Grades 3-5 Overview

In Grades 3-5, students explore diverse computing devices and digital tools while developing their problem-solving and computational thinking skills. These skills are necessary across the curriculum. Third- through fifth- grade students are able to engage in learning in ways that are methodical and imaginative. Students' capabilities as problem solvers, innovators, and creators build on their K–2 experiences.

Students in third, fourth, and fifth grades will meet the following learning goals:

- As ***Computational Thinkers,*** students use problem-solving processes to understand how to write and debug an algorithm and to evaluate and create new informational representations which successfully reframe an issue.
- As ***Citizens of a Digital Culture,*** students demonstrate an understanding of concepts involving safety and security, responsible use of technology, and the influence of technology on its users.
- As ***Global Collaborators,*** students collaboratively utilize intermediate research skills to create artifacts and use digital tools to communicate or exchange information.
- As ***Computing Analysts,*** students understand and use various computing devices strategically to solve a problem and accomplish a task in the most effective way.
- As ***Innovative Designers,*** students pioneer new solutions, products, and processes through design thinking and be familiar with the advantages and limitations of technology.

When these learning goals are mastered in a student-centered environment, students will become proficient global citizens who are able to deal with a rapidly changing world. Alabama's students will be able to solve both intermediate and complex problems and find desirable solutions for both local and global issues. The design thinking process will allow students to use logic, intuition, imagination, and systematic reasoning to explore what could be and create innovative solutions that benefit themselves and others.

Grade 3 Overview

Grade 3 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 3

In third grade, students build on K-2 foundations by looking at basic troubleshooting and whole-class problem-solving. Students will identify appropriate uses of technology and a broad range of computing systems. Third grade standards focus on student collaboration and communication.

Underlined words appear in the glossary.

Students can:

Computational Thinker

Abstraction

1. Use numbers or letters to represent information in another form.
   Examples: Secret codes/encryption, Roman numerals, or abbreviations.
2. Analyze a given list of sub-problems while addressing a larger problem.
   Example: Problem - making a peanut butter sandwich; sub-problem - opening jar, finding a knife, getting the bread.
   Problem - design and share a brochure; sub-problem - selecting font, choosing layout.

Algorithms

3. Explain that different solutions exist for the same problem or sub-problem.
   Example: Multiple paths exist to get home from school; one may be a shorter distance while one may encounter less traffic.
4. Examine logical reasoning to predict outcomes of an algorithm.
5. Create an algorithm to solve a problem as a collaborative team.
   Examples: Move a character/robot/person through a maze. List steps to build a sandwich.
6. Describe the function of a flowchart.

Programming and Development

7. Test and debug a given program in a block-based visual programming environment using arithmetic operators, conditionals, and repetition in programs, in collaboration with others.
   Examples: Sequencing cards for unplugged activities, online coding practice.

Citizen of a Digital Culture

Safety, Privacy, and Security

8. Describe how to use proper ergonomics when using devices.
   Examples: Body position, lighting, positioning of equipment, taking breaks.
9. Identify the proper use and operation of security technologies.
   Examples: Passwords, virus protection software, spam filters, pop-up blockers.
10. Describe ways web advertising collects personal information.
    Examples: Search ads, banner ads, in-game ads, email ads.

Impact of Computing

11. Identify resources in the community that offer technology access.
    Examples: Libraries, community centers, restaurants, education programs, schools, or hardware/software donation programs.

12. Identify and discuss ways that access to technology helps empower individuals and groups.
    Examples: Gives access to information; provides the ability to communicate with others around the world; enables people to buy and sell things.

Global Collaborator

Communication

13. Communicate key ideas and details collaboratively in a way that informs, persuades, and/or entertains, using digital tools.
    Example: Create a digital presentation to persuade school administrators to allow additional time for lunch.

Digital Tools

14. Type 15 words per minute with 95% accuracy using appropriate keyboarding techniques.
15. Describe local, networked, and online or cloud environments.

Collaborative Research

16. Conduct basic keyword searches to produce valid, appropriate results, and evaluate results for accuracy, relevance, and appropriateness.
    Examples: Use search techniques, check for credibility and validity.

Computing Analyst

Data

17. Describe examples of data sets or databases from everyday life.
    Examples: Library catalogs, school records, telephone directories, or contact lists.

Systems

18. Identify a broad range of digital devices, the services they provide, and appropriate uses for them.
    Examples: Computers, smartphones, tablets, robots, e-textiles, driving directions apps that access remote map services, digital personal assistants that access remote information services.
19. Describe the differences between hardware and software.

Innovative Designer

Human/Computer Partnerships

20. Compare and contrast human and computer performance on similar tasks to understand which is better suited to the task.
    Examples: Sorting alphabetically, finding a path across a cluttered room.
21. Explain advantages and limitations of technology.
    Example: A spell-checker can check thousands of words faster than a human could look them up; however, a spell-checker might not know whether *underserved* is correct or if the author's intent was to type *undeserved*.

Design Thinking

22. Discuss the design process and use digital tools to illustrate potential solutions.
23. Implement the design process to solve a simple problem.
    Examples: Uneven table leg, noise in the cafeteria, tallying the collection of food drive donations.

Grade 4 Overview

Grade 4 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 4

Fourth graders will delve into more intricate processes of digital literacy and computer science through small group collaboration under the supervision and instruction of the teacher as a facilitator. Working with partners, students will identify and describe the different aspects of computational thinking and global collaboration using various devices.

Underlined words appear in the glossary.

Students can:

Computational Thinker

Abstraction

1. Construct a basic system of numbers, letters, or symbols to represent information as a cipher.
   Examples: Combine data from multiple sources, sorting multi-level.
2. Formulate a list of sub-problems to consider while addressing a larger problem.
   Examples: Problem - a multi-step math problem; sub-problem - steps to solve.
   Problem - light bulb does not light; sub-problem - steps to resolve why.

Algorithms

3. Show that different solutions exist for the same problem or sub-problem.
4. Detect and debug logical errors in various basic algorithms.
   Example: Trace the path of a set of directions to determine success or failure.
5. Use flowcharts to create a plan or algorithm.
6. Define a simple pseudocode.

Programming and Development

7. Create a working program in a block-based visual programming environment using arithmetic operators, conditionals, and repetition in programs, in collaboration with others.

Citizen of a Digital Culture

Safety, Privacy, and Security

8. Demonstrate the proper use and operation of security technologies.
   Examples: Passwords, virus protection software, spam filters, pop-up blockers.

Legal and Ethical Behavior

9. Identify laws and tools which help ensure that users of varying abilities can access electronic and information technology.
   Examples: ADA Laws

Digital Identity

10. Identify the different forms of web advertising and why websites, digital resources, and artifacts may include advertisements and collect personal information.
    Examples: Search ads, pay-per-click ads, banner ads, targeted ads, in-game ads, email ads.

Impact of Computing

11. Discuss the digital divide as unequal access to technology based on differences such as income, education, age, or geographic location and locate resources in the community that can give people access to technology.

Global Collaborator

Communication

12. Use basic features of digital tools to communicate key ideas and details in a way that informs and/or persuades.
13. Synthesize complex information from multiple sources in different ways to make it more useful and/or relevant.

Digital Tools

14. Type 20 words per minute with 95% accuracy using appropriate keyboarding techniques.

Collaborative Research

15. Conduct complex keyword searches to produce valid, appropriate results and evaluate results for accuracy, relevance, and appropriateness.
    Examples: Search techniques, check for credibility and validity.

Computing Analyst

Data

16. Gather and organize data to answer a question using a variety of computing and data visualization methods.
    Examples: Sorting, totaling, averaging, charts, and graphs.

Systems

17. Demonstrate an appropriate level of proficiency in performing tasks using a range of digital devices.
    Examples: Collect and record data, print, use send command, connect to Internet, or search; use probes, sensors, printers, robots, or computers.

Modeling and Simulation

18. Create a simple digital model of a system, individually and collaboratively, and explain what the model shows and does not show.
    Examples: Create a model of the water cycle and indicate that it shows how precipitation forms but does not indicate how pesticides get into rivers.
19. Use data from a simulation to answer a question collaboratively.

Innovative Designer

Human/Computer Partnerships

20. Explain how hardware and applications can enable everyone, including people with disabilities, to do things they could not do otherwise.
    Examples: Global Positioning System [GPS] to navigate, text-to-speech feature to read aloud from a digital resource, translate a digital resource to a different language.

Design Thinking

21. Develop, test, and refine prototypes as part of a cyclical design process to solve a simple problem.

Grade 5 Overview

Grade 5 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 5

During fifth grade, students will progress toward independence while continuing to collaborate on local and global issues. Students learn to be creators, not only consumers, who can effectively utilize digital tools and understand the influence of technology. These standards are written to encourage student-centered learning through teacher facilitation and creative, hands-on activities.

Underlined words appear in the glossary.

Students can:

Computational Thinker

Abstraction

1. Construct a complex system of numbers or letters to represent information.
   Example: Student-created complex secret codes using more than one form to solve a problem or answer a question.

Algorithms

2. Create an algorithm to solve a problem while detecting and debugging logical errors within the algorithm.
   Examples: Program the movement of a character, robot, or person through a maze.
   Define a variable that can be changed or updated.
3. Create an algorithm that is defined by simple pseudocode.
4. Create a simple pseudocode.
5. Develop and recommend solutions to a given problem and explain the process to an audience.

Programming and Development

6. Create a working program in a block-based visual programming environment using arithmetic operators, conditionals, and repetition in programs.
7. Identify variables.
8. Demonstrate that programs require known starting values that may need to be updated appropriately during the execution of programs.
   Examples: Set initial value of a variable, updating variables.

Citizen of a Digital Culture

Safety, Privacy, and Security

9. Explain the proper use and operation of security technologies.
   Examples: Passwords, virus protection software, spam filters, pop-up blockers, cookies.
10. Identify appropriate and inappropriate uses of communication technology and discuss the permanence of actions in the digital world.

Legal and Ethical Behavior

11. Explain that laws and tools exist to help ensure that people of varying abilities can access electronic and information technology.
    Examples: Section 508, Telecommunication Act of 1996, Braille, closed captioning, text to speech.

Digital Identity

12. Explain the different forms of web advertising and why websites, digital resources, and artifacts may include advertisements that may collect personal information.
    Examples: personalized web experiences based on tailored web searches, maintaining search history, quicker access to relevant information.

Impact of Computing

13. Share knowledge of resources in the community that can give people access to technology.
    Example: student created print and/or digital resource to share WiFi or other connectivity opportunities within the community.
14. Analyze the impact of social media on individuals, families, and society.
15. Explore and predict how advances in computing technologies affect job opportunities and/or processes now and in the future.

Global Collaborator

Communication

16. Use advanced features of digital tools and media-rich resources to communicate key ideas and details in a way that informs, persuades, and/or entertains.
17. Publish organized information in different ways to make it more useful or relevant.
    Examples: Infographic, student created website.

Digital Tools

18. Type 25 words per minute with 95% accuracy using appropriate keyboarding techniques.

Collaborative Research

19. Conduct advanced keyword searches to produce valid, appropriate results and evaluate results for accuracy, relevance, and appropriateness.
    Examples: Search techniques, check for credibility and validity.

Social Interactions

20. Collaborate locally and globally using online digital tools under teacher supervision.

Computing Analyst

Data

21. Manipulate data to answer a question using a variety of computing methods and tools to collect, organize, graph, analyze, and publish the resulting information.

Systems

22. Identify computing services that may be initially turned on by default.
    Examples: Geolocations, geotagging.
23. Identify the key components of a network.
    Examples: Links, nodes, networking devices.
24. Describe the need for authentication of users and devices as it relates to access permissions, privacy, and security.
    Examples: Logging in at school, logging personal devices to public networks.

Modeling and Simulations

25. Analyze the concepts, features, and behaviors illustrated by a simulation.
    Examples: Object motion, weather, ecosystem, predator/prey.
26. Connect data from a simulation to real-life events.

Innovative Designer

Human/Computer Partnerships

27. Define social engineering and discuss possible defenses.
    Examples: Phishing, impersonating

Design Thinking

28. Develop, test, and refine prototypes as part of a cyclical design process to solve a complex problem.
    Examples: Design backpack for a specific user's needs; design a method to collect and transport water without the benefit of faucets; design boats that need to hold as much payload as possible before sinking; design models of chairs based on specific user needs.