

# Virginia Board of Education Agenda Item



**Agenda Item:** K

**Date:** November 29, 2012

<b>Title</b>	First Review of Proposed Revisions to the <i>Computer Technology Standards of Learning</i>		
<b>Presenter</b>	Mr. Lan Neugent, Assistant Superintendent of Technology, Career & Adult Education		
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**Purpose of Presentation:**

Action required by state or federal law or regulation.

**Previous Review or Action:**

Previous review and action. Specify date and action taken below:

Date: April 25-26, 2012

Action: Approval of Timetable for the Review and Approval of the Revised *Computer Technology Standards of Learning*

**Action Requested:**

Action will be requested at a future meeting. Specify anticipated date below:

Date: January 10, 2013

**Alignment with Board of Education Goals: Please indicate (X) all that apply:**

	Goal 1: Accountability for Student Learning
X	Goal 2: Rigorous Standards to Promote College and Career Readiness
	Goal 3: Expanded Opportunities to Learn
	Goal 4: Nurturing Young Learners
	Goal 5: Highly Qualified and Effective Educators
	Goal 6: Sound Policies for Student Success
	Goal 7: Safe and Secure Schools
	Other Priority or Initiative. Specify:

**Background Information and Statutory Authority:**

Goal 2: The Board of Education’s 2012-2017 Comprehensive Plan calls for a review of all Standards of Learning (SOL) on a regular schedule.

The *Code of Virginia* also requires a review of Virginia’s Standards of Learning every seven years.

*Code of Virginia*, Section 22.1-253.13:1 By October 1, 2000, the Board of Education shall establish a regular schedule, in a manner it deems appropriate, for the review, and revision as may be necessary, of the Standards of Learning in all subject areas. Such review of each subject area shall occur at least once every seven years. Nothing in this section shall be construed to prohibit the Board from conducting such review and revision on a more frequent basis.

The *Computer Technology Standards of Learning* were adopted by the Board of Education on June 22, 2005. The current standards may be viewed online at [http://www.doe.virginia.gov/testing/sol/standards\\_docs/computer\\_technology/index.shtml](http://www.doe.virginia.gov/testing/sol/standards_docs/computer_technology/index.shtml).

On April 26, 2012, the Board of Education waived first review and approved the timetable for reviewing the current standards. Upon approval of the timetable, the following actions occurred:

- Public comment on the 2005 *Computer Technology Standards of Learning* was announced via Superintendent's Memo #118-12 and received during May 2012 through a Web-based comment form.
- On May 15, 2012, the Virginia Educational Technology Advisory Committee (VETAC) met to develop a framework for the revised standards based on current research, best practices, and a review of national and international standards. VETAC advises the Virginia Board of Education through the Superintendent of Public Instruction on educational technology matters and is comprised of members from 40 organizations representing schools, professional organizations, and the business community across the Commonwealth. VETAC members were appointed to subcommittees to draft the specific standards within each of the strands.
- From May 29 through June 7, the subcommittees met via WebEx and telephone conference. Each subcommittee focused on one area of the proposed standards' structure and developed a draft of the proposed standards within the strand.
- During July 2012, the Department's draft document reflecting the combined work of all subcommittees was posted on the Department of Education's Web site for additional comment. Constituents were notified through VETAC representatives and by direct communication with division technology directors, instructional technology resource teachers, library media specialists, and business technology councils representing all areas of the Commonwealth.
- On August 7, 2012, the VETAC executive committee met via WebEx and telephone conference to review the comments and recommend revisions based on the feedback.
- During October 2012, additional revisions were incorporated and the draft document was disseminated to a group of classroom teachers for a final review of the Department's internal draft.
- The Office of Educational Technology incorporated the revisions and prepared the document for Board review.

### **Summary of Important Issues:**

A wide variety of constituents have been consulted regarding the revisions to the 2005 *Computer Technology Standards of Learning*. The various concerns and priorities of those constituents have been incorporated whenever possible within the proposed draft of the *Computer Technology Standards of Learning*. The revised standards are presented in Attachment A. A strike-through version indicating changes is included in Attachment B. The list of VETAC member organizations is included as Attachment C.

Because there is no specific SOL test for these standards, it was recommended that the standards support

the content area Standards of Learning as well as other key efforts including the *Educational Technology Plan for Virginia: 2010-15*, the Internet safety initiative, college and career readiness, and character education programs.

Public comment was carefully considered and suggestions were incorporated into the draft standards as appropriate. Several comments focused on the need for additional guidelines that address specific grade level benchmarks. Several people commented that Virginia should adopt the International Society for Technology in Education (ISTE) standards since there are significant resources currently aligned to those standards. In the second round of public comment, several readers interpreted the *Computer Technology Standards of Learning* as standards for computer science and declared that the proposed standards did not adequately address this field of study. A few comments focused specifically on the standards, providing suggested changes in wording. Much of the feedback was positive and indicated that the standards were an excellent “next step” for the integration of technology into educational practice. A third round of revisions incorporated additional specificity at each grade band.

**Impact on Fiscal and Human Resources:**

The Department of Education administers the state standards review process and the implementation of those standards, once approved by the Board. The agency’s existing resources can absorb this responsibility at this time.

**Timetable for Further Review/Action:**

Upon acceptance of the proposed *Computer Technology Standards of Learning* for first review by the Board of Education, a 30-day public comment period in November will be announced. Any significant comments will be provided to the Board before the final review of the standards in January.

Upon approval of the final revisions to the *Computer Technology Standards of Learning*, the Department of Education will post the revised standards on the Department’s Web site and inform constituents through a variety of channels including a Superintendent’s Memo and the VETAC membership.

**Superintendent's Recommendation:**

The Superintendent of Public Instruction recommends that the Board of Education accept for first review the attached revisions to the *Computer Technology Standards of Learning*.

**Computer Technology  
Standards of Learning  
for Virginia's Public Schools**

DRAFT

**November 2012**

**Board of Education  
Commonwealth of Virginia**

## Computer Technology Standards of Learning

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### Introduction

*As the new century has unfolded, various studies have postulated about the likely competencies that will be needed in the workplace of tomorrow; one consistent conclusion is that technology will be integrated into every facet of business and life.*

*The Educational Technology Plan for Virginia: 2010-15 focuses primarily on one specific component of 21st century skills—information and communications technology (ICT) literacy. The most recognized definition for this topic was formulated in 2002 by the International ICT Literacy Panel: “ICT literacy is using digital technology, communications tools, and/or networks to access, manage, integrate, evaluate, and create information in order to function in a knowledge society.”*

#### *Educational Technology Plan for Virginia: 2010-15*

The Computer Technology Standards of Learning define the essential knowledge and skills necessary for students to access, manage, evaluate, use, and create information responsibly using technology and digital resources. They provide a framework for digital literacy and include the progressive development of technical knowledge and skills, intellectual skills for thinking about and using information, and skills needed for working responsibly and productively individually and within groups. Digital literacy is not an end in itself but lays the foundation for deep and continuous learning. It focuses on using technology to learn rather than learning about technology.

To become technologically proficient, students must develop these skills through integrated activities across all K-12 content areas. These skills should be introduced and refined collaboratively by all K-12 teachers as an integral part of the learning process. Teachers can use these standards as guidelines for planning technology-based activities in which students achieve success in learning and communication—preparing them to meet the challenges of today’s knowledge-based society.

## Computer Technology Standards of Learning

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### Grades K-2

#### Basic Operations and Concepts

- C/T K-2.1 Demonstrate an operational knowledge of various technologies.
- A. Use various types of technology devices to perform learning tasks.
    - Use a keyboard, mouse, touchscreen, touchpad, and other input devices to interact with a computer.
    - Use appropriate buttons, gestures, menu choices, and commands to manipulate the computer when completing learning tasks.
  - B. Communicate about technology with appropriate terminology.
    - Use basic technology vocabulary as needed.
- C/T K-2.2 Identify and use available technologies to complete specific tasks.
- A. Identify the specific uses for various types of technology and digital resources.
    - Identify the difference between hardware and software.
    - Create a text document.
    - Open and read an electronic book.
    - Create a digital image.
  - B. Use content-specific tools, software, and simulations to complete projects.
    - Use tools in various content areas as appropriate.

#### Social and Ethical Issues

- C/T K-2.3 Make responsible decisions—grounded in knowledge of digital safety and security best practices—that pertain to various digital communication tools and methods.
- A. Demonstrate knowledge of school policies for using computers and other technologies.
    - Be able to articulate what is allowed and what is not allowed at school when using technology.
  - B. Understand the importance of protecting personal information and passwords.
    - Communicate an understanding of the basic principles of online safety.
    - Follow procedures that protect safety and security as outlined in the division's acceptable use policy.
  - C. Understand the basic principles of the ownership of ideas.
    - Identify digital information as being produced by people—either as individuals or as part of a group or organization.

#### Technology Research Tools

- C/T K-2.4 Plan and apply strategies for gathering information, using a variety of tools and sources, and reflect on alternate strategies that might lead to greater successes in future projects.
- A. Identify information in various formats.
    - Recognize that information may be presented as printed text, electronic text, audio, video, or images.

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- B. Identify available sources of information.
  - Be able to name and use sources of information available at school and outside the school.

### Thinking Skills, Problem Solving, and Decision Making

- C/T K-2.5 Practice reasoning skills when gathering and evaluating data.
- A. Recognize that technology can be used to solve problems and make informed decisions.
    - Communicate how a decision was made based on assistance from a technology tool.
  - B. Use technology tools to assist with problem solving.
    - Demonstrate how technology can be used to investigate and solve problems in various content areas.

### Technology Communication Tools

- C/T K-2.6 Communicate effectively with others (e.g., peers, teachers, experts) in collaborative learning situations.
- A. Use technology tools for individual and collaborative writing, communication, and presentation activities.
    - Use word processing to practice writing skills.
    - Use common graphic and presentation tools when preparing and providing presentations.
  - B. Recognize communication needs when sharing technology tools.
    - Demonstrate the ability to share technology tools as needed.

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### Grades 3-5

#### Basic Operations and Concepts

- C/T 3-5.1 Demonstrate an operational knowledge of various technologies.
- A. Use various types of technology devices to perform learning tasks.
    - Demonstrate the ability to perform a wide variety of basic tasks using technology, including saving, editing, printing, viewing, and graphing.
  - B. Communicate about technology with appropriate terminology.
    - Use basic technology vocabulary in daily practice.
- C/T 3-5.2 Identify and use available technologies to complete specific tasks.
- A. Identify the specific uses for various types of technology and digital resources.
    - Identify the differences among local, network, and Internet resources and tools.
    - Create, edit, and format a document with text and graphics.
    - Create and present a multimedia presentation.
    - Create and populate a spreadsheet with data.
    - Capture a digital image.
    - Demonstrate the ability to choose appropriate resources when completing assignments in various content areas.
  - B. Use content-specific tools, software, and simulations to complete projects.
    - Use tools in various content areas as directed by the teacher.

#### Social and Ethical Issues

- C/T 3-5.3 Make responsible decisions—grounded in knowledge of digital safety and security best practices—that pertain to various digital communication tools and methods.
- A. Demonstrate knowledge of basic practices related to online safety.
    - Use best practices for online safety as defined by the division's online safety program.
    - Demonstrate an understanding of the division's acceptable use policy and consequences for inappropriate use.
  - B. Discuss and model responsible behaviors when using information and technology.
    - Identify reasons for taking security precautions when using any technology, especially those related to the Internet.
    - Demonstrate responsible behavior, such as using strong passwords and avoiding high-risk activities.
- C/T 3-5.4 Exhibit personal responsibility for appropriate, legal, and ethical conduct.
- A. Understand the need for laws and regulations regarding technology use.
    - Model appropriate, legal, and ethical behavior in all technology use and technology-supported environments.

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- B. Understand the basic principles of the ownership of ideas.
  - Demonstrate a basic understanding of “fair use.”

C/T 3-5.5 Demonstrate digital citizenship by actively participating in positive activities for personal and community well-being.

- A. Communicate respect for people when participating in group online learning activities.
  - Identify ways in which online communications are different from face-to-face communications.
  - Demonstrate online etiquette when communicating with others.
- B. Explore the potential of the Internet as a means of personal learning and the respectful exchange of ideas and products.
  - Participate in the creation of digital projects that involve communicating with others.

### Technology Research Tools

C/T 3-5.6 Plan and apply strategies for gathering information, using a variety of tools and sources, and reflect on alternate strategies that might lead to greater successes in future projects.

- A. Collect information from a variety of sources.
  - Conduct research using various types of text- and media-based information.
- B. Apply best practices for searching digital resources.
  - Apply effective search strategies that will yield targeted information.
  - Identify basic indicators that a digital source is likely to be reliable.

C/T 3-5.7 Draw conclusions from research and relate these findings to real-world situations.

- A. Use research to support written and oral presentations.
  - Apply research derived from digital resources to original work.
  - Demonstrate how to cite digital resources when developing nonfiction reports and presentations.
- B. Apply knowledge when conducting research to develop accurate and balanced reports.
  - Use best practice guidelines for evaluating research results.

### Thinking Skills, Problem Solving, and Decision Making

C/T 3-5.8 Practice reasoning skills when gathering and evaluating data.

- A. Determine when technology tools are appropriate to solve a problem and make a decision.
  - Identify technology resources and tools that can help with decision making.
- B. Demonstrate organization and persistence when completing personal and group assignments, activities, and projects.

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- Use various productivity tools that help with planning, time management, project goal setting, etc.

- C/T 3-5.9 Use models and simulations to understand complex systems and processes.
- A. Understand the use of simulations in learning.
- Enhance understanding of concepts and skills by explaining how a simulation differs from and is similar to real life.
- B. Use simulations to understand complex concepts.
- Enhance understanding of concepts and skills by using simulations.

### Technology Communication Tools

- C/T 3-5.10 Communicate effectively with others (e.g., peers, teachers, experts) in collaborative learning situations.
- A. Use technology tools for individual and collaborative writing, communication, and publishing activities.
- Produce documents and presentations that demonstrate the ability to edit, reformat, and integrate various tools and media.
- B. Participate in communications among different cultures.
- Understand the need to place communication in the context of culture.
- C. Assume different roles (e.g., leader/follower, orator/listener) on teams in various situations.
- Recognize that different people on a team bring different technical skills, and understand how that can influence team responsibilities.
  - Demonstrate the ability to share technology tools as needed.
- C/T 3-5.11 Apply knowledge and skills to generate innovative ideas, products, processes, and solutions.
- A. Organize and display knowledge and understanding in ways that others can view, use, and assess.
- Understand the various ways in which digital products can be shared.
- B. Use technology tools to share original work.
- Use presentation tools to organize and present stories, poems, songs, and other original work.

## Computer Technology Standards of Learning

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### Grades 6-8

#### Basic Operations and Concepts

- C/T 6-8.1 Demonstrate an operational knowledge of various technologies.
- A. Use various types of technology devices to perform learning tasks.
    - Demonstrate the ability to perform specific tasks using technology, including organizing, analyzing, and presenting data; formatting and presenting text and graphic information; and capturing and manipulating images.
  - B. Communicate about technology with appropriate terminology.
    - Use technology vocabulary in daily practice.
- C/T 6-8.2 Identify and use available technologies to complete specific tasks.
- A. Identify the specific uses for various types of technology and digital resources.
    - Select and use local, network, and Internet resources and tools.
    - Capture and edit video.
    - Explain how various careers incorporate technology.
  - B. Use content-specific tools, software, and simulations to complete projects.
    - Use tools in various content areas, such as graphing calculators, science simulations, story diagramming applications, image processing applications, and history timeline applications.

#### Social and Ethical Issues

- C/T 6-8.3 Make responsible decisions—grounded in knowledge of digital safety and security best practices—that pertain to various digital communication tools and methods.
- A. Demonstrate knowledge of basic practices related to online safety.
    - Use best practices for online safety as defined by the division’s online safety program.
    - Apply the division’s acceptable use policy to everyday situations.
    - Model appropriate, legal, and ethical behavior in all technology use and technology-supported environments.
  - B. Discuss and model responsible behaviors when using information and technology.
    - Identify reasons for taking security precautions when using any technology, especially those related to the Internet.
    - Demonstrate responsible behavior, such as using strong passwords and avoiding high-risk activities.
- C/T 6-8.4 Exhibit personal responsibility for appropriate, legal, and ethical conduct.
- A. Demonstrate an understanding of “fair use.”
    - Apply knowledge of copyright and “fair use” when developing presentations, products, and papers.

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- B. Demonstrate an understanding of current copyright laws.
- Identify copyright laws that impact student work.

- C/T 6-8.5 Demonstrate digital citizenship by actively participating in positive activities for personal and community well-being.
- A. Communicate respect for people when participating in group online learning activities.
- Demonstrate online etiquette when communicating with others.
  - Demonstrate an understanding of cyberbullying and strategies for stopping a cyberbully.
- B. Explore the potential of the Internet as a means of personal learning and the respectful exchange of ideas and products.
- Participate in the creation of digital projects that involve others working together toward a common goal.
  - Demonstrate the ability to identify diverse perspectives on issues.

- C/T 6-8.6 Understand the nature of information in a global society and how the characteristics of various media may influence others.
- A. Identify the various uses of media based on intent and audience.
- Investigate media messages in various contexts.
- B. Be able to construct and deconstruct media messages.
- Connect media messages to various writing techniques, logic models, and outcomes.
  - Develop communication projects using various types of media.

### Technology Research Tools

- C/T 6-8.7 Plan and apply strategies for gathering information, using a variety of tools and sources, and reflect on alternate strategies that might lead to greater successes in future projects.
- A. Use various technology and digital resources to collect information.
- Conduct research using various types of text- and media-based information.
  - Use various types of content-specific technology to gather data and information.
- B. Use search strategies to retrieve information.
- Apply effective search strategies that will yield targeted information.
  - Identify indicators that a digital source is likely to be reliable.
- C/T 6-8.8 Draw conclusions from research and relate these findings to real-world situations—investigating further, if necessary.
- A. Use digital research to support written and oral presentations.
- Apply research derived from digital resources to original work, as appropriate.

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- B. Apply knowledge when conducting research to develop accurate and balanced reports.
  - Determine when further research is needed based on original search results and first drafts.
  - Demonstrate how to cite digital resources when developing nonfiction reports and presentations.
  - Apply strategies that help avoid plagiarism when clipping and storing digital notes.
- C. Interpret digital primary sources within historical and contemporary contexts.
  - Follow procedures to interpret various primary sources for a variety of content areas.

- C/T 6-8.9 Analyze, synthesize, and evaluate information based on source validity and the appropriateness to specific tasks.
- A. Evaluate the accuracy, relevance, and appropriateness of electronic information sources.
    - Use a variety of strategies to evaluate the accuracy of digital resources.
    - Use various digital tools, such as graphic organizers, to analyze and synthesize data for learning tasks.
  - B. Use various digital tools to organize, analyze, and synthesize data for learning tasks.
    - Use digital tools, such as graphic organizers, spreadsheets, and databases.

### Thinking Skills, Problem Solving, and Decision Making

- C/T 6-8.10 Practice reasoning skills when gathering and evaluating data.
- A. Employ technology in developing strategies for solving problems.
    - Identify and use technology resources and tools that can help with problem solving.
    - Use a variety of technologies to identify and provide possible solutions to real-world problems.
  - B. Select resources that extend one's own capability to solve problems and make informed decisions.
    - Understand how certain technologies can extend human capabilities to understand complex situations.
- C/T 6-8.11 Demonstrate organization and persistence when completing personal and group assignments, activities, and projects.
- A. Use digital resources to assist with project planning.
    - Use various productivity tools that help with planning and time management.
  - B. Use digital resources to assist with project management.
    - Use productivity tools to assist in tracking and meeting goals.
- C/T 6-8.12 Use models and simulations to understand complex systems and processes.

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- A. Use simulations to understand complex concepts.
  - Enhance understanding of concepts and skills by using simulations.
- B. Use various digital resources to produce graphical representations of data.
  - Complete assignments involving data by using data graphing or imaging tools.

### Technology Communication Tools

- C/T 6-8.13 Communicate effectively with others (e.g., peers, teachers, experts) in collaborative learning situations.
- A. Use technology tools for individual and collaborative writing, communication, and publishing activities.
    - Use various technology resources to develop written and media-based reports and projects, integrating technologies as appropriate.
    - Collaborate with others using digital communication tools.
  - B. Participate in communications among different cultures.
    - Understand the need to place communication in the context of culture.
  - C. Assume different roles (e.g., leader/follower, orator/listener) on teams in various situations.
    - Use technology to complete a wide variety of tasks when working in teams, depending on the individual's group role.
- C/T 6-8.14 Apply knowledge and skills to generate innovative ideas, products, processes, and solutions.
- A. Organize and display knowledge and understanding in ways that others can view, use, and assess.
    - Choose the appropriate tool, format, and style to communicate information for specific purposes.
    - Independently use technology tools to create and communicate for individual and/or collaborative projects.
  - B. Add meaning to individual and group ideas and products through creative work.
    - Use digital resources and technology to enhance original oral and written presentations.
  - C. Produce resources created in a variety of formats.
    - Demonstrate the ability to determine proper formats for delivering products digitally so others may use them.

## Computer Technology Standards of Learning

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### Grades 9-12

#### Basic Operations and Concepts

- C/T 9-12.1 Demonstrate an operational knowledge of various technologies.
- A. Use various types of technology devices to perform learning tasks.
    - Demonstrate the ability to perform a wide variety of complex tasks using technology, including creating and using models and simulations, developing multipage documents and multimedia presentations, capturing and manipulating video, and constructing spreadsheets that use mathematical or logical functions to manipulate and present data.
  - B. Communicate about technology with appropriate terminology.
    - Use an expansive technology vocabulary in daily practice.
- C/T 9-12.2 Identify and use available technologies to help complete specific tasks.
- A. Identify the specific uses for various types of technology and digital resources.
    - Apply knowledge of different types of technology and digital resources to routine and complex tasks.
  - B. Use content-specific tools, software, and simulations to approach projects.
    - Use specialized tools to assist with learning in various content areas.
    - Use models and simulations to learn complex concepts, solve problems, and make decisions.
- C/T 9-12.3 Demonstrate an understanding of the strengths and weaknesses of various technologies for supporting different tasks (e.g., writing, research, presentations, creating artwork, statistical analysis).
- A. Make appropriate choices when determining how to use different technologies for different purposes.
    - Demonstrate the ability to choose appropriate resources when completing assignments in various content areas.
    - Make use of self-help tutorials and manuals to troubleshoot and explore unfamiliar features in various tools.
  - B. Explore career opportunities in technology-related careers, and consider the roles technology will play in future career choices.
    - Explain how various careers incorporate technology.
    - Investigate careers that focus on inventing or developing technology.
- C/T 9-12.4 Incorporate new and emerging technologies as appropriate.
- A. Demonstrate knowledge of current advancements in information technologies.
    - Identify and describe the impact of new and emerging technologies and their applications.
    - Debate ethical issues related to new technologies.

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- B. Develop and apply strategies to evaluate new and emerging technologies as potential tools for learning.
  - Research and report on new and emerging technologies and how these impact daily life, with a focus on learning.

### Social and Ethical Issues

- C/T 9-12.5 Make responsible decisions—grounded in knowledge of digital safety and security best practices—that pertain to various digital communication tools and methods.
- A. Discuss and debate appropriate legal, ethical, and responsible behaviors concerning information and technology.
    - Investigate current issues related to legal, ethical, and responsible use of various types of technology and information.
  - B. Model appropriate legal, ethical, and responsible behaviors when using information and technology.
    - Use best practices for online safety as defined by the division’s online safety program.
    - Demonstrate responsible behavior, such as using strong passwords and avoiding high-risk activities.
    - Model responsible behavior when using technology tools and software as well as various types of networks.
- C/T 9-12.6 Exhibit personal responsibility for appropriate, legal, and ethical conduct.
- A. Demonstrate an understanding of “fair use” and copyright law.
    - Apply knowledge of “fair use” and copyright law when developing presentations, products, and papers.
    - Identify copyright laws that impact student work.
  - B. Respectfully collaborate with peers, experts, and others to contribute to an electronic community of learning.
    - Demonstrate advocacy for and a personal commitment to respectful online interaction.
    - Contribute in various ways to an online community.
    - Model respect for the privacy of others.
  - C. Demonstrate knowledge of cyber crime and cyber security issues.
    - Identify the use of digital resources and tools for illegal activity.
    - Compare and contrast various state, federal, and international policies designed to stem the illegal use of technology.
- C/T 9-12.7 Model digital citizenship by actively participating in positive activities for personal and community well-being.
- A. Communicate respect for people when participating in group online learning activities.
    - Apply knowledge about effective online communications to ensure personal communications are clear.

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- Use rules of online etiquette when communicating with others.
- B. Explore the Internet as a means of personal learning and a respectful exchange of ideas and products.
  - Participate in projects that involve others digitally, working together toward a common goal.
  - Pursue individual projects using online resources.
  - Demonstrate the ability to identify diverse perspectives on issues.

- C/T 9-12.8 Understand the nature of information in a global society and how the characteristics of various media may influence others.
- A. Identify the various uses of media based on intent and audience.
    - Investigate media messages in various contexts.
  - B. Be able to construct and deconstruct media messages and graphical representations of data.
    - Connect media messages to various writing techniques, logic models, and outcomes.
    - Develop and communicate an innovative solution to a complex problem through various types of media in collaboration with experts and peers.

### Technology Research Tools

- C/T 9-12.9 Plan and apply strategies for gathering information, using a variety of tools and sources, and reflect on alternate strategies that might lead to greater successes in future projects.
- A. Use various technology and digital resources to collect information.
    - Perform research using a variety of purposefully chosen technology and digital resources.
    - Use various types of content-specific technology to gather data and information.
  - B. Design and implement a variety of advanced search strategies to retrieve electronic information.
    - Develop search strategies based on prior knowledge and reflect on strategies to increase their effectiveness.
- C/T 9-12.10 Draw conclusions from research and relate these findings to real-world situations—investigating further, if necessary.
- A. Use digital research to support written and oral presentations.
    - Apply research derived from digital resources to original work, as appropriate.
    - Demonstrate an understanding of copyright and plagiarism when using digital resources.
  - B. Apply knowledge when conducting research to develop accurate and balanced reports.
    - Determine when further research is needed based on original search results and first drafts.

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- C. Interpret digital primary sources for historical and contemporary events.
- Apply knowledge to interpret digital primary sources for a variety of content areas.
- C/T 9-12.11 Analyze, synthesize, and evaluate information based on source validity and the appropriateness to specific tasks.
- A. Analyze and draw conclusions about the comprehensive nature and bias of electronic information sources.
- Follow best practice guidelines for analyzing information from particular Web sites.
  - Evaluate information in the original context.
- B. Evaluate the relevance of electronic information sources to a given situation.
- Determine appropriate types of information sources for various situations.
  - Choose only relevant information when citing resources.
- C. Use various digital tools to organize, analyze, and synthesize data for learning tasks.
- Use digital tools, such as graphic organizers, spreadsheets, and databases.

### Thinking Skills, Problem Solving, and Decision Making

- C/T 9-12.12 Practice reasoning skills when gathering and evaluating data.
- A. Employ technology in developing strategies for solving problems.
- Regularly use technology tools to assist in authentic problem-solving activities.
  - Investigate and apply expert systems and intelligent agents in real-world situations.
- B. Select resources that extend one's own capability to solve problems and make informed decisions.
- Choose resources that extend one's own capabilities when solving problems.
- C/T 9-12.13 Demonstrate organization and persistence when completing personal and group assignments, activities, and projects.
- A. Use digital resources to assist with project planning.
- Use various productivity tools that help with planning and time management.
- B. Use digital resources to assist with project management.
- Use productivity tools to assist in tracking and meeting goals.
- C/T 9-12.14 Use models and simulations to understand complex systems and processes.
- A. Use simulations to understand complex concepts.
- Enhance understanding of concepts and skills by using simulations.
- B. Use various digital resources to produce graphical representations of data.
- Complete assignments involving data by using data graphing or imaging tools.

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### Technology Communication Tools

- C/T 9-12.15 Communicate effectively with others (e.g., peers, teachers, experts) in collaborative learning situations.
- A. Use technology tools for individual and collaborative writing, communication, and publishing activities.
    - Use various technology resources to develop, revise, and assess written and media-based reports and projects, integrating technologies as appropriate.
    - Independently collaborate with others using digital communication tools.
    - Use digital communication tools to communicate with specific audiences.
  - B. Participate in communications among different cultures.
    - Contribute during a distance-based communication project that includes individuals from different cultures by leveraging the differences of those cultures to develop solutions to common issues.
  - C. Participate in online courses, social and learning networks, and virtual worlds.
    - Complete an online course.
    - Participate in activities that involve social and learning networks and virtual worlds.
- C/T 9-12.16 Apply knowledge and skills to generate innovative ideas, products, processes, and solutions.
- A. Use various creative software and digital tools to convey existing ideas in new and effective ways.
    - Use technology to develop innovative and effective solutions for assignments.
  - B. Add meaning to individual and group ideas and products through creative work.
    - Create a drawing, painting, or other visual image.
    - Create original music.
    - Produce a video.
  - C. Participate with peers and experts to assess projects.
    - Use peer networks to provide and receive assessments.
    - Use communication media to locate experts who can assess projects.

**Computer Technology  
Standards of Learning  
for Virginia's Public Schools**

**~~June 22, 2005~~ November 2012**

**Board of Education  
Commonwealth of Virginia**

## Computer Technology Standards of Learning

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### Introduction

#### ***Technology Literate***

*...to possess technology skills that support learning, personal productivity, decision-making, and daily life.*

*—————Six Year Educational Technology Plan for Virginia, 2003-2009*

*As the new century has unfolded, various studies have postulated about the likely competencies that will be needed in the workplace of tomorrow; one consistent conclusion is that technology will be integrated into every facet of business and life.*

*The Educational Technology Plan for Virginia: 2010-15 focuses primarily on one specific component of 21st century skills—information and communications technology (ICT) literacy. The most recognized definition for this topic was formulated in 2002 by the International ICT Literacy Panel: “ICT literacy is using digital technology, communications tools, and/or networks to access, manage, integrate, evaluate, and create information in order to function in a knowledge society.”*

*—————Educational Technology Plan for Virginia: 2010-15*

The Computer/Technology Standards of Learning ~~identify and~~ define the ~~progressive development of~~ essential knowledge and skills necessary for students to access, manage, evaluate, use, and create information responsibly using technology and digital resources. They provide a framework for ~~technology-digital~~ literacy and ~~demonstrate a progression from physical manipulation skills for the use of technology~~ include the progressive development of technical knowledge and skills, ~~to~~ intellectual skills ~~necessary for~~ thinking about and using information ~~use, to~~ and skills needed for working responsibly and productively individually and within groups. ~~Computer/technology proficiency~~ Digital literacy is not an end in itself; but lays the foundation for deep and continuous learning. ~~The focus is~~ It focuses on ~~learning~~ using technology to learn rather than learning about technology.

To become technologically proficient, the student must develop ~~the~~ these skills through integrated activities ~~in~~ across all ~~content areas~~ K-12 content areas. ~~, rather than through one specific course.~~ These skills should be introduced and refined collaboratively by all K-12 teachers as an integral part of the learning process. Teachers can use these standards as guidelines for planning technology-based activities in which students achieve success in learning; and communication, ~~and prepare~~ preparing them to meet the challenges of today's ~~technology-rich world of work~~ knowledge-based society.

## Computer Technology Standards of Learning

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### Grades K-2

#### Basic Operations and Concepts

- C/T K-2.1 ~~The student will demonstrate knowledge of the nature and operation of technology systems.~~ Demonstrate an operational knowledge of various technologies.
- A. Use various types of technology devices to perform learning tasks.
- ~~• Identify the computer as a machine that helps people at school, work, and play.~~
  - ~~• Use technology to demonstrate the ability to perform a variety of tasks; among them turning on and off a computer, starting and closing programs, saving work, creating folders, using pull-down menus, closing windows, dragging objects, and responding to commands.~~
    - Use a keyboard, mouse, touchscreen, touchpad, and other input devices to interact with a computer.
    - Use appropriate buttons, gestures, menu choices, and commands to manipulate the computer when completing learning tasks.
- B. Communicate about technology with appropriate terminology.
- Use basic technology vocabulary as needed.

- C/T K-2.2 ~~The student will demonstrate proficiency in the use of technology.~~ Identify and use available technologies to complete specific tasks.
- A. Identify the specific uses for various types of technology and digital resources.
- ~~• Demonstrate the use of mouse, keyboard, printer, multimedia devices, and earphones.~~
  - ~~• Use multimedia resources such as interactive books and software with graphical interfaces.~~
    - Identify the difference between hardware and software.
    - Create a text document.
    - Open and read an electronic book.
    - Create a digital image.
- B. Use content-specific tools, software, and simulations to complete projects.
- Use tools in various content areas as appropriate.

#### Social and Ethical Issues

- C/T K-2.3 ~~The student will practice responsible use of technology systems, information, and software.~~ Make responsible decisions—grounded in knowledge of digital safety and security best practices—that pertain to various digital communication tools and methods.
- A. Demonstrate knowledge of school policies for using computers and other technologies.

- ~~• Know the school's rules for using computers.~~
- ~~• Understand the importance of protecting personal information or passwords.~~
- ~~• Understand the basic principles of the ownership of ideas.~~
  - ~~• Be able to articulate what is allowed and what is not allowed at school when using technology.~~
- B. Understand the importance of protecting personal information and passwords.
  - Communicate an understanding of the basic principles of online safety.
  - Follow procedures that protect safety and security as outlined in the division's acceptable use policy.
- C. Understand the basic principles of the ownership of ideas.
  - Identify digital information as being produced by people—either as individuals or as part of a group or organization.

~~C/T K-2.4 The student will use technology responsibly.~~

- ~~• Demonstrate respect for the rights of others while using computers.~~
- ~~• Understand the responsible use of equipment and resources.~~

### **Technology Research Tools**

~~C/T K-2.54 The student will use technology to locate, evaluate, and collect information from a variety of sources. Plan and apply strategies for gathering information, using a variety of tools and sources, and reflect on alternate strategies that might lead to greater successes in future projects.~~

- A. Identify information in various formats.
  - Recognize that information may be presented as printed text, electronic text, audio, video, or images.
- B. Identify available sources of information.
  - ~~• Identify available sources of information.~~
  - ~~• Be able to name and use sources of information available at school and outside the school.~~
    - Be able to name and use sources of information available at school and outside the school.

### **Thinking Skills, Problem-solving and Decision-making Tools**

~~C/T K-2.65 The student will use technology resources for solving problems and making informed decisions. Practice reasoning skills when gathering and evaluating data.~~

- A. Recognize that technology can be used to solve problems and make informed decisions.
  - Communicate how a decision was made based on assistance from a technology tool.
  - ~~• Identify and select technologies to address problems.~~
- B. Use technology tools to assist with problem solving.

- Demonstrate how technology can be used to investigate and solve problems in various content areas.

### **Technology Communication Tools**

- C/T K-2.76 ~~The student will use a variety of media and formats to communicate information and ideas effectively to multiple audiences. Communicate effectively with others (e.g., peers, teachers, experts) in collaborative learning situations.~~
- ~~Identify the best tool to communicate information.~~
  - A. Use technology tools for individual and collaborative writing, communication, and publishing-presentation activities.
    - Use word processing to practice writing skills.
    - Use common graphic and presentation tools when preparing and providing presentations.
  - B. Recognize communication needs when sharing technology tools.
  - ~~Demonstrate the ability to create, save, retrieve, and print document.~~
    - Demonstrate the ability to share technology tools as needed.

## Computer Technology Standards of Learning

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### Grades 3-5

#### Basic Operations and Concepts

- C/T 3-5.1 ~~The student will demonstrate knowledge of the nature and operation of technology systems.~~ Demonstrate an operational knowledge of various technologies.
- A. Use various types of technology devices to perform learning tasks.
- ~~• Discuss common uses of computers in their daily life and the advantages and disadvantages those uses provide.~~
    - Demonstrate the ability to perform a wide variety of basic tasks using technology, including saving, editing, printing, viewing, and graphing.
- B. Communicate about basic technology components with appropriate terminology.
- Use basic technology vocabulary in daily practice.
- C/T 3-5.2 ~~The student will demonstrate proficiency in the use of technology.~~ Identify and use available technologies to complete specific tasks.
- A. Identify the specific uses for various types of technology and digital resources.
- ~~• Use skills and procedures needed to operate various technologies such as scanners, digital cameras and hand-held computers.~~
  - ~~• Identify basic software applications such as word processing, databases, and spreadsheets.~~
    - Identify the differences among local, network, and Internet resources and tools.
    - Create, edit, and format a document with text and graphics.
    - Create and present a multimedia presentation.
    - Create and populate a spreadsheet with data.
    - Capture a digital image.
    - Demonstrate the ability to choose appropriate resources when completing assignments in various content areas.
- B. Use content-specific tools, software, and simulations to complete projects.
- Use tools in various content areas as directed by the teacher.

#### Social and Ethical Issues

- C/T 3-5.3 ~~The student will demonstrate knowledge of ethical, cultural, and societal issues related to technology.~~ Make responsible decisions—grounded in knowledge of digital safety and security best practices—that pertain to various digital communication tools and methods.
- A. Demonstrate knowledge of basic practices related to online safety.
- ~~• Identify how technology has changed society in areas such as communications, transportation, and the economy.~~

- ~~Discuss ethical behaviors when using information and technology.~~
  - Use best practices for online safety as defined by the division's online safety program.
  - Demonstrate an understanding of the division's acceptable use policy and consequences for inappropriate use.
- B. Discuss and model responsible behaviors when using information and technology.
  - Identify reasons for taking security precautions when using any technology, especially those related to the Internet.
  - Demonstrate responsible behavior, such as using strong passwords and avoiding high-risk activities.

- C/T 3-5.4 ~~The student will practice responsible use of technology systems, information, and software. Exhibit personal responsibility for appropriate, legal, and ethical conduct.~~
- A. Understand the need for the school division's acceptable use policy laws and regulations regarding technology use.
- Model appropriate, legal, and ethical behavior in all technology use and technology-supported environments.
- B. Understand the basic principles of the ownership of ideas.
- ~~Discuss the rationale of fair use and copyright regulations.~~
    - Demonstrate a basic understanding of "fair use."
  - ~~Follow rules for personal safety when using the Internet.~~

- C/T 3-5.5 ~~The student will demonstrate knowledge of technologies that support collaboration, personal pursuits, and productivity. Demonstrate digital citizenship by actively participating in positive activities for personal and community well-being.~~
- A. Communicate respect for people when participating in group online learning activities.
- ~~Work collaboratively when using technology.~~
  - ~~Practice and communicate respect for people, equipment, and resources.~~
    - Identify ways in which online communications are different from face-to-face communications.
    - Demonstrate online etiquette when communicating with others.
  - ~~Understand how technology expands opportunities for learning.~~
- B. Explore the potential of the Internet as a means of personal learning and the respectful exchange of ideas and products.
- Participate in the creation of digital projects that involve communicating with others.

### **Technology Research Tools**

- C/T 3-5.6 ~~The student will use technology to locate, evaluate, and collect information from a variety of sources. Plan and apply strategies for gathering information, using a variety of tools and sources, and reflect on alternate strategies that might lead to greater successes in future projects.~~

- A. Collect information from a variety of sources.
    - Conduct research using various types of text- and media-based information.
  - B. Apply best practices for searching digital resources.
    - Apply effective search strategies that will yield targeted information.
    - Identify basic indicators that a digital source is likely to be reliable.
- ~~Evaluate the accuracy of electronic information sources.~~

C/T 3-5.7 Draw conclusions from research and relate these findings to real-world situations.

- A. Use research to support written and oral presentations.
    - Apply research derived from digital resources to original work.
    - Demonstrate how to cite digital resources when developing nonfiction reports and presentations.
  - B. Apply knowledge when conducting research to develop accurate and balanced reports.
    - Use best practice guidelines for evaluating research results.
- ~~Enter data into databases and spreadsheets.~~

### **Thinking Skills, Problem-sSolving and Decision-mMaking Tools**

C/T 3-5.78 ~~The student will use technology resources for solving problems and making informed decisions.~~ Practice reasoning skills when gathering and evaluating data.

- A. Determine when technology tools are appropriate to solve a problem and make a decision.
  - ~~Select resources to solve problems and make informed decisions.~~
  - Identify technology resources and tools that can help with decision making.
- B. Demonstrate organization and persistence when completing personal and group assignments, activities, and projects.
  - Use various productivity tools that help with planning, time management, project goal setting, etc.

C/T 3-5.9 Use models and simulations to understand complex systems and processes.

- A. Understand the use of simulations in learning.
  - Enhance understanding of concepts and skills by explaining how a simulation differs from and is similar to real life.
- B. Use simulations to understand complex concepts.
  - Enhance understanding of concepts and skills by using simulations.

### **Technology Communication Tools**

C/T 3-5.810 ~~The student will use a variety of media and formats to communicate information and ideas effectively to multiple audiences.~~ Communicate

effectively with others (e.g., peers, teachers, experts) in collaborative learning situations.

A. Use technology tools for individual and collaborative writing, communication, and publishing activities.

- Produce documents and presentations that demonstrate the ability to edit, reformat, and integrate various software tools and media.

~~• Use telecommunication tools to communicate and share information with others.~~

B. Participate in communications among different cultures.

- Understand the need to place communication in the context of culture.

C. Assume different roles (e.g., leader/follower, orator/listener) on teams in various situations.

- Recognize that different people on a team bring different technical skills, and understand how that can influence team responsibilities.
- Demonstrate the ability to share technology tools as needed.

C/T 3-5.11 Apply knowledge and skills to generate innovative ideas, products, processes, and solutions.

A. Organize and display knowledge and understanding in ways that others can view, use, and assess.

- Understand the various ways in which digital products can be shared.

B. Use technology tools to share original work.

- Use presentation tools to organize and present stories, poems, songs, and other original work.

## Computer Technology Standards of Learning

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### Grades 6-8

#### Basic Operations and Concepts

- C/T 6-8.1 ~~The student will demonstrate knowledge of the nature and operation of technology systems.~~ Demonstrate an operational knowledge of various technologies.
- A. Use various types of technology devices to perform learning tasks.
- ~~• Describe how technology impacts learning.~~
  - ~~• Explore how software and hardware are developed to respond to the changing needs of technology.~~
  - ~~• Describe compatibility issues, between various types of technology.~~
    - Demonstrate the ability to perform specific tasks using technology, including organizing, analyzing, and presenting data; formatting and presenting text and graphic information; and capturing and manipulating images.
- B. Communicate about technology with appropriate terminology.
- Use technology vocabulary in daily practice.
- C/T6-8.2 ~~The student will demonstrate proficiency in the use of technology.~~ Identify and use available technologies to complete specific tasks.
- A. Identify the specific uses for various types of technology and digital resources.
- ~~• Understand that hardware and software have different operating systems that may affect their use.~~
  - ~~• Use self-help features such as online tutorials and manuals to learn to use hardware and software.~~
    - Select and use local, network, and Internet resources and tools.
    - Capture and edit video.
    - Explain how various careers incorporate technology.
- B. Use content-specific tools, software, and simulations to complete projects.
- Use tools in various content areas, such as graphing calculators, science simulations, story diagramming applications, image processing applications, and history timeline applications.

#### Social and Ethical Issues

- C/T 6-8.3 ~~The student will demonstrate knowledge of ethical, cultural, and societal issues related to technology.~~ Make responsible decisions—grounded in knowledge of digital safety and security best practices—that pertain to various digital communication tools and methods.
- A. Demonstrate knowledge of basic practices related to online safety.
- ~~• Demonstrate knowledge of current changes in information technologies.~~

- Use best practices for online safety as defined by the division’s online safety program.
- Apply the division’s acceptable use policy to everyday situations.
- Model appropriate, legal, and ethical behavior in all technology use and technology-supported environments.

B. Discuss and model responsible behaviors when using information and technology.

- ~~Explain the need for laws and policies to govern technology.~~
- ~~Explore career opportunities in technology related careers.~~
  - Identify reasons for taking security precautions when using any technology, especially those related to the Internet.
  - Demonstrate responsible behavior, such as using strong passwords and avoiding high-risk activities.

C/T 6-8.4 ~~The student will practice responsible use of technology systems, information, and software.~~ Exhibit personal responsibility for appropriate, legal, and ethical conduct.

A. Demonstrate the correct use of fair use and copyright regulations an understanding of “fair use.”

- ~~Demonstrate compliance with the school division’s Acceptable Use Policy and other legal guidelines.~~
  - Apply knowledge of copyright and “fair use” when developing presentations, products, and papers.

B. Demonstrate an understanding of current copyright laws.

- Identify copyright laws that impact student work.

C/T 6-8.5 ~~The student will demonstrate knowledge of technologies that support collaboration, personal pursuits, and productivity.~~ Demonstrate digital citizenship by actively participating in positive activities for personal and community well-being.

A. Communicate respect for people when participating in group online learning activities.

- ~~Work collaboratively and/or independently when using technology.~~
- ~~Practice preventative maintenance of equipment, resources, and facilities.~~
  - Demonstrate online etiquette when communicating with others.
  - Demonstrate an understanding of cyberbullying and strategies for stopping a cyberbully.

B. Explore the potential of the Internet as a means of personal learning and the respectful exchange of ideas and products.

- Participate in the creation of digital projects that involve others working together toward a common goal.
- Demonstrate the ability to identify diverse perspectives on issues.

C/T 6-8.6 Understand the nature of information in a global society and how the characteristics of various media may influence others.

A. Identify the various uses of media based on intent and audience.

- Investigate media messages in various contexts.
- B. Be able to construct and deconstruct media messages.
  - Connect media messages to various writing techniques, logic models, and outcomes.
  - Develop communication projects using various types of media.

### **Technology Research Tools**

- C/T 6-8.67 ~~The student will use technology to locate, evaluate, and collect information from a variety of sources. Plan and apply strategies for gathering information, using a variety of tools and sources, and reflect on alternate strategies that might lead to greater successes in future projects.~~
- A. Use various technology and digital resources to collect information.
- ~~• Use databases and spreadsheets to evaluate information.~~
  - ~~• Use technology resources such as calculators and data collection probes for gathering information.~~
  - ~~• Use Internet and other electronic resources to locate information in real time.~~
    - Conduct research using various types of text- and media-based information.
    - Use various types of content-specific technology to gather data and information.
- B. Use search strategies to retrieve information.
- Apply effective search strategies that will yield targeted information.
  - Identify indicators that a digital source is likely to be reliable.
- C/T 6-8.8 ~~Draw conclusions from research and relate these findings to real-world situations—investigating further, if necessary.~~
- A. Use digital research to support written and oral presentations.
- Apply research derived from digital resources to original work, as appropriate.
- B. Apply knowledge when conducting research to develop accurate and balanced reports.
- Determine when further research is needed based on original search results and first drafts.
  - Demonstrate how to cite digital resources when developing nonfiction reports and presentations.
  - Apply strategies that help avoid plagiarism when clipping and storing digital notes.
- C. Interpret digital primary sources within historical and contemporary contexts.
- Follow procedures to interpret various primary sources for a variety of content areas.
- C/T 6-8.79 ~~The student will evaluate and select new information resources and technological innovations based on the appropriateness for specific tasks.~~

Analyze, synthesize, and evaluate information based on source validity and the appropriateness to specific tasks.

A. Evaluate the accuracy, relevance, and appropriateness of electronic information sources.

~~• Use search strategies to retrieve information.~~

- Use a variety of strategies to evaluate the accuracy of digital resources.
- Use various digital tools, such as graphic organizers, to analyze and synthesize data for learning tasks.

B. Use various digital tools to organize, analyze, and synthesize data for learning tasks.

- Use digital tools, such as graphic organizers, spreadsheets, and databases.

### **Thinking Skills, Problem-solving and Decision-making Tools**

C/T 6-8.810 The student will use technology resources for solving problems and making informed decisions. Practice reasoning skills when gathering and evaluating data.

A. Employ technology in the development of strategies for solving problems.

- Identify and use technology resources and tools that can help with problem solving.
- Use a variety of technologies to identify and provide possible solutions to real-world problems.

B. Select resources that extend one's own capability to solve problems and make informed decisions.

- ~~• Use content-specific tools, software, and simulations such as environmental probes, graphic calculators, exploratory environments, and web tools.~~
- ~~• Participate in collaborative problem-solving activities.~~
- ~~• Select and use appropriate tools and technology resources to accomplish a variety of tasks.~~
  - Understand how certain technologies can extend human capabilities to understand complex situations.

C/T 6-8.11 Demonstrate organization and persistence when completing personal and group assignments, activities, and projects.

A. Use digital resources to assist with project planning.

- Use various productivity tools that help with planning and time management.

B. Use digital resources to assist with project management.

- Use productivity tools to assist in tracking and meeting goals.

C/T 6-8.12 Use models and simulations to understand complex systems and processes.

A. Use simulations to understand complex concepts.

- Enhance understanding of concepts and skills by using simulations.
- B. Use various digital resources to produce graphical representations of data.
  - Complete assignments involving data by using data graphing or imaging tools.

### **Technology Communication Tools**

C/T 6-8.13 Communicate effectively with others (e.g., peers, teachers, experts) in collaborative learning situations.

- A. Use technology tools for individual and collaborative writing, communication, and publishing activities.
  - Use various technology resources to develop written and media-based reports and projects, integrating technologies as appropriate.
  - Collaborate with others using digital communication tools.
- B. Participate in communications among different cultures.
  - Understand the need to place communication in the context of culture.
- C. Assume different roles (e.g., leader/follower, orator/listener) on teams in various situations.
  - Use technology to complete a wide variety of tasks when working in teams, depending on the individual's group role.

C/T 6-8.914 The student will use a variety of media and formats to communicate information and ideas effectively to multiple audiences. Apply knowledge and skills to generate innovative ideas, products, processes, and solutions.

- A. Organize and display knowledge and understanding in ways that others can view, use, and assess.
  - Choose the appropriate tool, format, and style to communicate information for specific purposes.
  - Independently use technology tools to create and communicate for individual and/or collaborative projects.
  - ~~Produce documents demonstrating the ability to edit, reformat, and integrate various software tools.~~
- B. Add meaning to individual and group ideas and products through creative work.
  - Use digital resources and technology to enhance original oral and written presentations.
- C. Produce resources created in a variety of formats.
  - Demonstrate the ability to determine proper formats for delivering products digitally so others may use them.

## Computer Technology Standards of Learning

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### Grades 9-12

#### Basic Operations and Concepts

- C/T 9-12.1 ~~The student will demonstrate knowledge of the nature and operation of technology systems.~~ Demonstrate an operational knowledge of various technologies.
- A. Use various types of technology devices to perform learning tasks.
- ~~• Discuss the inherent advantages and limitations of technology.~~
  - ~~• Define the relationship between infrastructure, electronic resources, and connectivity.~~
  - ~~• Identify and describe the impact of new and emerging technologies and their applications.~~
    - Demonstrate the ability to perform a wide variety of complex tasks using technology, including creating and using models and simulations, developing multipage documents and multimedia presentations, capturing and manipulating video, and constructing spreadsheets that use mathematical or logical functions to manipulate and present data.
- B. Communicate about technology with appropriate terminology.
- Use an expansive technology vocabulary in daily practice.
- C/T 9-12.2 ~~The student will demonstrate proficiency in the use of technology.~~ Identify and use available technologies to help complete specific tasks.
- A. Identify the specific uses for various types of technology and digital resources.
- ~~• Identify and resolve hardware and software compatibility issues.~~
  - ~~• Develop and communicate strategies for solving routine hardware and software problems.~~
    - Apply knowledge of different types of technology and digital resources to routine and complex tasks.
- B. Use content-specific tools, software, and simulations to approach projects.
- Use specialized tools to assist with learning in various content areas.
  - Use models and simulations to learn complex concepts, solve problems, and make decisions.
- C/T 9-12.3 Demonstrate an understanding of the strengths and weaknesses of various technologies for supporting different tasks (e.g., writing, research, presentations, creating artwork, statistical analysis).
- A. Make appropriate choices when determining how to use different technologies for different purposes.
- Demonstrate the ability to choose appropriate resources when completing assignments in various content areas.

- Make use of self-help tutorials and manuals to troubleshoot and explore unfamiliar features in various tools.
- B. Explore career opportunities in technology-related careers, and consider the roles technology will play in future career choices.
  - Explain how various careers incorporate technology.
  - Investigate careers that focus on inventing or developing technology.

C/T 9-12.4 Incorporate new and emerging technologies as appropriate.

- A. Demonstrate knowledge of current advancements in information technologies.
  - Identify and describe the impact of new and emerging technologies and their applications.
  - Debate ethical issues related to new technologies.
- B. Develop and apply strategies to evaluate new and emerging technologies as potential tools for learning.
  - Research and report on new and emerging technologies and how these impact daily life, with a focus on learning.

### **Social and Ethical Issues**

C/T 9-12.35 The student will demonstrate knowledge of ethical, cultural, and societal issues related to technology. Make responsible decisions—grounded in knowledge of digital safety and security best practices—that pertain to various digital communication tools and methods.

- A. Discuss and debate appropriate legal, ethical, and responsible behaviors concerning information and technology.
  - ~~Assess the potential of information and technology to address personal and workplace needs.~~
  - ~~Demonstrate knowledge of electronic crimes such as viruses, pirating, and computer hacking.~~
  - ~~Explore and participate in online communities, and online learning opportunities.~~
  - ~~Identify the role that technology will play in future career opportunities.~~
    - Investigate current issues related to legal, ethical, and responsible use of various types of technology and information.
- B. Model appropriate legal, ethical, and responsible behaviors when using information and technology.
  - Use best practices for online safety as defined by the division's online safety program.
  - Demonstrate responsible behavior, such as using strong passwords and avoiding high-risk activities.
  - Model responsible behavior when using technology tools and software as well as various types of networks.

- C/T 9-12.46 ~~The student will practice responsible use of technology systems, information, and software. Exhibit personal responsibility for appropriate, legal, and ethical conduct.~~
- A. Demonstrate an understanding of “fair use” and copyright law.
- ~~• Adhere to fair use and copyright guidelines.~~
  - ~~• Adhere to the school division’s Acceptable Use Policy as well as other state and federal laws.~~
  - ~~• Model respect for intellectual property.~~
    - Apply knowledge of “fair use” and copyright law when developing presentations, products, and papers.
    - Identify copyright laws that impact student work.
- B. Respectfully collaborate with peers, experts, and others to contribute to an electronic community of learning.
- Demonstrate advocacy for and a personal commitment to respectful online interaction.
  - Contribute in various ways to an online community.
  - Model respect for the privacy of others.
- C. Demonstrate knowledge of cyber crime and cyber security issues.
- Identify the use of digital resources and tools for illegal activity.
  - Compare and contrast various state, federal, and international policies designed to stem the illegal use of technology.

- C/T 9-12.57 ~~The student will demonstrate knowledge of technologies that support collaboration, personal pursuits, and productivity. Model digital citizenship by actively participating in positive activities for personal and community well-being.~~
- A. Communicate respect for people when participating in group online learning activities.
- ~~• Respectfully collaborate with peers, experts, and others to contribute to an electronic community of learning.~~
  - ~~• Model responsible use and respect for equipment, resources, and facilities.~~
    - Apply knowledge about effective online communications to ensure personal communications are clear.
    - Use rules of online etiquette when communicating with others.
- B. Explore the Internet as a means of personal learning and a respectful exchange of ideas and products.
- Participate in projects that involve others digitally, working together toward a common goal.
  - Pursue individual projects using online resources.
  - Demonstrate the ability to identify diverse perspectives on issues.

- C/T 9-12.8 Understand the nature of information in a global society and how the characteristics of various media may influence others.
- A. Identify the various uses of media based on intent and audience.
- Investigate media messages in various contexts.

- B. Be able to construct and deconstruct media messages and graphical representations of data.
- Connect media messages to various writing techniques, logic models, and outcomes.
  - Develop and communicate an innovative solution to a complex problem through various types of media in collaboration with experts and peers.

### **Technology Research Tools**

- C/T 9-12.69 ~~The student will use technology to locate, evaluate, and collect information from a variety of sources. Plan and apply strategies for gathering information, using a variety of tools and sources, and reflect on alternate strategies that might lead to greater successes in future projects.~~
- A. Use various technology and digital resources to collect information.
- ~~Integrate databases, spreadsheets, charts, and tables to create reports.~~
  - ~~Use available technological tools to expand and enhance understanding of ideas and concepts.~~
    - Perform research using a variety of purposefully chosen technology and digital resources.
    - Use various types of content-specific technology to gather data and information.
- B. Design and implement a variety of advanced search strategies to retrieve electronic information.
- Develop search strategies based on prior knowledge and reflect on strategies to increase their effectiveness.
- C/T 9-12.10 Draw conclusions from research and relate these findings to real-world situations—investigating further, if necessary.
- A. Use digital research to support written and oral presentations.
- Apply research derived from digital resources to original work, as appropriate.
  - Demonstrate an understanding of copyright and plagiarism when using digital resources.
- B. Apply knowledge when conducting research to develop accurate and balanced reports.
- Determine when further research is needed based on original search results and first drafts.
- C. Interpret digital primary sources for historical and contemporary events.
- Apply knowledge to interpret digital primary sources for a variety of content areas.
- C/T 9-12.711 ~~The student will evaluate and select new information resources and technological innovations based on the appropriateness for specific tasks. Analyze, synthesize, and evaluate information based on source validity and the appropriateness to specific tasks.~~

- A. Analyze and draw conclusions about the comprehensive nature and bias of electronic information sources.
  - ~~Analyze and draw conclusions about the comprehensiveness and bias of electronic information sources.~~
  - ~~Design and implement a variety of search strategies to retrieve electronic information.~~
    - Follow best practice guidelines for analyzing information from particular Web sites.
    - Evaluate information in the original context.
- B. Evaluate the relevance of electronic information sources to a given situation.
  - Determine appropriate types of information sources for various situations.
  - Choose only relevant information when citing resources.
- C. Use various digital tools to organize, analyze, and synthesize data for learning tasks.
  - Use digital tools, such as graphic organizers, spreadsheets, and databases.

### **Thinking Skills, Problem-solving and Decision-making Tools**

C/T 9-12.812 ~~The student will use technology resources for solving problems and making informed decisions. Practice reasoning skills when gathering and evaluating data.~~

- A. Employ technology in developing strategies for solving problems.
  - Regularly use technology tools to assist in authentic problem-solving activities.
  - ~~Investigate and apply expert systems, and intelligent agents, and simulations in real-world situations.~~
- B. Select resources that extend one's own capability to solve problems and make informed decisions.
  - ~~Select and apply technology tools for information analysis, problem-solving, and decision-making.~~
  - ~~Use technology resources such as educational software, simulations, and models for problem solving, and independent learning.~~
  - ~~Produce and disseminate information through collaborative problem-solving activities.~~
    - Choose resources that extend one's own capabilities when solving problems.

C/T 9-12.13 Demonstrate organization and persistence when completing personal and group assignments, activities, and projects.

- A. Use digital resources to assist with project planning.
  - Use various productivity tools that help with planning and time management.
- B. Use digital resources to assist with project management.
  - Use productivity tools to assist in tracking and meeting goals.

- C/T 9-12.14 Use models and simulations to understand complex systems and processes.
- A. Use simulations to understand complex concepts.
- Enhance understanding of concepts and skills by using simulations.
- B. Use various digital resources to produce graphical representations of data.
- Complete assignments involving data by using data graphing or imaging tools.

### **Technology Communication Tools**

- C/T 9-12.915 The student will use a variety of media and formats to communicate information and ideas effectively to multiple audiences. Communicate effectively with others (e.g., peers, teachers, experts) in collaborative learning situations.
- A. Use technology tools for individual and collaborative writing, communication, and publishing activities.
- ~~Determine the most effective tool, format, and style to communicate to specific audiences.~~
  - ~~Use technology based options, including distance and distributed education, to collaborate, research, publish, and communicate.~~
  - ~~Practice self-directed use of advanced technology tools for communicating with specific audiences.~~
    - Use various technology resources to develop, revise, and assess written and media-based reports and projects, integrating technologies as appropriate.
    - Independently collaborate with others using digital communication tools.
    - Use digital communication tools to communicate with specific audiences.
- B. Participate in communications among different cultures.
- Contribute during a distance-based communication project that includes individuals from different cultures by leveraging the differences of those cultures to develop solutions to common issues.
- C. Participate in online courses, social and learning networks, and virtual worlds.
- Complete an online course.
  - Participate in activities that involve social and learning networks and virtual worlds.

- C/T 9-12.16 Apply knowledge and skills to generate innovative ideas, products, processes, and solutions.
- A. Use various creative software and digital tools to convey existing ideas in new and effective ways.
- Use technology to develop innovative and effective solutions for assignments.

B. Add meaning to individual and group ideas and products through creative work.

- Create a drawing, painting, or other visual image.
- Create original music.
- Produce a video.

C. Participate with peers and experts to assess projects.

- Use peer networks to provide and receive assessments.
- Use communication media to locate experts who can assess projects.

**2012-2013 Virginia Educational Technology  
Advisory Committee (VETAC) Member Organizations**

Business & Industry (3)  
Educational Technology Professional—Leadership—Large School Division  
Educational Technology Professional—Leadership—Medium School Division  
Educational Technology Professional—Leadership—Small School Division  
Large School Instructional Technology Resource Teacher  
Medium School Instructional Technology Resource Teacher  
Small School Instructional Technology Resource Teacher  
Regional Study Group I  
Regional Study Group II  
Regional Study Group III  
Regional Study Group IV  
Regional Study Group V  
Regional Study Group VI  
Regional Study Group VII  
Regional Study Group VIII  
State Council of Higher Education for Virginia (SCHEV)  
Virginia Association for Supervision and Curriculum Development (VASCD)  
Virginia Association of Colleges of Teacher Education (VACTE)  
Virginia Association of Elementary School Principals (VAESP)  
Virginia Association of School Business Officials (VASBO)  
Virginia Association of School Superintendents (VASS)  
Virginia Association of Science Teachers (VAST)  
Virginia Association of Secondary School Principals (VASSP)  
Virginia Association of Teachers of English (VATE)  
Virginia Community College System (VCCS)  
Virginia Congress of Parents and Teachers (VCPT)  
Virginia Council for Private Education (VCPE)  
Virginia Council for the Social Studies (VCSS)  
Virginia Council of Teachers of Mathematics (VCTM)  
Virginia Education Association (VEA)  
Virginia Educational Media Association (VEMA)  
Virginia Electronic Student Information Services (VESIS)  
Virginia Middle School Association (VMSA)  
Virginia School Boards Association (VSBA)  
Virginia Society for Technology in Education (VSTE)  
Virginia State Reading Association (VSRA)