**Standard 1:** Technology Literacy: **Each Iowa student will be empowered with the technological knowledge and skills to learn effectively and live productively.**

1. **Grade Level Benchmark:** Demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

**Objective(s):**

1. Apply existing knowledge to generate new ideas, products, or processes.
   1. Students design, develop, create, and/or test self-generated digital learning objects that are accessible by as many users as possible, and demonstrate knowledge and skills related to curriculum content.
   2. Knows that alternatives, risks, costs, and benefits must be considered when deciding on proposals to introduce new technologies or to curtail existing ones
   3. Knows that technology can benefit the environment by providing scientific information, providing new solutions to older problems, and reducing the negative consequences of existing technology
   4. Knows that mathematics, creativity, logic, and originality are all needed to improve technology
   5. Knows that a system usually has some properties that are different from those of its parts, but appear because of the interaction of those parts
2. Create original works as a means of personal or group expression.
   1. Students individually or collaboratively create media-rich products to be displayed, published, or performed for a variety of audiences.
   2. Uses desktop publishing software to create a variety of publications
   3. Designs and creates comprehensive websites (e.g., identifies needs of target audience; creates readable, searchable content; meets accessibility requirements; tests, implements, and evaluates final product)
   4. Knows that mathematics, creativity, logic, and originality are all needed to improve technology
3. Use models and simulations to explore complex systems and issues.
   1. Students employ curriculum-specific, technology-based simulations to aid them in understanding complex, real-world systems. Simulation studies include formulating problems, developing models, running models, and analyzing outputs that help predict behaviors and outcomes
   2. Knows that an optimal solution to a design problem is more likely to be found when the process followed is systematic and repetitive
   3. Proposes designs and uses models, simulations, and other tests to choose an optimal solution
   4. Implements a proposed solution
   5. Knows that a design involves different design factors and design principles
   6. Knows that understanding how things work and designing solutions to problems of almost any kind can be facilitated by systems thinking, which employs mathematical modeling and simulation
   7. Knows that systems are embedded within larger systems, including technological, social, and environmental systems
   8. Understands scientific principles of energy, work, and power in relation to technological design
4. Identify trends and forecast possibilities.
   1. Students investigate complex global issues, make informed choices based on capabilities and limitations of technology systems, resources, and services, and apply this learning to personal and workplace needs.
   2. Knows that alternatives, risks, costs, and benefits must be considered when deciding on proposals to introduce new technologies or to curtail existing ones
   3. Knows examples of advanced and emerging technologies and how they could impact society
   4. Knows that the rate of technological development and diffusion is increasing rapidly, even though individual technologies may be developed at a slow pace due to technical difficulties or consumer resistance
   5. Knows that even in simple systems, accurate prediction of the effect of changing some part of the system is not always possible
5. **Grade Level Benchmark:** 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.

**Objective(s):**

1. Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media.
   1. Using technology, students interact and collaborate with peers, experts, and others to contribute to a content-related, media-rich knowledge base by compiling, synthesizing, producing, and disseminating information, models, and other creative works.
   2. Understands the uses of listservs, RSS feeds and social networks
2. Communicate information and ideas effectively to multiple audiences using a variety of media and formats.
   1. Students use technology tools and resources, including distance and distributed education, for effectively exchanging information with a variety of audiences in an array of media-rich formats.
   2. Understands the uses of listservs, RSS feeds and social networks
   3. Uses desktop publishing software to create a variety of publications
   4. Designs and creates comprehensive websites (e.g., identifies needs or target audience; creates readable, searchable content; ;meets accessibility requirements; tests, implements, and evaluates final product)
   5. Knows that communication systems can transfer information from person to person or machine to machine
3. Develop cultural understanding and global awareness by engaging with learners of other cultures.
   1. Students use a variety of existing online tools and emerging technologies for communicating with and learning about people of other cultures. Students investigate, communicate, and understand cultural norms manifested in music, literature, painting and sculpture, and theater and film, resulting in greater global awareness.
   2. Understands the uses of listservs, RSS feeds and social networks
   3. Designs and creates comprehensive websites (e.g., identifies needs of target audience; creates readable, searchable content; meets accessibility requirements; tests, implements, and evaluates final product)
   4. Knows ways in which social and economic forces influence which technologies will be developed and used
   5. Observes common courtesies and acceptable use policies while telecomputing
4. Appropriately contribute to project teams to produce original works or solve problems.
   1. Students share knowledge and skills with local or distance teams of peers, experts, or others using technological tools and resources to create collaborative works and/or innovative sustainable solutions.
   2. Proposes designs and uses models, simulations, and other tests to choose an optimal solution
   3. Implements a proposed solution
5. **Grade Level Benchmark:** Apply digital tools to gather, evaluate, and use information.

**Objective(s):**

1. Plan strategies to guide inquiry.
   1. Students design a process which establishes criteria for selecting digital tools and resources to use for in-depth investigation of a real-world task and justify the selection based on efficiency and effectiveness.
   2. Knows that science and technology are pursued for different purposes
   3. Knows that in defining a system, it is important to specify its boundaries and subsystems, indicate its relation to other systems, and identify what its input and its output are expected to be
2. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
   1. Students model legal and ethical behaviors when using information and technology by properly selecting, acquiring, and citing resources for research, information analysis, problem solving, and decision making in content learning.
   2. Designs and creates comprehensive websites (e.g., identifies needs of target audience; creates readable, searchable content; meets accessibility requirements; tests, implements, and evaluates final product)
   3. Knows that science and technology are pursued for different purposes
   4. Evaluates a designed solution and its consequences based on the needs or criteria the solution was designed to meet
   5. Knows that in defining a system, it is important to specify its boundaries and subsystems, indicate its relation to other systems, and identify what its input and its output are expected to be
3. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks.
   1. Students access information efficiently and effectively, evaluate information critically and competently, and use digital information and tools accurately and creatively for the issue or problem at hand.
   2. Knows the role of technology in a variety of careers
   3. Evaluates a designed solution and its consequences based on the needs or criteria the solution was designed to meet
   4. Knows that complex systems are subject to failure and are designed with various elements and procedures that help reduce system failure
   5. Knows that genetic engineering is the process by which controlled changes in a genetic structure can be made and that this process is used to research and diagnose disease and create pharmaceuticals
   6. Knows that biotechnology is used in a variety of areas and requires specific scientific knowledge about the natural system being modified
4. Process data and report results.
   1. Students use technological tools to select, organize, and analyze data, convert that information into easily understood knowledge, and effectively convey the results to an intended audience.
   2. Identifies some advanced features of software products (e.g., galleries, templates, macros, mail merge)
   3. Uses desktop publishing software to create a variety of publications
   4. Proposes designs and uses models, simulations, and other tests to choose an optimal solution
   5. Implements a proposed solution
   6. Evaluates a designed solution and its consequences based on the needs or criteria the solution was designed to met
5. **Grade Level Benchmark:** Demonstrate critical thinking skills using appropriate tools and resources to plan and conduct research, manage projects, solve problems and make informed decisions.

**Objective(s):**

1. Identify and define authentic, real-world problems and significant questions for investigation.
   1. Students identify global issues and analyze capabilities and limitations of current and emerging technology resources in order to develop and refine investigatible questions.
   2. Knows limitations and trade-offs of current and emerging computer-related hardware (e.g., laptops, printers, scanners, smart phones, PDAs)
   3. Knows that science and technology are pursued for different purposes
   4. Knows how feedback can be used to help monitor, control, and stabilize the operation of a system
   5. Knows different requirements for structural design and that these structures require maintenance
2. Plan and manage activities to develop a solution or complete a project.
   1. Students effectively use multiple technologies and resources to develop a systematic plan for conducting research in order to assess potential sustainable solutions, or to develop a complete product to demonstrate knowledge and skills.
   2. Constructs and operates systems
3. Collect and analyze data to identify trends, solutions, or make informed decisions.
   1. Students use technology to gather appropriate data, analyze its application to a task, and assess its effectiveness in order to design, develop, and test possible solutions that assist students in making decisions.
   2. Knows that technology can benefit the environment by providing scientific information, providing new solutions to older problems, and reducing the negative consequences of existing technology
   3. Knows that an optimal solution to a design problem is more likely to be found when the process followed is systematic and repetitive
   4. Knows that understanding how things work and designing solutions to problems of almost any kind can be facilitated by systems thinking, which employs mathematical modeling and simulation
   5. Knows that in defining a system, it is important to specify its boundaries and subsystems, indicate its relation to other systems, and identify what its input and its output are expected to be
   6. Knows that even in simple systems, accurate prediction of the effect of changing some part of the system is not always possible
   7. Knows that genetic engineering is the process by which controlled changes in a genetic structure can be made and that this process is used to research and diagnose disease and create pharmaceuticals
   8. Knows that communication systems can transfer information from person to person or machine to machine
   9. Knows that modern transportation systems are diverse, intelligent, and are necessary in the functioning of most other technologies
   10. Knows that there are different types of manufacturing systems and manufacturing results in two different types of goods, durable and non-durable
   11. Knows different requirements for structural design and that these structures require maintenance
4. Use multiple processes and diverse perspectives to explore alternative solutions.
   1. Students use multiple perspectives to analyze and evaluate information from a variety of technological resources. Students critically assess numerous solutions and investigate them from differing viewpoints.
   2. Identifies malfunctions and problems in hardware (e.g., hard drive crash, monitor burn-out)
   3. Knows that alternatives, risks, costs, and benefits must be considered when deciding on proposals to introduce new technologies or to curtail existing ones
   4. Knows that an optimal solution to a design problem is more likely to be found when the process followed is systematic and repetitive
   5. Constructs and operates systems
   6. Knows that biotechnology is used in a variety of areas and requires specific scientific knowledge about the natural system being modified
   7. Knows that power systems have a source of energy, a process, loads, and some have a feedback system
   8. Knows that communication systems can transfer information from person to person or machine to machine
   9. Knows that modern transportation systems are diverse, intelligent, and are necessary in the functioning of most other technologies
   10. Knows that there are different types of manufacturing systems and manufacturing results in two different types of goods, durable and non-durable
5. **Grade Level Benchmark:** Understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

**Objective(s):**

1. Advocate and practice safe, legal, and responsible use of information and technology at an age-appropriate level.
   1. Students use technology efficiently and in a manner that does not harm them or others. Their choices demonstrate and advocate for legal and ethical behaviors among peers, family, and community regarding the use of technology and information. Students understand the concept of acceptable use of copyrighted materials, and how disregarding intellectual property affects others.
   2. Understands the uses of listserves, RSS feeds and social networks
   3. Knows how to import and export text, data, and graphics between software programs
   4. Designs and creates comprehensive websites (e.g., identifies needs of target audience; creates readable, searchable content; meets accessibility requirements; tests, implements, and evaluates final product)
   5. Knows ways in which social and economic forces influence which technologies will be developed and used
   6. Knows that technological knowledge is often not made public because of patents and the financial potential of the idea or invention; scientific knowledge is made public through presentations at professional meetings and publications in scientific journals
   7. Observes common courtesies and acceptable use policies while telecomputing
   8. Understands the impact of the internet on society
2. Exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity.
   1. Students willingly and routinely use online resources to meet needs for collaboration, research, publication, communication, and productivity. Evidence for a positive attitude includes a proclivity to help others with the use of technology in their learning.
   2. Knows that technological knowledge is often not made public because of patents and the financial potential of the idea or invention; scientific knowledge is made public through presentations at professional meetings and publications in scientific journals
   3. Understands the impact of the internet on society
3. Demonstrate personal responsibility for lifelong learning.
   1. Students use their skills to identify capabilities and limitations of contemporary and emerging technology resources and assess the potential of these systems and services to address personal, lifelong learning, and workplace needs. They use this knowledge to make informed choices among technology systems, resources, and services.
   2. Knows ways in which social and economic forces influence which technologies will be developed and used
   3. Knows examples of advanced and emerging technologies and how they could impact society
4. Exhibit leadership for digital citizenship.
   1. Students use their skills to identify capabilities and limitations of contemporary and emerging technology resources and assess the potential of these systems and services to address personal, lifelong learning, and workplace needs. They use this knowledge to make informed choices among technology systems, resources, and services.
   2. Understands the uses of listservs, RSS feeds and social networks
   3. Knows how to import and export text, data, and graphics between software programs
   4. Designs and creates comprehensive websites (e.g., identifies needs of target audience; creates readable, searchable content; meets accessibility requirements; tests, implements, and evaluates final product)
   5. Observes common courtesies and acceptable use policies while telecomputing
   6. Understands the impact of the internet on society
5. **Grade Level Benchmark:** Demonstrate a sound understanding of technology concepts, systems and operations.

**Objective(s):**

1. Understand and use technology systems
   1. Students adapt to evolving technology systems and apply them for everyday use. They also interpret the underlying structure of the system so it can be used for multiple purposes and applied to unique situations.
   2. Knows limitations and trade-offs of current and emerging computer-related hardware (e.g., laptops, printers, scanners, smart phones, PDAs)
   3. Knows that a design involves different design factors and design principles
   4. Knows that understanding how things work and designing solutions to problems of almost any kind can be facilitated by systems thinking, which employs mathematical modeling and simulation
   5. Knows how feedback can e used to help monitor, control, and stabilize the operation of a system
   6. Constructs and operates systems
   7. Knows that complex systems are subject to failure and are designed with various elements and procedures that help reduce system failure
   8. Knows that systems are embedded within larger systems, including technological, social, and environmental systems
   9. Knows that genetic engineering is the process by which controlled changes in a genetic structure can be made and that this process is used to research and diagnose disease and create pharmaceuticals
   10. Knows that biotechnology is used in a variety of areas and requires specific scientific knowledge about the natural system being modified
   11. Understands scientific principles of energy, work, and power in relation to technological design
   12. Knows that power systems have a source of energy, a process, loads, and some have a feedback system
   13. Knows that communication systems can transfer information from person to person or machine to machine
   14. Knows that modern transportation systems are diverse, intelligent, and are necessary in the functioning of most other technologies
   15. Knows that there are different types of manufacturing systems and manufacturing results in two different types of goods, durable and non-durable
   16. Knows different requirements for structural design and that these structures require maintenance
2. Select and use applications effectively and productively
   1. Students select and apply technology tools for research, information analysis, problem solving, and decision making. Students use technology tools and resources for managing and communicating personal and professional information (e.g., finances, schedules, addresses, purchases, correspondence).
   2. Knows how to import and export text, data, and graphics between software programs
   3. Identifies some advanced features of software products (e.g., galleries, templates, macros, mail merge)
   4. Knows the role of technology in a variety of careers
   5. Constructs and operates systems
3. Troubleshoot systems and applications.
   1. Students utilize a working knowledge of technology or technological support services to identify a problem/issue and its solution.
   2. Identifies malfunctions and problems in hardware (e.g., hard drive crash, monitor burn-out)
   3. Knows how feedback can be used to help monitor, control, and stabilize the operation of a system
   4. Knows that even in simple systems, accurate prediction of the effect of changing some part of the system is not always possible
   5. Constructs and operates systems
   6. Knows that complex systems are subject to failure and are designed with various elements and procedures that help reduce system failure
4. Transfer current knowledge to learning of new technologies.
   1. Students apply what they know of one technology to intuitively utilize other technologies.
   2. Knows examples of advanced and emerging technologies and how they could impact society
   3. Knows that mathematics, creativity, logic, and originality are all needed to improve technology
   4. Knows that a system usually has some properties that are different from those of its parts, but appear because of the interaction of those parts