Grades 6-8 Overview

Students in Grades 6-8 are developing more independence as they seek their places in an increasingly digital and global society. Many of these students will begin developing their global online presence for the first time. In these grades, students are becoming proficient digital citizens, while continuing to build on a strong foundation in computer science principles. The goals of the content strands at this level demonstrate this balance.

Sixth, seventh, and eighth grade students will meet the following learning goals:

- As *Computational Thinkers*, students break problems into component parts, identify key pieces of information, and use that information to solve problems.
- As *Citizens of a Digital Culture*, students verbalize the impact of computing in a global society while safely, securely, ethically, and legally interacting with digital environments and protecting their digital identities.
- As *Global Collaborators*, students use appropriate digital tools to communicate data that informs, persuades, and entertains to collaborate with society locally and globally.
- As *Computing Analysts*, students utilize computing systems efficiently in the management and interpretation of data and information.
- As *Innovative Designers*, students leverage human and computer partnerships within a design process, creating useful and thoughtful solutions to problems.

The content standards for Grades 6-8 encourage analysis, synthesis, and evaluation in digital literacy and computer science as themes within all areas of the academic curriculum. Furthermore, students in Grades 6-8 will work collaboratively to explore, employ, and develop digital tools.

Grade 6 Overview

Grade 6 content for digital literacy and computer science is organized into five strands of focused study outlined below in the column on the left and identified by bold print in shaded bars. Related content standards are grouped by topic below each strand.

The Recurring Standards for Digital Literacy and Computer Science are listed below in the column on the right. These recurring standards should be incorporated into classroom instruction at the appropriate level of rigor in each grade level.

Content Standard Strands and Topics

Computational Thinker

Abstraction
Algorithms
Programming and Development

Citizen of a Digital Culture

Safety, Privacy, and Security
Legal and Ethical Behavior
Digital Identity
Impact of Computing

Global Collaborator

Communication
Digital Tools
Collaborative Research

Computing Analyst

Data
Systems

Innovative Designer

Human/Computer Partnerships
Design Thinking

Recurring Standards

Safety, Privacy, and Security
1. Identify, demonstrate, and apply personal safe use of digital devices.

Legal and Ethical Behavior
2. Recognize and demonstrate age-appropriate responsible use of digital devices and resources as outlined in school/district rules.

Impact of Computing
3. Assess the validity and identify the purpose of digital content.

Systems
4. Identify and employ appropriate troubleshooting techniques used to solve computing or connectivity issues.

Collaborative Research
5. Locate and curate information from digital sources to answer research questions.

Digital Tools
6. Produce, review, and revise authentic artifacts that include multimedia using appropriate digital tools.

Grade 6

During sixth grade, students will continue to develop the foundation of computer science. They will expand their problem-solving skills and progress toward independence while continuing to collaborate on local and global issues. Students must be creators, not just consumers, who can effectively utilize digital tools and understand the influence of technology. These standards are written to encourage student-centered learning through innovative and engaging activities.

Underlined words appear in the glossary.

Students can:

Computational Thinker

Abstraction
1. Remove background details from an everyday process to highlight essential properties.
   Examples: When making a sandwich, the type of bread, condiments, meats, and/or vegetables do not affect the fact that one is making a sandwich.
2. Define a process as a function.
   Example: Functions or sets of steps combined to produce a process: turning off your alarm + getting out of bed + brushing your teeth + getting dressed = morning routine.

Algorithms
3. Create pseudocode that uses conditionals.
   Examples: Using if/then/else (If it is raining then bring an umbrella else get wet).
4. Differentiate between flowcharts and pseudocode.
   Example: Flowcharts use shapes to indicate what to do at each step while pseudocode uses text.
5. Identify algorithms that make use of sequencing, selection or iteration.
   Examples: Sequencing is doing steps in order (put on socks, put on shoes, tie laces); selection uses a Boolean condition to determine which of two parts of an algorithm are used (hair is dirty? True, wash hair; false, do not); iteration is the repetition of part of an algorithm until a condition is met (if you're happy and you know it clap your hands, when you're no longer happy you stop clapping).

Programming and Development
6. Identify steps in developing solutions to complex problems using computational thinking.
7. Describe how automation works to increase efficiency.
   Example: Compare the amount of time/work to hand wash a car *vs*. using an automated car wash.
8. Create a program that initializes a variable.
   Example: Create a flowchart in which the variable or object returns to a starting position upon completion of a task.

Citizen of a Digital Culture

Safety, Privacy, and Security
9. Differentiate between a secure and a non-secure website including how they affect personal data.
   Example: HTTP *vs*. HTTPS.

Legal and Ethical Behavior

10. Describe the causes and effects of illegal use of <u>intellectual property</u> as it relates to print and digital media, considering <u>copyright</u>, fair use, licensing, sharing, and <u>attribution</u>.
11. Differentiate between appropriate and inappropriate digital content and the use of that content.

Digital Identity

12. Define <u>digital permanence</u>.
13. Define personal privacy, <u>digital footprint</u>, and open communication.

Impact of Computing

14. Discuss <u>digital globalization</u> and Internet <u>censorship</u>.
    Examples: Software that scans a <u>website</u> for posts about potential threats; a person's ability to order a product directly from a manufacturer in another part of the world; a student in Africa can take an online math course created in the United States; web-hosting company prevents posting of content.
15. Identify <u>emerging technologies</u> in computing.

Global Collaborator

Creative Communications

16. Communicate and/or publish collaboratively to inform others from a variety of backgrounds and cultures about issues and problems.

Digital Tools

17. Type 30 words per minute with 95% accuracy using appropriate keyboarding techniques.

Social Interactions

18. Define <u>censorship</u>.

Computing Analyst

Data

19. Track <u>data</u> change from a variety of sources.
    Example: Use editing or versioning tools to track changes to data.
20. Identify <u>data</u> transferring protocols, visualization, and the purpose of <u>data</u> and methods of storage.
    Examples: Using an online collection tool or form to collect data that is then stored in a spreadsheet or <u>database</u>.
21. Identify varying <u>data</u> structures/<u>systems</u> and methods of classification, including decimal and <u>binary</u>.
    Examples: Difference between a <u>bit</u> and a <u>byte</u>, <u>bit</u> representation, <u>pixels</u>.
22. Summarize the purpose of the <u>American Standard Code for Information Interchange (ASCII).</u>

Systems

23. Discuss how digital devices may be used to collect, analyze, and present <u>information</u>.
24. Compare and contrast types of <u>networks</u>.
    Examples: Wired, wireless (WiFi), local, wide area, mobile, Internet, and intranet.
25. Differentiate between secure and non-secure <u>systems</u>.

Modeling and Simulation

26. Explain why professionals may use models as logical representations of physical, mathematical, or logical systems or processes.
    Example: Students will discuss why an engineer may build a model of a building before actually constructing the building.
27. Explain how simulations serve to implement models.

Innovative Designer

Human/Computer Partnerships

28. Define assistive technologies and state reasons they may be needed.
29. Define artificial intelligence and identify examples of artificial intelligence in the community.
    Examples: Image recognition, voice assistants.

Design Thinking

30. Discuss and apply the components of the problem-solving process.
    Example: Students will devise a plan to alleviate traffic congestion around the school during drop-off and pick-up.

Grade 7 Overview

Grade 7 content for digital literacy and computer science is organized into five strands of focused study outlined below in the column on the left and identified by bold print in shaded bars. Related content standards are grouped by topic below each strand.

The Recurring Standards for Digital Literacy and Computer Science are listed below in the column on the right. These recurring standards should be incorporated into classroom instruction at the appropriate level of rigor in each grade level.

Content Standard Strands and Topics

Computational Thinker

> Abstraction
> Algorithms
> Programming and Development

Citizen of a Digital Culture

> Safety, Privacy, and Security
> Legal and Ethical Behavior
> Digital Identity
> Impact of Computing

Global Collaborator

> Communication
> Digital Tools
> Collaborative Research

Computing Analyst

> Data
> Systems

Innovative Designer

> Human/Computer Partnerships
> Design Thinking

Recurring Standards

Safety, Privacy, and Security
1. Identify, demonstrate, and apply personal safe use of digital devices.

Legal and Ethical Behavior
2. Recognize and demonstrate age-appropriate responsible use of digital devices and resources as outlined in school/district rules.

Impact of Computing
3. Assess the validity and identify the purpose of digital content.

Systems
4. Identify and employ appropriate troubleshooting techniques used to solve computing or connectivity issues.

Collaborative Research
5. Locate and curate information from digital sources to answer research questions.

Digital Tools
6. Produce, review, and revise authentic artifacts that include multimedia using appropriate digital tools.

Grade 7

During seventh grade, students will become independent thinkers while developing their global online presence. Students must be creators, not just consumers, who will effectively utilize digital tools, understand technology's impact on a global society, and integrate principles of computer science. These standards are written for student-centered learning with teacher mentoring.

Underlined words appear in the glossary.

Students can:

Computational Thinker

Abstraction
1. Create a function to simplify a task.
   Example: Get a writing utensil, get paper, jot notes can collectively be named "note taking".

Algorithms
2. Create complex pseudocode using conditionals and Boolean statements.
   Example: Automated vacuum pseudocode – drive forward until the unit encounters an obstacle; reverse 2"; rotate 30 degrees to the left, repeat.
3. Create algorithms that demonstrate sequencing, selection or iteration.
   Examples: Debit card transactions are approved until the account balance is insufficient to fund the transaction = iteration, do until.
4. Design a complex algorithm that contains sequencing, selection or iteration.
   Examples: Lunch line algorithm that contains parameters for bringing your lunch and multiple options available in the lunch line.

Programming and Development
5. Solve a complex problem using computational thinking.
6. Create and organize algorithms in order to automate a process efficiently.
   Example: Set of recipes (algorithms) for preparing a complete meal.
7. Create a program that updates the value of a variable in the program.
   Examples: Update the value of score when a coin is collected (in a flowchart, pseudocode or program).
8. Formulate a narrative for each step of a process and its intended result, given pseudocode or code.

Citizen of a Digital Culture

Safety, Privacy, and Security
9. Identify common methods of securing data.
   Examples: Permissions, encryption, vault, locked closet.

Legal and Ethical Behavior
10. Explain social engineering, including countermeasures, and its impact on a digital society.
    Examples: Phishing, hoaxes, impersonation, baiting, spoofing.
11. Demonstrate positive, safe, legal, and ethical habits when creating and sharing digital content and identify the consequences of failing to act responsibly.

Digital Identity

12. Discuss the impact of <u>data</u> permanence on <u>digital identity</u> including best practices to protect personal <u>digital footprint</u>.

Impact of Computing

13. Compare and contrast <u>information</u> available locally and globally.
    Example: Review an article published in the United States and compare to an article on the same subject published in China.
14. Discuss current events related to <u>emerging technologies</u> in computing and the effects such events have on individuals and the global society.
15. Discuss unique perspectives and needs of a global culture when developing computational artifacts, including options for accessibility for all users.
    Example: Would students create a webpage aimed at reaching a village of users that have no way access to the Internet?

Global Collaborator

Creative Communications

16. Construct content designed for specific audiences through an appropriate medium.
    Examples: Design a multi-media children's e-book with an appropriate readability level.
17. Publish content to be available for external feedback.

Digital Tools

18. Type 35 words per minute with 95% accuracy using appropriate keyboarding techniques.

Social Interactions

19. Discuss the benefits and limitations of <u>censorship</u>.
20. Evaluate the validity and accuracy of a <u>data</u> set.

Computing Analyst

Data

21. Compare common transfer protocols.
    Examples: FTP, HTTP
22. Compare <u>data</u> storage structures.
    Examples: <u>Stack</u>, <u>array</u>, <u>queue</u>, <u>table</u>, <u>database</u>.

Systems

23. Demonstrate the use of a variety of digital devices individually and collaboratively to collect, analyze, and present <u>information</u> for content-related problems.
24. Diagram a <u>network</u> given a specific setup or need.
    Examples: Home <u>network</u>, public <u>network</u>, business <u>network</u>.
25. List common methods of <u>system</u> cybersecurity.
    Examples: Various <u>password</u> requirements, two factor authentication, <u>biometric</u>, <u>geolocation</u>.

Modeling and Simulation

26. Categorize models based on the most appropriate representation of various <u>systems</u>.
27. Identify <u>data</u> needed to create a model or <u>simulation</u> of a given event.
    Examples: When creating a random name generator, the program needs access to a list of possible names.

Innovative Designer

Human/Computer Partnerships

28. Classify types of <u>assistive technologies</u>.
    Examples: Hardware, software, stylus, sticky keys.
29. Compare and contrast human intelligence and <u>artificial intelligence</u>.

Design Thinking

30. Apply the <u>problem-solving process </u>to solve real-world problems.

Grade 8 Overview

Grade 8 content for digital literacy and computer science is organized into five strands of focused study outlined below in the column on the left and identified by bold print in shaded bars. Related content standards are grouped by topic below each strand.

The Recurring Standards for Digital Literacy and Computer Science are listed below in the column on the right. These recurring standards should be incorporated into classroom instruction at the appropriate level of rigor in each grade level.

Content Standard Strands and Topics

Computational Thinker

Abstraction
Algorithms
Programming and Development

Citizen of a Digital Culture

Safety, Privacy, and Security
Legal and Ethical Behavior
Digital Identity
Impact of Computing

Global Collaborator

Communication
Digital Tools
Collaborative Research

Computing Analyst

Data
Systems

Innovative Designer

Human/Computer Partnerships
Design Thinking

Recurring Standards

Safety, Privacy, and Security
1. Identify, demonstrate, and apply personal safe use of digital devices.

Legal and Ethical Behavior
2. Recognize and demonstrate age-appropriate responsible use of digital devices and resources as outlined in school/district rules.

Impact of Computing
3. Assess the validity and identify the purpose of digital content.

Systems
4. Identify and employ appropriate troubleshooting techniques used to solve computing or connectivity issues.

Collaborative Research
5. Locate and curate information from digital sources to answer research questions.

Digital Tools
6. Produce, review, and revise authentic artifacts that include multimedia using appropriate digital tools.

Grade 8

During eighth grade, students will expound upon computer science and global collaboration experiences. Students will be designers, not just consumers, who will effectively utilize digital tools and articulate the impact of technology on a global society. These standards are written to provide student-centered learning with minimal guidance from the teacher.

Underlined words appear in the glossary.

Students can:

Computational Thinker

Abstraction
1. Design a <u>function</u> using a <u>programming language</u> that demonstrates <u>abstraction</u>.
    Example: Create a <u>program</u> that utilizes <u>functions</u> in an effort remove repetitive sequences of steps.
2. Explain how <u>abstraction</u> is used in a given <u>function</u>.
    Example: Examine a set of block-based code and explain how <u>abstraction</u> was used.

Algorithms
3. Create an <u>algorithm</u> using a <u>programming language</u> that includes the use of sequencing, selections, or iterations.
    Example: Use a block-based or script <u>programming language</u>
    Step 1: Start
    Step 2: Declare variables a, b and c.
    Step 3: Read variables a, b and c.
    Step 4: If a>b

    If a>c

    Display a is the largest number.

    Else

    Display c is the largest number.

    Else

    If b>c

    Display b is the largest number.

    Else

    Display c is the greatest number.

    Step 5: Stop

4. Create a <u>function</u> to simplify a task.
   Example: $3^8 = 3*3*3*3*3*3*3*3$; =(Average) used in a spreadsheet to average a given list of grades.

Programming and Development
5. Discuss the efficiency of an <u>algorithm</u> or technology used to solve complex problems.
6. Describe how algorithmic processes and <u>automation</u> increase efficiency.
7. Create a <u>program</u> that includes <u>selection</u>, <u>iteration</u>, or <u>abstraction</u>, and <u>initializes</u>, and updates, at least two <u>variables</u>.
   Examples: Make a game, interactive card, story, or adventure game.

Citizen of a Digital Culture

Safety, Privacy, and Security
8. Compare and contrast common methods of securing <u>data</u>.
9. Secure a file or other <u>data</u>.
   Examples: lock spreadsheet cell(s), password protect, encrypt.

Legal and Ethical Behavior
10. Analyze different modes of <u>social engineering</u> and their effectiveness. Examples: <u>Phishing</u>, hoaxes, impersonation, baiting, <u>spoofing</u>.
11. Advocate for positive, safe, legal, and ethical habits when creating and sharing digital content.
    Example: Students create a brochure that highlights the consequences of illegally downloading media.

Digital Identity
12. Cite evidence of the positive and negative effects of <u>data</u> permanence on personal and professional <u>digital identity</u>.

Impact of Computing
13. Evaluate the impact of <u>digital globalization</u> on public perception and ways Internet <u>censorship</u> can affect free and <u>equitable access</u> to <u>information</u>.
14. Analyze current events related to computing and their effects on education, the workplace, individuals, communities, and global society.
15. Critique <u>computational artifacts</u>, including options for accessibility for all users, with respect to the needs of a global culture.

Global Collaborator

Creative Communications
16. Present content designed for specific audiences through an appropriate medium.
    Example: Create and share a help video for a senior's center that provides tips for online safety.
17. Communicate and publish individually or collaboratively to persuade peers, experts, or community about issues and problems.

Digital Tools
18. Type 40 words per minute with 95% accuracy using appropriate keyboarding techniques.

Social Interactions
19. Critique the impacts of <u>censorship</u> as it impacts global society.
    Example: Create a presentation outlining the social implications of limiting access to web
    content by favoring or blocking particular products or <u>websites</u>.
20. Examine an artifact that demonstrates <u>bias</u> through distorting, exaggerating, or
    misrepresenting <u>data</u> and redesign it using factual, relevant, unbiased content to more
    accurately reflect the truth.

Computing Analyst

Data
21. Differentiate types of <u>data</u> storage and apply most efficient
    structure. Examples: <u>Stack</u>, <u>array</u>, <u>queue</u>, <u>table</u>, <u>database</u>.
22. Encrypt and decrypt various <u>data</u>.
    Example: Create and decipher a message sent in a secret code.

Systems
23. Design a digital artifact to propose a solution for a content-related problem.
    Example: Create a presentation outlining how to create a cost-efficient method to melt
    snow on roads during the winter.
24. Compare and contrast common methods of <u>cybersecurity</u>.
    Example: Discuss how <u>password</u> protections and <u>encryption</u> are similar and different.

Modeling and Simulation
25. Create a model that represents a system.
    Example: Food chain, supply and
    demand.
26. Create a <u>simulation</u> that tests a specific model.
    Examples: Demonstrate that pressure changes with temperature in a controlled environment;
    demonstrate that rocket design affects the height of a rocket's launch; demonstrate that the
    amount of water changes the height of a plant.

Innovative Designer

Human/Computer Partnerships
27. Analyze <u>assistive technologies</u> and how they improve the quality of life for users.
    Example: Research multiple speech to text technologies and write a persuasive essay in favor
    of one over another.
28. Develop a logical argument for and against <u>artificial intelligence</u>.
    Examples: Students debate the use of <u>artificial intelligence</u> in self-driving vehicles.
            Students write a persuasive essay to argue for or against <u>digital personal assistants</u>.

Design Thinking

29. Create an artifact to solve a problem using <u>ideation</u> and <u>iteration</u> in the <u>problem-solving process</u>.

Examples: Create a public service announcement or design a computer <u>program</u>, game, or application.