Berlin - Boylston Regional School District

Why Technology is necessary in grade K-5



Why Technology in Grades K-5?



Preparing Students for a Digital World



Building Critical *Thinking* & Problem-Solving Skills



Equipping Students for Future Careers



Our District Mission & Vision

- ✓ Achieve Personal & Academic Excellence
- ✓ Develop Independent Learners
- ✓ Create a Safe & Inclusive Environment



District Improvement Plan 2022-2025

Technology Objective

- Advance technology for safety, functionality, and effectiveness of all systems
- Continuously add, maintain, and replace tools and platforms
- Meet ever changing technological advancements in education
- Ensure all students have access to necessary devices and connectivity

Department of Elementary and Secondary Education

Digital Literacy and Computer Science



Massachusetts Curriculum Framework

Revised 2016

Grades Kindergarten to 12

Massachusetts Curriculum Standards

Digital Literacy & Computer Science



Computing & Society



Digital Tools & Collaboration



Computational Thinking



Computing Systems

Essential Skills for the 21st Century

Key Features



1. Core Concepts Across Four Strands

Covers Computing & Society, Digital Tools, Computational Thinking, and Computing Systems.



2. Necessary Practices for Success

Defines skills and habits essential for effective digital engagement and problem-solving.



3. Coherent Progression from K–12

Shows a clear, developmental sequence of learning from kindergarten through high school.



4. Prepares for Post-Secondary Opportunities

Equips students for civic life, higher education, and future careers.



5. Complements Other Frameworks

Integrates seamlessly with existing Massachusetts Curriculum Frameworks.



Effective instruction involves engaging students in multiple practices simultaneously. Curricula and assessment must build student knowledge and ability toward standards mastery.

Guiding Principles



Learning

Digital literacy and computer science ideas should be explored in ways that stimulate curiosity, create enjoyment, and develop depth of understanding.



Teaching

An effective program is based on a carefully designed set of content standards that are clear and specific, focused, and articulated over time as a coherent sequence.



Equity

All students should have a high-quality digital literacy and computer science program that prepares them for college and a career.



Literacy Across the Content Areas

An effective digital literacy and computer science program builds upon and develops students' literacy skills and knowledge.



Assessment

Assessment of student learning in digital literacy and computer science should take many forms to inform instruction and learning.



Planning and Support

An effective digital literacy and computer science program requires coherent district-wide planning and ongoing support for implementation.

What Students Learn in Grades K-2

Digital Citizenship



Online Safety & Privacy



Basic Technology Skills



Using Devices & Apps



Simple Coding



Intro to Programming



Working with Data



Exploring & Organizing Information



Kindergarten to Grade 2: Digital Literacy and Computer Science Practices



Key Progression & Approach

- Develop concepts through exploration, discovery, and creativity with educator guidance.
- Design, build, and test inventions and solutions through play.
- Focus on active learning, creativity, and exploration.
- Flexible timing for technology introduction.
- Basic skills learned through manipulatives and manual methods.



How it works: Kindergarten to Grade 2

Early elementary students learn foundational concepts by combining basic digital literacy with simple comparing humans, computing devices, and digital tools, students grasp when and how to use technology. Kindergarten through grade 2 standards incorporate all seven practices and require students to the ability to

Computing and Society [CAS]



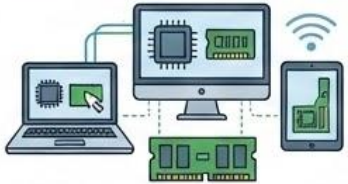
- Understand basic safety and security concepts and basic understanding of safe information sharing.
- Explore what it means to be a good digital citizen to a good digital citizen.
- Observe and describe how people use technology and how technology can influence people.

Digital Tools and Collaboration [DTC]



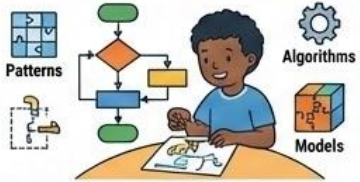
- Develop basic use of digital tools to create a digital story artifacts.
- Develop basic use of digital tools to communicate or exchange information information.

Computing Systems [CS]



- Understand that computing devices take many forms and have different components.
- Consider basic structures of computing systems of computing systems and networks.
- Explore human and computer differences to determine when technology is beneficial.

Computational Thinking [CT]



- Explore abstraction through identification of common.
- Create and enact a simple algorithm.
- Understand how information can be collected, presented of digital citizen.
- Create a simple computer "program".
- Use basic models and simulations and simulations.

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How it works: Kindergarten to Grade 2

Digital Tools and Collaboration [DTC]

Digital Tools [K-2.DTC.a]



- Operate various digital tools (e.g., open/close, find, save/print, navigate, use input/output).
- Identify and use letters, numbers, and special keys on a keyboard (e.g., Space Bar, Shift, Delete).
- Create simple digital artifacts.
- Use appropriate digital tools, individually or collaboratively, to create, review, and revise simple artifacts with text, images, and audio.

Collaboration and Communication [K-2.DTC.b]



- Use digital tools collaboratively to communicate key ideas that inform, persuade, and/or entertain.
- Exchange information and feedback with teachers using digital tools.
- Present information to others using digital tools.

Research [K-2.DTC.c]



- Use keywords to search teacher-provided digital sources (e.g., library catalog, databases).
- Individually or collaboratively create an artifact that answers a research question, clearly expressing ideas.
- Name and acknowledge sources of information or media (e.g., title, author, website).

How it works: Kindergarten to Grade 2

Computing Systems [CS]

Computing Devices [K-2.CS.a]



- Identify computing devices (laptops, tablets, smart phones, desktops) in various locations.
- Identify visible components (keyboard, screen, monitor, printer, pointing device).
- Explain that devices function when applications, programs, or commands run.
- Operate computing systems (turn on, use input/output devices, find, navigate, launch a program).

Human and Computer Partnerships [K-2.CS.b]



- Computing devices are non-living machines that assist humans with tasks.
- Humans and computing devices excel at different tasks (e.g., human rescue vs. robots in dangerous settings).
- Different tools can solve the same problems (e.g., pen and paper, calculators, and smartphones for math).

Networks [K-2.CS.c]



- Networks connect computers and devices globally and locally, enabling information access and communication.

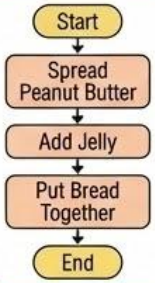
Kindergarten to Grade 2: Computational Thinking

Abstraction [K-2.CT.a]



- List attributes of a common object (e.g., car color, type, seats).

Algorithms [K-2.CT.b]



- Define an algorithm as a sequence of steps.
- Create a simple, computer-free algorithm (e.g., making a sandwich).



- Act out or visually present the algorithm.

Data [K-2.CT.c]

- Identify types of information (text, charts, images, etc.).



- Collect information using digital technologies.



- Propose solutions based on analysis.
- Create data visualizations.



- Explain computers save information as data.

Programming and Development [K-2.CT.d]



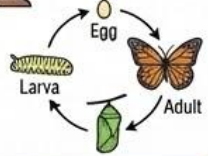
- Define a program as human-created commands.
- Explain computers follow instructions precisely.
- Create a simple program using visual tools.

Modeling and Simulation [K-2.CT.e]

- Describe how models represent real-iant real-life systems.



- Define simulation and identify concepts (e.g., butterfly life cycle).



What Students Learn in Grades 3-5

Coding & Programming



Block Coding Projects

Research Skills



Evaluating Online Information

Collaborative Tools



Google Classroom & Docs

Grades 3 to 5: Digital Literacy and Computer Science Practices



Key Progression & Approach

- Systematic & creative engagement with increased maturity.
- Builds on K-2 experiences as creators & problem solvers.
- Continued exploration, discovery, and creativity with educator guidance.
- Flexible timing for technology introduction.



Grades 3 to 5: Digital Literacy & Computer Science

Upper elementary students differentiate human and computing tasks, explore diverse tools, and refine computational thinking. They evaluate and modify artifacts, documenting their work through writing and presentations, integrating all seven practices.





Computing and Society [CAS]

- Understand safety, security, and responsible use.
- Recognize and deal with cyberbullying.
- Demonstrate digital citizenship and appropriate interactions.
- Analyze technology's influence and media messaging.
- Understand equity of access.



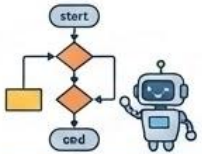
Digital Tools and Collaboration [DTC]

- Use tools and keyboarding to publish multimedia.
- Communicate and exchange information effectively.
- Develop intermediate research and evaluation skills.
- Create artifacts and correctly attribute credit.



Computing Systems [CS]

- Understand computing devices and components.
- Troubleshoot and solve simple hardware/software problems.
- Differentiate human vs. computing system tasks.
- Understand networks, authentication, and services.



Computational Thinking [CT]

- Decompose problems into subproblems.
- Write, debug, and analyze algorithms.
- Understand databases and data transformation.
- Create and refine programs with sophisticated techniques.
- Develop models and use simulations for inquiry.

Grades 3 to 5

Computing And Society

Safety and Security [3-5.CAS.a]

- ✔ 1. Describe proper ergonomics (body position, lighting, breaks) when using devices.
- ✔ 2. Describe threats to safe/efficient use (SPAM, spyware, phishing, viruses) from various tech uses.
- ✔ 3. Identify appropriate/inappropriate uses of technology in social media, email, texts, browsing.
- ✔ 4. Explain proper use/operation of security technologies (passwords, virus protection, filters).
- ✔ 5. Describe safe practices to avoid risks in online communications, downloads, purchases, etc.
- ✔ 6. Identify types of cyberbullying (harassment, flaming, exclusion, outing, impersonation).
- ✔ 7. Explain necessity to report cyberbullying or inappropriate content to a responsible adult.

Ethics and Laws [3-5.CAS.b]

- ✔ 1. Demonstrate responsible use of resources as outlined in school Acceptable Use Policy (AUP).
- ✔ 2. Describe difference between open/free digital artifacts and those protected by copyright.
- ✔ 3. Explain guidelines for fair use of downloading, sharing, or modifying digital artifacts.
- ✔ 4. Describe purpose of copyright and possible consequences for inappropriate use.
- ✔ 5. Explain laws exist (e.g., Section 508) to ensure electronic and information technology accessibility.

Interpersonal and Societal Impact [3-5.CAS.c]

- ✔ 1. Explain different forms of web advertising (search ads, banner ads, targeted ads, etc.).
- ✔ 2. Explain why websites/resources include advertisements and collect personal information.
- ✔ 3. Define digital divide as unequal access based on income, education, age, location.
- ✔ 4. Use critical thinking to explain how tech access empowers individuals and groups.
- ✔ 5. Identify community resources providing tech access (libraries, centers, schools).
- ✔ 6. Identify ways people with disabilities access/use technology (audio players, magnifiers).
- ✔ 7. Identify impact of social media and cyberbullying on individuals, families, and society.

Grades 3 to 5

Digital Tools and Collaboration

Digital Tools [3-5.DTC.a]

1. Type five words-per-minute times grade level (e.g., for Grade 5, type 25 words/minute).
2. Navigate between local, networked, or online/cloud environments and transfer files between each (upload/download).
3. Use digital tools to manipulate and publish multimedia artifacts.



Collaboration and Communication [3-5.DTC.b]

1. Communicate key ideas and details individually or collaboratively in a way that informs, persuades, and/or entertains using digital tools and media-rich resources.
2. Collaborate through online digital tools under teacher supervision.





Research [3-5.DTC.c]

1. Identify digital information sources to answer research questions (e.g., online library catalog, online encyclopedias, databases, websites).
2. Perform searches to locate information using two or more keywords and techniques to refine and limit such searches.
3. Evaluate digital sources for accuracy, relevancy, and appropriateness.
4. Gather and organize information from digital sources by quoting, paraphrasing, and/or summarizing.
5. Create an artifact that answers a research question and clearly communicates thoughts and ideas.
6. Cite text-based sources using a school- or district-adopted format.
7. Provide basic source information [e.g., Uniform Resource Locator (URL), date accessed] for non text-based sources (e.g., images, audio, video).



Grades 3 to 5

Computing Systems

Computing Devices [3-5.CS.a]

- Identify a broad range of computing devices (e.g., computers, smart phones, tablets, robots, etextiles) and appropriate uses.
- Describe function and purpose of various input/output devices (monitor, keyboard, speakers, controller, probes, sensors, Bluetooth transmitters, synthesizers).
- Demonstrate appropriate proficiency in using a range of computing devices.
- Identify and solve simple hardware and software problems (power, connections, application window).
- Describe differences between hardware and software.
- Identify some computing functions are always active (e.g., location function on smartphones).

Human and Computer Partnerships [3-5.CS.b]

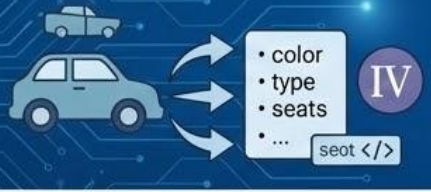
- Compare and contrast human and computer performance on similar tasks (e.g., sorting, finding path) to understand suitability.
- Explain how hardware and applications (GPS, text-to-speech, translation) enable everyone, including people with disabilities, to do things they could not do otherwise.
- Explain advantages and limitations of technology (e.g., spell-checker speed vs. understanding context).

Networks [3-5.CS.c]

- Describe how a network is made up of a variety of components (links, nodes, networking devices).
- Describe need for authentication of users/devices as it relates to access permissions, privacy, and security.
- Define and explain why devices are numbered/labeled in networks (URL, IP address, MAC).
- Recognize many sources and means for accessing information within a network (websites, e-mail protocols, search engines).

Services [3-5.CS.d]

- Identify common services (e.g., driving directions apps accessing remote map services, digital personal assistants accessing remote information services).



Grades 3 to 5

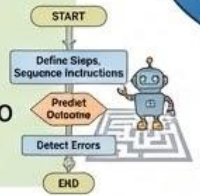
Computational Thinking

Abstraction [3-5.CT.a]
1. Use numbers or letters to represent information in another form (e.g., secret codes, Roman numerals, abbreviations).
2. Organize information in different ways to make it more useful/relevant (e.g., sorting, tables).
3. Make a list of sub-problems to consider, while addressing a larger problem.

Algorithms [3-5.CT.b]
1. Define an algorithm as a sequence of instructions that can be processed by a computer.
2. Recognize that different solutions exist for the same problem (or sub-problem).
3. Use logical reasoning to predict outcomes of an algorithm.
4. Individually and collaboratively create an algorithm to solve a problem (e.g., move a character/robot/person through a maze).
5. Detect and correct logical errors in various algorithms (e.g., written, mapped, live action, or digital).

Data [3-5.CT.c]
1. Describe examples of databases from everyday life (e.g., library catalogs, school records, telephone directories, contact lists).
2. Individually and collaboratively collect and manipulate data to answer a question using a variety of computing methods (e.g., sorting, totaling, averaging) and tools (such as a spreadsheet) to collect, organize, graph, and analyze data.

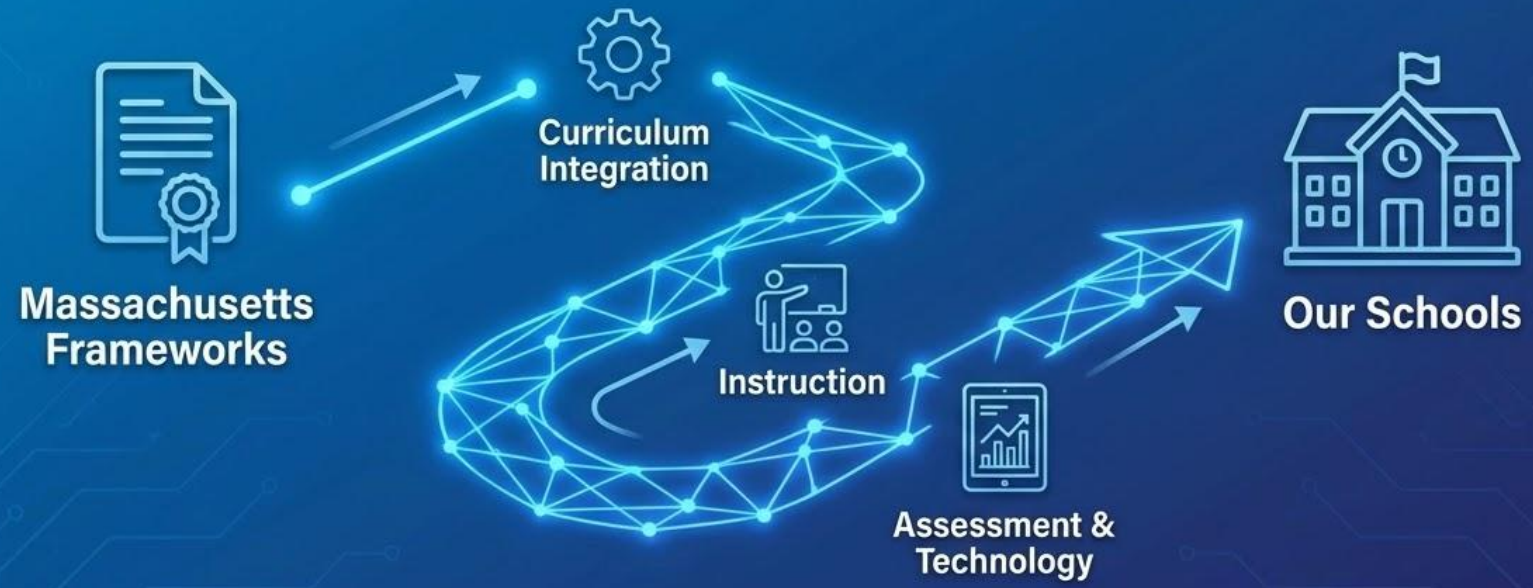
Programming and Development [3-5.CT.d]
1. Individually and collaboratively create, test, and modify a program in a graphical environment (e.g., block-based visual enviroenming language).
2. Use arithmetic operators, conditionals, and repetition in programs.
3. Use interactive debugging to detect and correct simple program errors.
4. Recognize that programs need known starting values (e.g., set initial score to zero in a game).



Modeling and Simulation [3-5.CT.e]
1. Individually and collaboratively create a simple model of a system (e.g., water cycle, solar system) and explain what the model shows and does not show.
2. Identify the concepts, features, and behaviors illustrated by a simulation (e.g., object motion, weather, ecosystem, predator/prey) and those that were not included.
3. Individually and collaboratively, use data from a simulation to answer a question.



How are the Massachusetts Frameworks reached in our schools?



Technology in Our Classrooms

1:1 Chromebooks



Grades
2–5

iPads



Grades
K–1

Online Learning Tools

Google Apps & Educational Programs

Assessments and Evaluations

Programs And Applications

- Curriculum
- Handwriting without Tears K-1 (ipad only app)
- Houghton Mifflin Harcourt HMH Reading
- Envision Math Program (Savvas)

Assessments

- **Statewide:** MCAS Testing (Chromebook)
- **Districtwide:** EarlyBird K-1 3x per year - (ipads in small groups)
- AimswebPlus K - 1 - 3x per year - (ipads in small groups)
- AimswebPlus 2-5 - 3x per year - (1:1 chromebooks)

Classroom Extensions

- Google Classroom
- Docs
- Slides
- Sheets
- Email

Devices are used daily at all grades levels

1:1 in Grades 2 - 5



Small Groups in K - 1





Research, extension of the limited school library



Advancement for the gifted learner



Support for the needed differentiated instruction



Online access to published work



Building typing skills



Working on fine motor skills



Lifelong safety skills



Individual Education Plan advancement

Technology in Elementary Classrooms: More Than Just Gadgets

Preparing Students for a Digital World



Building Critical Skills

- Developing critical thinking and problem-solving muscles
- Preparing for future careers
- Teaching essential skills like digital citizenship and computational thinking from day one



Personalized Learning

- 1:1 Chromebooks for Grades 1-5
- iPads in small groups for K-1 learners
- Meeting every student where they are
- Offering extra support and new challenges



Beyond State Standards

- Ensuring academic success
- More than just checking a box for Massachusetts state standards
- Integrating technology for holistic development