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

independently or in groups, research a complex real-world topic using online resources (e.g., websites, databases, e-mail, and online forums). Summarize the state of knowledge about a challenge related to that topic. Analyze existing knowledge and develop and capture new ideas (e.g., using search tools to analyze text, spreadsheets to tabulate and chart numerical data, or graphic organizers to create concept maps). Extend knowledge by developing new ideas, products, or processes or contributing comments and reflections to others' work.

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

design, develop, and test a product (e.g., website that meets accessibility requirements, multimedia, Web 2.0 creation) that incorporates original individual or collaborative works (including mashups), and includes commentary demonstrating analysis of the elements and techniques for using the medium.

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

use a dynamic technology-based simulation of a complex, real-world system designed to show the results of manipulating independent variables. Develop a 3-D animation to model a complex process such as cell division or how something works or changes over time. Use a geographical information system (GIS) to analyze effects of a natural disaster on a particular area.

d. d. identify trends and forecast possibilities

use technology-based models and simulations to depict and predict the behavior of complex systems (e.g., use GIS modeling to predict future growth patterns in a community, use visualization software to explore changes in weather patterns, tables of values to identify and apply numerical patterns, concept maps to identify likely future interrelationships).

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 with peers and field-specific experts to research a real-world, global issue, use digital tools and resources to explore potential solutions, and submit results for publication to appropriate channels (e.g., national competitions for solutions, local newspaper editorials, online blogs and networks).

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

collaborate with local and global partners and content experts to develop multimedia presentations incorporating a variety of media elements (e.g., clip art, movies, animations, graphs, concept maps) to clearly illustrate, explain, explore, or demonstrate a demanding/complex concept, principle, or procedure appropriate for specific audiences (e.g., audience with specific level of knowledge or perspectives).

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

engage in collaborative research with students and experts from other countries to develop cultural understanding by exploring sophisticated global issues. Create a product that increases understanding of a global issue for a variety of audiences/stakeholders.

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

collaborate to research, select, and apply advanced technology resources (e.g., expert systems, intelligent agents, real-world models and simulations) to investigate a real-world problem or issue. Share findings through real-time and/or recorded demonstrations to classmates and a broader audience online.

3. Research and Information Fluency

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

a. plan strategies to guide inquiry

define a research thesis or issue for investigation (e.g., determine best examples of responsible disposal practices, explore how natural resources affect nations and potential conflict among them, explore the role technology plays in the history of a people). As part of a systematic research approach, describe a variety of strategies for gathering information (e.g., determine appropriate search engine database, share links with important text highlighted using social bookmarking tools, collect data using digital probes and/or student response systems, access news from information aggregators); for analyzing data; for reaching a conclusion, or for making recommendation(s). Reflect on and justify selection of strategies for guiding inquiry

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

apply efficient and effective search strategies (e.g., including applying advanced options on your search engine such as Boolean logic) for locating digital resources for use in a collaborative real-world research project. Organize and synthesize data (e.g., online collaborative and productivity tools) to guide decision making and/or conclusions. Document sources using a process and format appropriate for digital publication.

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

determine criteria for choosing digital tools and resources (ease of use, cost-effectiveness, availability of digital tools and credibility, authenticity, timeliness of resources) and justify selection based on an iterative, collaborative process.

d. process data and report results

analyze complex data sets (e.g., weather data, population statistics, other content-related data using an advanced database query tool or software tools) to develop hypotheses, test theories, or propose solutions to real-world problems. Use appropriate formats to effectively communicate results to specific audience(s).

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

apply technology-based problem-solving strategies (e.g., digital search strategies, visual representations, simulations) to identify, research, and model effects of complex problems and issues (individual, local, global). Present ideas for innovative sustainable solutions.

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

Using appropriate digital tools (e.g. project management and collaborative tools), organize steps and develop a systematic plan, describe activities, allocate resources, and define criteria for measuring success in achieving project goals. Implement activities and make changes based on ongoing assessment.

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

apply technology-based problem-solving strategies (e.g., simulations, visual representations, developing and implementing algorithms, modularity). Select appropriate tools to make predictions, solve a problem, and report/disseminate results.

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

apply targeted research, sampling techniques, simulations, and critical-thinking skills to determine how varying circumstances, resources, beliefs, and other factors related to specific locations or communities may affect decisions and/or solutions/practices.

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

analyze and evaluate consequences and costs of unethical use of information and computer technology (e.g., hacking, spamming, consumer fraud, virus setting, privacy intrusion). Identify methods for addressing these risks. Put processes and systems into place to protect people, information, and technology systems.

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

lead, organize, and facilitate use of collaboration, communications tools, and productivity tools among group members to achieve team goals.

c. demonstrate personal responsibility for lifelong learning

select and apply technology resources to support personal growth, lifelong learning, and career needs.

d. exhibit leadership for digital citizenship

explore the social, ethical, and legal issues related to the use of technology resources locally and globally. Propose and advocate a course of action to anticipate and resolve problems.

6. Technology Operations and Concepts

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

a. understand and use technology systems

communicate about technology using developmentally appropriate and accurate terminology (e.g., be able to identify and refer to parts of the computer with proper terms). Perform basic hardware and software operations (e.g., copy and paste, navigate among open windows, use input devices, control sound and brightness of image, undo/redo). Demonstrate the ability to navigate in electronic environments (e.g., e-books, educational games and simulations, digital presentation software, mobile devices, and websites) with assistance as needed.

b. select and use applications effectively and productively

select from a teacher-approved list and independently apply age-appropriate applications and resources to address content-related tasks and problems (e.g., use games to practice basic skills, text readers and e-books to read, word processors to write, digital cameras to record stages in science projects, graphics programs to draw).

c. troubleshoot systems and applications

identify and, with the help of the teacher, resolve common problems that occur during everyday use (e.g., frozen screen, failure to print, difficulty accessing Internet, computer doesn't power up).

d. transfer current knowledge to learning of new technologies

recognize common terminology, icons, and symbols related to basic functions of technology and apply that knowledge to new technologies.