1. Creativity and Innovation

Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. Students:

a. apply existing knowledge to generate new ideas, products, or processes

identify local or global problems that need creative solutions. In small groups, engage in divergent thinking to explore options for solutions. Use technology (e.g., graphs, wikis, other group authoring tools) to capture and share promising strategies with the whole group. Select and describe specific ideas or create products or processes that could provide new solutions.

b. create original works as a means of personal or group expression

use technology resources (e.g., photo-editing tools, digital video-editing tools, green screen technology, animation tools) to modify or create digital works; produce a media-rich digital story, individually or collaboratively (e.g., story based on a first-person interview or historical research); document a reflection of processes and results.

c. c. use models and simulations to explore complex systems and issues

program a robot to perform a task or use online simulations and visualization tools to explore affects of manipulating variables individually and in groups; record and display results or conclusions using electronic tools (e.g., graphs, word clouds, ranking or sorting tools).

d. d. identify trends and forecast possibilities

collect and electronically store data based on observations of changes in one or more variables over time (e.g., plant growth, population growth, pollution reduction). Use graphs to identify trends. Make a data-driven prediction about future outcomes.

2. Communication and Collaboration

Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. Students:

a. interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media

collaborate in pairs or groups to develop technology-based presentations or products for content-related topics using digital audio, photos, images, video, or charts (e.g., interact via e-mail, videoconferencing, or blogging with young adult authors/musicians/artists/scientists to collaborate on a multimedia product).

b. communicate information and ideas effectively to multiple audiences using a variety of media and formats

create and edit products in a variety of media environments (e.g., presentation, newsletter, video, annotated calendar, wiki) to effectively communicate individual and group curriculum activities, ideas, or results to multiple audiences.

c. develop cultural understanding and global awareness by engaging with learners of other cultures

use technology communications tools (e.g., online forums, blogs, e-mail, text messaging, chat, voice-over IP, videoconferencing) to interact with students or experts from other cultures, communities, or countries on a collaborative, content-specific activity or project.

d. contribute to project teams to produce original works or solve problems

working in pairs or small groups with assigned roles, use digital tools to explore specific subject-related concepts or content and present problem solutions or create original works using appropriate tools (e.g., animation and drawing software, visual data tools, graphic organizers, simulation development tools, programming languages, video cameras, editing software, music software).

3. Research and Information Fluency

Students apply digital tools to gather, evaluate, and use information. Students:

a. plan strategies to guide inquiry

individually, in pairs, or in small groups, develop and refine questions for investigating a learning-related topic (e.g., What makes one country more just than another? What should we do to improve our readiness for natural disasters?). List possible sources of the information needed and appropriate information gathering tools. Outline the steps in the investigation using digital planning tools (e.g., concept mapping, KWHL charting).

b. b. locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media

use digital tools (e.g., age-appropriate search engines, subject directories, or graphic organizers) to locate and organize relevant and reliable information from a variety of digital sources. Analyze and synthesize results to answer a question or clarify an issue. Document sources appropriately.

c. evaluate and select information sources and digital tools based on the appropriateness to specific tasks

compare and contrast the effectiveness of two or more digital tools and information resources used to accomplish an assigned task. Validate sources and document possible bias by checking credentials and analyzing url (e.g., consider whether the source is a .gov, .org, .com, etc.).

d. process data and report results

use digital tools (e.g., spreadsheets, graphs, visualization, individual response systems) to process data and display meaningful patterns. Present a report using appropriate visual formats (e.g., graphs, info graphics, 3-D animations, video, etc.).

4. Critical Thinking, Problem Solving, and Decision Making

Students use critical thinking skills to plan and conduct research, manage projects, solve problems and make informed decisions using appropriate digital tools and resources. Students:

a. identify and define authentic problems and significant questions for investigation

use print and online resources to identify significant issues for their school, community, or beyond (e.g., making their school more energy efficient, cyberbullying, reducing school trash and litter, hunger and poverty issues in their community). Record the results of their investigations along with relevant questions and analyze results (e.g., using ranking and sorting tools, visualization tools) to clarify and focus the issue or problem.

b. plan and manage activities to develop a solution or complete a project

conceptualize, guide, and manage individual or group activities using digital planning tools for completing a project or solving a problem (e.g., wikis, age-appropriate project management software, learning management system, social bookmarking tools).

c. collect and analyze data to identify solutions and/or make informed decisions

select and apply digital tools to collect, organize, and analyze data for evaluating theories and testing hypotheses (e.g., cause and effect tools, spreadsheets, graphs, modeling and simulation tools).

d. use multiple processes and diverse perspectives to explore alternative solutions

apply digital tools and resources (e.g., online surveys, video interviews, blogs, forums, wikis, webinars) to explore a topic from the perspective of multiple stakeholders and propose more than one possible solution.

5. Digital Citizenship

Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. Students:

a. advocate and practice safe, legal, and responsible use of information and technology

research, discuss, and apply safe, responsible, and legal use of technology (e.g., privacy, security, copyright, file-sharing, accessibility, plagiarism). Use technology resources to convey the relevance of these issues to other students and the public at large.

b. exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity

select and apply technology resources and describe how these tools improve their ability to communicate, collaborate, be productive, and achieve goals.

c. demonstrate personal responsibility for lifelong learning

describe how they select and use technology resources to pursue their personal and academic learning projects outside of the classroom.

d. exhibit leadership for digital citizenship

identify and discuss the effects of existing and emerging technology on individuals, society, and the global community (e.g., access of have and have nots; screen time on health and fitness, multitasking on attention and deeper comprehension; energy used by digital tools and effects on the environment). Model positive digital behaviors.

6. Technology Operations and Concepts

Students demonstrate a sound understanding of technology concepts, systems, and operations. Students:

a. understand and use technology systems

demonstrate an understanding of the basic features of computer and network interfaces and use them efficiently without assistance. Explore and apply a variety of technology systems and resources (e.g., graphing calculators, smartphones, Internet-connected digital devices, digital cameras, probes, e-books, individual response systems, electronic white boards) to complete learning tasks. Apply basic technology-based thinking strategies (e.g., automated search methods, storage and retrieval techniques, algorithmic thinking) to a variety of problems.

b. select and use applications effectively and productively

apply criteria for selecting an appropriate technology application for use with a learning activity. Use the application proficiently to complete the task. Discuss its efficiency and effectiveness.

c. troubleshoot systems and applications

determine the source of common operational and network problems (e.g., loss of connectivity, frozen screen, printing problems, reloading) and propose changes in hardware, software, or network settings to solve them.

d. transfer current knowledge to learning of new technologies

apply basic concepts and functions (e.g., multiple windows, editing functions, navigational tools, help assistance) from previous learning to new technologies and situations.