions.)

Suggested Applications:

- Kindergarten – Students work on the writing process/structure, writing to a prompt/audience, etc. by breaking down the steps needed. For example, students can use a device to move a character across the screen, or to solve a level of a coding app. In a visual programming environment, students could break down the steps needed to draw a shape.
- 1st Grade – Students could decompose the planning of a birthday party into tasks such as: 1) Decide when and where it should be, 2) List friends and family to invite, 3) Send the invitations, 4) Bake a cake, 5) Decorate, etc.
- 2nd Grade – Students could come up with a project/plan for a community outreach and work with partners or interpedently to lay out the necessary steps and then use technology to present and communicate the plan.

CS Standard: 1A-AP-12 Develop plans that describe a program’s sequence of events, goals, and expected outcomes.

ELA Standard: W.K.-2.3 Use a combination of drawing, dictating, and writing to narrate a single event or several loosely linked events, tell about the events in the order in which they occurred, and provide a reaction to what happened.

Suggested Applications:

- Kindergarten – Students work on the writing process/structure, writing to a prompt/audience, etc. by describing the steps needed. For example, students can use a device to move a character across the screen, or to solve a level of a coding app. In a visual programming environment, students could create the steps needed to draw a shape.
- 1st grade – Students could plan a birthday party including creating event tasks such as: 1) Decide when and where it should be, 2) List friends and family to invite, 3) Send the invitations, 4) Bake a cake, 5) Decorate, etc.
- 2nd Grade – Students could come up with a project/plan for a community outreach and work with partners or interpedently to lay out the necessary steps and then use technology to present and communicate the plan.

CS Standard: 1A-AP-13 Give attribution when using the ideas and creations of others while developing programs

ELA Standard: SL.K-2.5 With guidance and support from adults, respond to questions and suggestions from peers and add details to strengthen writing as needed.

Suggested Applications:

- Kindergarten – Begin discussions of plagiarism, using own words, collaboration with peers (ex: what is a quality resource? Explain why you cannot use information you found on a website/resource as your own, etc.) For example, when creating an animation of the sun, moon, and stars using a block-based language, students could draw their own sun and use an image of the moon and stars from a website or a teammate. When students present the model to the class, they can orally give credit to the website or peer for the contributions.
- 1st Grade – Collaborate with peers to create outlines and research into rough drafts (still focusing on concepts of plagiarism and vetting materials). For example, when creating an image of life cycle of an apple, students could draw their own apple/seeds/etc. using plant life cycle models and use an image from a website or a teammate. When students present the model to the class, they can orally give credit to the website or peer for the contributions.
- 2nd Grade – Begin work independently using previous steps to select resources and use peer collaboration as supplemental source. For example, when creating an animation of biomes using a blocks-based language, students could draw their own biome and use an image of the desert/ocean/grassland/etc. from a website or a teammate. When students present the model to the class, they can orally give credit to the website or peer for the contributions.

CS Standard: 1A-AP-14 Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops.

ELA Standards: W.K.6 Use words and phrases acquired through conversations, reading and being read to, and responding to texts.

L.K-2.1-6 Use words and phrases appropriately and be able to identify and make necessary corrections in regard to language, conventions and vocabulary.

Suggested Applications:

- Kindergarten – When given images placed in a random order, students could give step-by-step commands to direct a robot, or a student playing a robot, to navigate to the images in the correct sequence. Examples of images include storyboard cards from a familiar story.
- 1st Grade – Students could “program” the teacher or another classmate by giving precise instructions to make a peanut butter and jelly sandwich or navigate around the classroom. When the teacher or classmate does not respond as intended, students correct their commands.
- 2nd Grade – Additionally, students could receive a partially completed soundboard program that has a variety of animals programmed to play a corresponding sound when the user touches them. Students correct any sounds that do not match the animal (e.g., if the cat moos, students change the moo sound to meow).

CS Standard: 1A-AP-15 Using correct terminology, describe steps taken and choices made during the iterative process of program development.

ELA Standards: W.K-2.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

W.K-2.3 Use knowledge of language and its conventions when writing, speaking, reading, or listening.

SL.K-2.5 With guidance and support from adults, respond to questions and suggestions from peers and add details to strengthen writing as needed.

Suggested Applications;

- Kindergarten – In following developmental thought from concrete to abstract, students could use a combination of images, verbal reflections, a physical model, and/or written text to show the step-by-step process taken to develop a program such as cutting and pasting coding commands into a journal, using manipulatives that represent different commands and control structures, and taking screenshots of code and adding to a digital journal. This iterative process could be documented via a speech, journal, one on one conference with teacher or peer, small group conference, or blog.
- 1st Grade – In following developmental thought from concrete to abstract, students could use a combination of images, verbal reflections, a physical model, and/or written text to show the step-by-step process taken to develop a program such as cutting and pasting coding commands into a journal, using manipulatives that represent different commands and control structures, and taking screenshots of code and adding to a digital journal. This iterative process could be documented via a speech, journal, one on one conference with teacher or peer, small group conference, or blog.
- 2nd Grade – In following developmental thought from concrete to abstract, students could use a combination of images, verbal reflections, a physical model, and/or written text to show the step-by-step process taken to develop a program such as cutting and pasting coding commands into a journal, using manipulatives that represent different commands and control structures, and taking screenshots of code and adding to a digital journal. This iterative process could be documented via a speech, journal, one on one conference with teacher or peer, small group conference, or blog.

## Impacts of Computing

CS Standards: 1A-IC-16 Compare how people live and work before and after the implementation or adoption of new computing technology.

ELA Standard: RI.K-2.3 With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text (historical, scientific, etc.).

Suggested Applications:

- Kindergarten – Group reading of two texts from different time periods (i.e. pre-technology and current technology) as a class, and students could create a timeline using the information gathered using computing technologies. Relate this process to literacy/development of literacy.
- 1st Grade – Partner read two texts to compare/contrast connections/elements of text. Use a graphic organizer and use technology to convey findings from the text. Students could retell or dramatize stories, myths, and fairy tales from two distinct time periods.
- 2nd Grade – Independently read two texts to compare/contrast connections/elements of text.

Use a graphic organizer and use technology to convey findings. students could retell or dramatize stories, myths, and fairy tales from two distinct time periods before and after a particular computing technology had been introduced.

CS Standards: 1A-IC-17 Work respectfully and responsibly with others online.

ELA Standards: SL.K-2.1 Participate in collaborative conversations with diverse partners about grade level topics and texts with peers and adults in small and larger groups.

W.K-2.6 With guidance and support from adults, explore a variety of digital tools to produce and publish writing, including in collaboration with peers.

W.K-2.5 With guidance and support from adults, respond to questions and suggestions from peers and add details to strengthen writing as needed.

Suggested Applications:

- Kindergarten – Talk about online safety and personal information and when it is appropriate to share. Students can work with a partner and guidance from the teacher and create a social story to share with the class.
- 1st Grade – Students could share their work on a classroom blog or in other collaborative spaces online, taking care to avoid sharing information that is inappropriate or that could personally identify themselves to others.
- 2nd Grade – Students could provide feedback to others on their work in a kind and respectful manner. They could learn how written words can be easily misinterpreted and may seem negative when the intention may be to express confusion, give ideas, or prompt further discussion. They could also learn to identify harmful behavior on collaborative spaces and intervening to find the proper authority to help.

CS Standard: 1A-IC-18 Keep login information private and log off devices appropriately.

ELA Standard: SL.K-2.1.a-b Participate in collaborative conversations with diverse partners about grade level topics and texts with peers and adults in small and larger groups.

a. Follow agreed-upon rules for discussions (e.g., listening to others and taking turns speaking about the topics and texts under discussion).

b. Continue a conversation through multiple exchanges.

Suggested Applications:

- Kindergarten – Teach basic rules of peer conversations, technology use, starting to understand how to use independent technology etc. (rules, steps, etc.). Create individual index cards with student login information and teach basic privacy skills.
- 1st Grade – Build upon kindergarten skills to work with a partner student can write an informational piece regarding the importance of keeping login information private and logging off public devices.
- 2nd Grade – Build upon 1st grade skills to work towards independence. While learning about individual responsibility and citizenship, students could create a “privacy folder” to store login information and keep this folder in a secure location that is not easily seen and accessed by classmates. Students could discuss the relative benefits and impacts of choosing to store passwords



in a folder online versus on paper. They could also describe how using the same login and password across many systems and apps could lead to significant security issues and requires even more vigilance in maintaining security.

## **Resources**

[Michigan Computer Science Standards](#)

[Michigan ELA Standards](#)

[Computer – Parts of Computer](#)