

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

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**Board of Education
Commonwealth of Virginia**

Computer Technology Standards of Learning

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 both 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

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.
 - D. Identify and model responsible behaviors when using information and technology.
 - Identify strategies to address bullying situations involving electronic devices.

Technology Research Tools

Computer Technology Standards of Learning

- 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.
 - 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 tools useful for communication.
 - Identify how different technologies appeal to different senses.

Computer Technology Standards of Learning

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.
 - Use a keyboard, mouse, touchscreen, touchpad, and other input devices to interact with a computer.
 - 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 and edit 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.
 - Identify inappropriate or threatening interpersonal situations involving electronic devices and develop strategies to react to them safely.

Computer Technology Standards of Learning

- Behave appropriately in virtual groups and be proactive in preventing bullying behavior in an environment that provides anonymity to bullies.
- 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.
 - 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.

Computer Technology Standards of Learning

- 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.
 - 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

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.
 - Identify examples of inappropriate or bullying online behavior and demonstrate an understanding of the reasons why such behavior is inappropriate in a civil society.
 - Identify differences between healthy and unhealthy virtual relationships such as bullying and practice positive responses to problems.

Computer Technology Standards of Learning

- Demonstrate personal responsibility for online behavior, especially in social media settings.
- Demonstrate awareness of the potential social, economic, and legal consequences of inappropriate online behavior.

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.
- 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.

Computer Technology Standards of Learning

- 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 6-8.9 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.

Computer Technology Standards of Learning

- 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 6-8.14 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 in a variety of formats.

Computer Technology Standards of Learning

- Demonstrate the ability to determine proper formats for delivering products digitally so others may use them.

Computer Technology Standards of Learning

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.

Computer Technology Standards of Learning

- 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.
 - Identify personal responsibilities in virtual relationships and demonstrate an understanding of the connection to legal, ethical, and responsible behavior.
 - Identify positive and negative uses of social media and develop strategies to avoid risky or negative situations as well as how to report such situations to authorities.
- 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.

Computer Technology Standards of Learning

- 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.
 - 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.

Computer Technology Standards of Learning

- 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 9-12.11 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.

Computer Technology Standards of Learning

- 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 9-12.15 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.
 - Manage goals for learning in 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, programming environments, or 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.