

**PROPOSED REGULATION OF THE
STATE BOARD OF EDUCATION**

LCB FILE NO. R041-18I

**The following document is the initial draft regulation proposed
by the agency submitted on 03/08/2018**

NEVADA DEPARTMENT OF EDUCATION

NEVADA STATE BOARD OF EDUCATION

NAC 389.XXX “Computer Science” defined. (NRS 385.080) “Computer Science” is the study of computers and algorithmic processes, including their principles, their hardware and software designs, their applications, and their impact on society.

NAC 389.2424 Kindergarten through second grade: Technology and computers. (NRS 385.080, 385.110, 389.0185, 389.520) Instruction in kindergarten through the second grade in technology and computers must be designed so that pupils meet the following performance standards by the completion of the second grade:

1. For the areas of creativity and innovation, demonstrate creative thinking, build knowledge and develop innovative products and processes using technology, as demonstrated by the ability of the pupil to:

- (a) Use digital tools to brainstorm and organize ideas;
- (b) Create an original work using a variety of digital tools to demonstrate personal or group expression;
- (c) With assistance from the teacher, use digital models and simulations; and
- (d) Identify patterns and predict possibilities in data from the classroom using digital tools.

2. For the areas of communication and collaboration, use digital media and environments to communicate and work in collaboration with other pupils, including pupils outside of the classroom, to support the learning of the pupil and the learning of other pupils, as demonstrated by the ability of the pupil to:

- (a) Work in groups in the classroom to create and publish digital products;
- (b) Communicate information and ideas to other pupils and the parents of the pupil using digital text and illustrations;
- (c) Use digital resources to learn about places, persons, celebrations and maps; and
- (d) Work in a team to solve problems using digital tools.

3. For the area of fluency of research and information, gather, evaluate and use information, as demonstrated by the ability of the pupil to:

- (a) Determine the steps necessary to answer a question using digital tools;
- (b) Identify and organize keywords and use multiple sources to answer a question;
- (c) Recognize that different sources of information and digital tools are appropriate for completing different tasks; and
- (d) Collect and display data using a variety of technological resources and report the results.

4. For the areas of critical thinking, problem solving and decision making, use critical thinking skills to plan and conduct research, manage projects, solve problems and make informed decisions using the digital tools and resources that are appropriate for the specific task, as demonstrated by the ability of the pupil to:

- (a) Investigate a problem that arises in an everyday situation using digital resources;
- (b) Use a digital planning tool;
- (c) Use data to answer a problem that arises in an everyday situation using digital tools; and
- (d) Explore alternative solutions to and diverse perspectives on problems that arise in everyday situations using digital tools.

5. For the area of the appropriate use of technology, understand human, cultural and societal issues relating to technology and practice legal and ethical behaviors when using technology, as demonstrated by the ability of the pupil to:

- (a) List the rules of the classroom governing the safe use of technology;
- (b) List potential dangers in digital environments and how to report situations that are potentially unsafe;
- (c) Use technologies in learning activities;
- (d) Describe how technology can enhance learning; and
- (e) Describe what it means to use technology in an appropriate manner and the responsibilities associated with using technology.

6. For the areas of technological operations and concepts, demonstrate an understanding of technological concepts, systems and operations, as demonstrated by the ability of the pupil to:

- (a) List examples of technological tools;
- (b) Use proper techniques for basic keyboarding skills;
- (c) Use software that is appropriate for the age of the pupil;
- (d) Demonstrate proper care of equipment; and
- (e) Use routine procedures for the technological tools in the classroom.

7. For the areas of algorithms and programming, demonstrate an understanding of algorithms, program development, variables, control, and modularity, as demonstrated by the ability of the pupil to:

- (a) Model daily processes by creating and following sets of step-by-step instructions (algorithms) to complete tasks;
- (b) Identify and fix (debug) errors in a sequence of instructions (algorithms) that includes loops;
- (c) Describe the iterative process of program development;
- (d) Develop plans that describe a program's sequence of events, goals, and expected outcomes;
- (e) Give attribution (credit) when using the ideas and creations of others while developing programs;
- (f) Model the way programs stores and manipulate data by using numbers or other symbols to represent information;
- (g) Develop programs with sequences and loops, to express ideas or address a problem; and
- (h) Break down (decompose) the steps needed to solve a problem into a precise sequence of instructions.

8. For the area of computing systems, demonstrate an understanding of hardware, software, devices, and troubleshooting, as demonstrated by the ability of the pupil to:

- (a) Use appropriate terminology in identifying and describing the function of common physical components of computer systems (hardware);
- (b) Recognize some computing devices can perform a variety of tasks and some computing devices are specialized;
- (c) Select and operate appropriate device and software to perform a variety of tasks, and recognize that users have different needs and preferences for the technology they use; and
- (d) Describe basic hardware and software problems using accurate terminology.

9. For the areas of data and analysis, demonstrate an understanding of storage, as demonstrated by the ability of the pupil to:

- (a) Recognize that data can be collected and stored on different computing devices over time;

(b) Recognize that a variety of data can be stored in and retrieved from a computing device; and

(c) Store, copy, search, retrieve, modify, and delete information using a computing device and define the information stored as data.

10. For the area of impacts of computing, demonstrate an understanding of culture, social interactions, safety, law, and ethics, as demonstrated by the ability of the pupil to:

(a) Understand how computing devices have changed people's lives;

(b) Compare how people live and work before and after the implementation or adoption of new computing technology;

(c) Exhibit good digital citizenship using technology safely, responsibly, and ethically;

(d) Work respectfully and responsibly with others online; and

(e) Identify safe and unsafe examples of online communications.

11. For the areas of networks and the internet, demonstrate an understanding of cybersecurity, as demonstrated by the ability of the pupil to:

(a) Explain that a password helps protect the privacy of information;

(b) Explain why we keep personal information private; and

(c) Explain what passwords are and why we use them; use strong passwords to protect devices and information from unauthorized access.

NAC 389.2948 Third through [Fifth] fifth {grade} grades: Technology and computers. (NRS 385.080, 385.110, 389.0185, 389.520) By the beginning of the fifth grade, pupils must know and be able to do everything required in the previous grades for technology and computers offered in public schools. Instruction in the fifth grade in technology and computers must be designed so that pupils meet the following performance standards by the completion of the fifth grade:

1. For the areas of creativity and innovation, demonstrate creative thinking, build knowledge and develop innovative products and processes using technology, as demonstrated by the ability of the pupil to:

(a) Process new ideas that are based on prior knowledge to brainstorm solutions to a problem that arises in an everyday situation using digital tools;

(b) With limited assistance from the teacher, create an original work in a digital format to demonstrate personal or group expression;

(c) Use digital models and simulations to explore complex systems and issues; and

(d) Identify and represent trends to make predictions using data from the classroom.

2. For the areas of communication and collaboration, use digital media and environments to communicate and work in collaboration with other pupils, including pupils outside of the classroom, to support the learning of the pupil and the learning of other pupils, as demonstrated by the ability of the pupil to:

(a) Collaborate with other pupils to create and publish a digital product and make the product available outside the classroom;

(b) Communicate information and ideas using digital text, images and sound;

(c) Describe the appropriate media and format for a specific audience;

(d) Use digital resources to research places, persons and different cultures from around the world;

(e) Contribute to a group to produce an original work in a digital format; and

(f) Describe the different ways to interact with other persons and contribute to a digital product.

3. For the area of fluency of research and information, gather, evaluate and use information, as demonstrated by the ability of the pupil to:

- (a) For a research project, use digital tools to plan a timeline and track the progress of the project;
- (b) Use keywords to search, organize, locate and synthesize information in multiple sources to create an original product;
- (c) Explain the importance of using more than one source and recognize the possible biases in digital resources;
- (d) Discern the differences between fact and opinion in digital content;
- (e) Choose and use a digital tool that is appropriate for a task; and
- (f) Collect, organize, analyze and manipulate data using digital tools and report the results in a format that is appropriate to the task.

4. For the areas of critical thinking, problem solving and decision making, use critical thinking skills to plan and conduct research, manage projects, solve problems and make informed decisions using the digital tools and resources that are appropriate for the specific task, as demonstrated by the ability of the pupil to:

- (a) Develop questions that will guide the pupil in the investigation of a problem that arises in an everyday situation using digital resources;
- (b) Plan and manage projects using a digital planning tool;
- (c) Propose a solution to a problem that arises in an everyday situation using digital tools and data that has been collected; and
- (d) Explore alternative solutions to and diverse perspectives on problems that arise in everyday situations and propose a solution to those problems using digital tools.

5. For the area of the appropriate use of technology, understand human, cultural and societal issues relating to technology and practice legal and ethical behaviors when using technology, as demonstrated by the ability of the pupil to:

- (a) Describe the code of conduct for the use of technology at the school in which the pupil is enrolled and the consequences of violating that code of conduct;
- (b) Describe unacceptable and unsafe behaviors when using technology, including, without limitation, cyber-bullying, divulging personal information and plagiarism;
- (c) Use technological resources for solving problems, directing personal learning, collaborating and extending learning activities;
- (d) Describe why a pupil needs lifelong learning in a world that is global and dynamic; and
- (e) Explain the concepts of using technology in an appropriate manner, accessing technology in an appropriate manner and technological literacy, and explain the personal and societal responsibilities associated with those concepts.

6. For the areas of technological operations and concepts, demonstrate an understanding of technological concepts, systems and operations, as demonstrated by the ability of the pupil to:

- (a) Give examples of technological systems;
 - (b) Demonstrate appropriate keyboarding skills;
 - (c) Choose the appropriate digital tools for a specific learning activity;
 - (d) Analyze and apply specific strategies for solving common hardware and software problems;
- and
- (e) Generalize routine procedures for a variety of technologies.

7. For the areas of algorithms and programming, demonstrate an understanding of algorithms, program development, variables, control, and modularity, as demonstrated by the ability of the pupil to:

- (a) Test, compare, and refine multiple algorithms for the same task and determine which is the most appropriate;

- (b) Debug errors in an algorithm or program that includes sequences and loops;
- (c) Take on varying roles with teacher guidance, when collaborating with peers during the design, implementation, and review stages of program development;
- (d) Test and debug errors in a program or algorithm to ensure it runs as intended;
- (e) Use the iterative process to develop a program to express an idea or address a problem while considering others' perspectives and preferences;
- (f) Describe choices made during program development using code comments, presentations, and demonstrations;
- (g) Observe intellectual property rights and give appropriate attribution when creating or remixing programs;
- (h) Create programs that use variables to store and modify data;
- (i) Develop programs that include sequences, events, loops, and conditionals;
- (j) Explore how complex tasks can be decomposed into simple tasks and how simple tasks can be composed into complex tasks;
- (k) Demonstrate how to decompose a task of complexity into simple tasks and compose a simple task into tasks of complexity; and
- (l) Modify, incorporate, and test portions of an existing program into their own work, to develop something new or add more advanced features.

8. For the area of computing systems, demonstrate an understanding of hardware, software, devices, and troubleshooting, as demonstrated by the ability of the pupil to:

- (a) Model how computer hardware and software work together as a system to accomplish tasks;
- (b) Describe how internal and external parts of computing devices function to form a system; and
- (c) Determine potential solutions to solve simple hardware and software problems using common troubleshooting strategies.

9. For the areas of data and analysis, demonstrate an understanding of storage, collection, visualization, transformation, inference, and models, as demonstrated by the ability of the pupil to:

- (a) Organize and present collected data visually to highlight relationships and support a claim;
- (b) Use data to highlight or propose cause-and-effect relationships, predict outcomes, or communicate ideas; and
- (c) Recognize how text, images, and sounds are represented as binary numbers in computing devices.

10. For the area of impacts of computing, demonstrate an understanding of culture, social interactions, safety, law, and ethics, as demonstrated by the ability of the pupil to:

- (a) Discuss computing technologies that have changed the world, and express how those technologies influence and are influenced by cultural practices;
- (b) Compare and contrast how computing has changed society from the past to the present;
- (c) Brainstorm ways to improve the accessibility and usability of technology products for the diverse needs and wants of users;
- (d) Seek diverse perspectives for the purpose of improving computational artifacts; and
- (e) Use public domain or creative commons media, and refrain from copying or using material created by others without permission.

11. For the areas of networks and the internet, demonstrate an understanding of cybersecurity, network, communication, and organization, as demonstrated by the ability of the pupil to:

- (a) Discuss real-world cybersecurity problems and how personal information can be protected;*
- (b) Model how information is broken down into smaller pieces, transmitted as packets through multiple devices over networks and the internet, and reassembled at the destination;*
- (c) Explain the concept of network protocols; and*
- (d) Identify the advantages and disadvantages of various network types.*

NAC 389.3905 Sixth through ~~Eighth~~ eighth ~~grade~~ grades: Technology and computers. (NRS 385.080, 385.110, 389.0185, 389.520) By the beginning of the eighth grade, pupils must know and be able to do everything required in the previous grades for technology and computers offered in public schools. Instruction in the eighth grade in technology and computers must be designed so that pupils meet the following performance standards by the completion of the eighth grade:

1. For the areas of creativity and innovation, demonstrate creative thinking, build knowledge and develop innovative products and processes using technology, as demonstrated by the ability of the pupil to:

- (a) Independently apply prior knowledge to develop new ideas, products or processes using digital tools;
- (b) Create an original work in a digital format to demonstrate personal or group expression;
- (c) Use digital models and simulations to answer questions or solve problems; and
- (d) Use technology to track trends, predict possibilities, and make and justify predictions using evidence, experiments and collaboration.

2. For the areas of communication and collaboration, use digital media and environments to communicate and work in collaboration with other pupils, including pupils outside of the classroom, to support the learning of the pupil and the learning of other pupils, as demonstrated by the ability of the pupil to:

- (a) Collaborate with other pupils to create and publish digital products for real audiences in a variety of digital environments;
- (b) Communicate information and ideas using digital text, images, sounds and video;
- (c) Create digital products in formats that are appropriate for specific audiences and purposes;
- (d) Use digital resources to communicate with other pupils and persons from a variety of cultures and places;
- (e) Contribute to a group project to produce original works or solve problems; and
- (f) Choose a method of interacting electronically for a specific goal or purpose.

3. For the area of fluency of research and information, gather, evaluate and use information, as demonstrated by the ability of the pupil to:

- (a) Use digital tools to plan and organize a research-based inquiry;
- (b) For a research project, use digital tools to plan a timeline, track the progress of the project and cite the sources the pupil used for the project;
- (c) Use techniques for advanced searches to locate, access, synthesize and evaluate information in multiple sources to create an original product;
- (d) Use digital tools to organize information with main ideas and supporting documents;
- (e) Evaluate and compare facts and opinions in different sources of digital content and describe the point of view of the content;
- (f) Choose and justify the use of appropriate digital resources to accomplish a variety of tasks;

- (g) Use multiple digital tools to collect and process data to test theories and hypotheses; and
- (h) Use a variety of formats to report results and evaluate the strengths and weaknesses of those formats.

4. For the areas of critical thinking, problem solving and decision making, use critical thinking skills to plan and conduct research, manage projects, solve problems and make informed decisions using the digital tools and resources that are appropriate for the specific task, as demonstrated by the ability of the pupil to:

(a) Use digital resources to identify a problem that arises in an everyday situation and develop questions that will guide the pupil in the investigation of the problem;

(b) Choose the appropriate digital planning tools for a project and use those tools to complete the project;

(c) Use data, examine patterns and use digital tools to research a problem that arises in an everyday situation and present a solution to the problem; and

(d) Use multiple processes to explore alternative solutions to and diverse perspectives on problems that arise in everyday situations and use digital tools to present a solution to the problems.

5. For the area of the appropriate use of technology, understand human, cultural and societal issues relating to technology and practice legal and ethical behaviors when using technology, as demonstrated by the ability of the pupil to:

(a) Model legal and ethical behaviors while using information and technology, including, without limitation, properly selecting, acquiring and citing a resource;

(b) Develop an argument for using technological resources in a safe, legal and responsible manner;

(c) Explain the value of current and emerging technologies to persons, society and the world;

(d) Assess the potential of current and emerging technologies to address personal, societal, lifelong learning and career needs; and

(e) Describe principles of leadership and ways to use current and emerging technologies in a responsible manner to foster leadership skills.

6. For the areas of technological operations and concepts, demonstrate an understanding of technological concepts, systems and operations, as demonstrated by the ability of the pupil to:

(a) Explain the uses for and advantages of technological systems;

(b) Demonstrate keyboarding skills by completing a variety of assignments in a timely manner;

(c) Choose and justify the use of digital tools and resources to accomplish a variety of tasks;

(d) Develop and apply strategies for solving common hardware and software problems; and

(e) Apply prior knowledge of technology to a current or emerging technology to answer a question that arises in everyday situations.

7. For the areas of algorithms and programming, demonstrate an understanding of algorithms, program development, variables, control, and modularity, as demonstrated by the ability of the pupil to:

(a) Use flowcharts and/or pseudocode to address complex problems as algorithms;

(b) Design meaningful solutions for others, incorporating data from collaborative team members and the end user, to meet the end user's needs;

(c) Incorporate existing code, media, and libraries into original programs, and give attribution;

(d) Systematically test and refine programs using a range of test cases;

(e) Distribute tasks and maintain a project timeline when collaboratively developing computational artifacts; and

(f) Document programs in order to make them easier to follow, test, and debug by others.

- (g) Create clearly named variables that represent different data types and perform operations on their values;
 - (h) Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals;
 - (i) Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs; and
 - (j) Create procedures with parameters to organize code and make it easier to reuse.
8. For the area of computing systems, demonstrate an understanding of hardware, software, devices, and troubleshooting, as demonstrated by the ability of the pupil to:
- (a) Design and evaluate projects that combine hardware and software components to collect and exchange data;
 - (b) Recommend improvements to the design of computing devices based on an analysis of how users interact with the devices, noting that advantages may have disadvantages and unintended consequences; and
 - (c) Systematically identify and fix problems with computing devices and their components.
9. For the areas of data and analysis, demonstrate an understanding of storage, collection, visualization, transformation, inference, and models, as demonstrated by the ability of the pupil to:
- (a) Model encoding schema used by software tools to access data, stored as bits, into forms more easily understood by people;
 - (b) Collect data using computational tools and transform the data to make it more meaningful and useful; and
 - (c) Refine computational models based on the reliability and validity of the data they generate.
10. For the area of impacts of computing, demonstrate an understanding of culture, social interactions, safety, law, and ethics, as demonstrated by the ability of the pupil to:
- (a) Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options;
 - (b) Discuss and evaluate issues of bias and accessibility in the design of existing technologies;
 - (c) Collaborate with many contributors through strategies such as crowdsourcing or surveys when creating a computational artifact;
 - (d) Identify risks associated with sharing information digitally; and
 - (e) Evaluate how legal and ethical issues shape computing practices.
11. For the areas of networks and the internet, demonstrate an understanding of cybersecurity, network, communication, and organization, as demonstrated by the ability of the pupil to:
- (a) Explain how physical and digital security measures protect electronic information;
 - (b) Apply multiple methods of encryption to model the secure transmission of information; and
 - (c) Compare and contrast modeled protocols used in transmitting data across networks and the internet.

NAC 389.505 ~~[Technology and computers.]~~ **Computer Education and Technology** (NRS 385.080, 385.110, 389.0185, 389.520) By the beginning of high school, pupils must know and be able to do everything required in the previous grades for ~~[technology and computers]~~ computer education and technology offered in public schools. Instruction in high school in ~~[technology and computers]~~ computer

education and technology must be designed so that pupils meet the following performance standards by the completion of high school:

1. For the areas of creativity and innovation, demonstrate creative thinking, build knowledge and develop innovative products and processes using technology, as demonstrated by the ability of the pupil to:

(a) Independently or in collaboration with other pupils, apply prior and newly acquired knowledge to develop new ideas, products or processes using digital tools;

(b) Create an original work using digital tools, including, without limitation, tools for planning, researching, editing and producing the original work;

(c) Develop digital models or simulations to answer questions or solve problems; and

(d) Use technology to conduct research, conduct experiments and report data from the experiments to determine trends and possibilities and use evidence to make and justify predictions.

2. For the areas of communication and collaboration, use digital media and environments to communicate and work in collaboration with other pupils, including pupils outside of the classroom, to support the learning of the pupil and the learning of other pupils, as demonstrated by the ability of the pupil to:

(a) Collaborate electronically with other pupils, persons and experts to create and publish digital products for real audiences;

(b) Create digital text, images, sound and video for use in a communication;

(c) Critique the appropriateness of digital formats for specific audiences and purposes;

(d) Interact electronically with groups of persons who are culturally diverse for specific purposes;

(e) Contribute electronically to a group project that identifies a problem, present solutions to the problem and evaluate those solutions; and

(f) Choose and justify a method of electronically interacting with other persons for a specific goal or purpose.

3. For the area of fluency of research and information, gather, evaluate and use information, as demonstrated by the ability of the pupil to:

(a) Use digital tools to plan, organize and critique research-based inquiries;

(b) For a research project, use digital tools to plan a timeline, track the progress of the project and cite the sources the pupil used for the project;

(c) Use techniques of advanced searches to locate, access, synthesize and evaluate information in multiple sources to create an original product for a real audience;

(d) Use digital tools to organize and compare information with main ideas and supporting documents;

(e) Use digital resources to assemble and evaluate facts, opinions and points of view that are appropriate for a specific task;

(f) Evaluate how other pupils use resources that are appropriate for a specific task;

(g) Use multiple digital tools to analyze data and critique theories and hypotheses; and

(h) Evaluate digital formats for reporting results to a variety of audiences and justify the use of those formats.

4. For the areas of critical thinking, problem solving and decision making, use critical thinking skills to plan and conduct research, manage projects, solve problems and make informed decisions using the digital tools and resources that are appropriate for the specific task, as demonstrated by the ability of the pupil to:

(a) Identify a complex issue, develop a systematic plan for the investigation of the issue and present innovative solutions to the issue;

(b) Analyze the capabilities and limitations of different digital planning tools for developing solutions or completing a project;

(c) Choose and apply digital tools to collect, organize and analyze data to evaluate theories or test hypotheses; and

(d) Use multiple processes to consider diverse perspectives on a problem that arises in an everyday situation, use digital resources to derive original solutions to the problem and assess the potential of those resources to address the social, lifelong learning and career needs.

5. For the area of the appropriate use of technology, understand human, cultural and societal issues relating to technology and practice legal and ethical behaviors when using technology, as demonstrated by the ability of the pupil to:

(a) Articulate the concepts and issues concerning intellectual and digital property rights;

(b) Compare the similarities and differences between the acceptable use of technological resources at school and in the work environment;

(c) Extrapolate how technology will affect the ability of the pupil to collaborate, learn and produce in postsecondary education and in a career;

(d) Analyze the capabilities and limitations of current and emerging technologies and assess the potential of those technologies to address personal, societal, lifelong learning and career needs; and

(e) Model appropriate behaviors in the use of technology while leading a group of pupils through a collaborative project using current and emerging technologies.

6. For the areas of technological operations and concepts, demonstrate an understanding of technological concepts, systems and operations, as demonstrated by the ability of the pupil to:

(a) Describe the components of technological systems and how those components interact;

(b) Critique the selection of digital tools based on the efficiency and effectiveness of those tools;

(c) Analyze and troubleshoot common hardware and software issues to optimize learning and productivity; and

(d) Analyze the capabilities and limitations of current and emerging technologies based on the potential of those technologies to address personal learning, career needs and societal issues.

7. For the areas of algorithms and programming, demonstrate an understanding of algorithms, control, modularity, program development, and variables, as demonstrated by the ability of the pupil to:

(a) Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests;

(b) Systematically design and develop programs for broad audiences by incorporating feedback from users;

(c) Evaluate licenses that limit or restrict use of computational artifacts when using resources such as libraries;

(d) Evaluate and refine computational artifacts to make them more usable by all and accessible to people with disabilities;

(e) Design and develop computational artifacts working in team roles using collaborative tools.;

(f) Document design decisions using text, graphics, presentations, and/or demonstrations in the development of complex programs;

(g) Demonstrate the use of both linked lists and arrays to simplify solutions, generalizing computational problems instead of repeatedly using simple variables;

(h) Justify the selection of specific control structures when trade offs involve implementation, readability, and program performance, and explain the benefits and drawbacks of choices made;

(i) Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue by using events to initiate instructions;

- (j) Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects; and
- (k) Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated program.

8. For the areas of computing systems, demonstrate an understanding of devices, hardware and software, and troubleshooting, as demonstrated by the ability of the pupil to:

- (a) Compare levels of abstraction and interactions between application software, system software, and hardware layers;
- (b) Explain how abstractions hide the underlying implementation details of computing systems embedded in everyday objects; and
- (c) Develop guidelines that convey systematic troubleshooting strategies that others can use to identify and fix errors.

9. For the areas of data and analysis, demonstrate an understanding of storage, collection, visualization, transformation, inference, and models, as demonstrated by the ability of the pupil to:

- (a) Translate between different bit representations of real-world phenomena, such as characters, numbers, and images;
- (b) Evaluate the tradeoffs in how data elements are organized and where data is stored;
- (c) Create interactive data visualizations or alternative representations using software tools to help others better understand real-world phenomena; and
- (d) Create computational models that represent the relationships among different elements of data collected from a phenomenon, process, or model.

10. For the area of impacts of computing, demonstrate an understanding of culture, social interactions, safety, law, and ethics, as demonstrated by the ability of the pupil to:

- (a) Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices;
- (b) Test and refine computational artifacts to reduce bias and equity deficits;
- (c) Demonstrate ways a given algorithm applies to problems across disciplines;
- (d) Explain the potential impacts of artificial intelligence on society;
- (e) Use tools and methods for collaboration on a project to increase connectivity of people different cultures and career fields;
- (f) Explain the beneficial and harmful effects that intellectual property laws can have on innovation;
- (g) Explain the privacy concerns related to the collection and generation of data through automated processes that may not be evident to users; and
- (h) Evaluate the social and economic implications of privacy in the context of safety, law, or ethics.

11. For the areas of networks and the internet, demonstrate an understanding of cybersecurity, networks, communication, and organization, as demonstrated by the ability of the pupil to:

- (a) Give examples to illustrate how sensitive data can be affected by malware and other attacks;
- (b) Recommend security measures to address various scenarios based on factors such as efficiency, feasibility, and ethical impacts;
- (c) Compare various security measures, considering tradeoffs between the usability and security of a computing system;
- (d) Explain tradeoffs when selecting and implementing cybersecurity recommendations; and
- (e) Evaluate the scalability and reliability of networks, by describing the relationship between routers, switches, servers, topology, and addressing.

~~[NAC 389.391—Eighth grade: Introduction to technology. (NRS 385.080, 385.110)—A course in the study of biological, informational, communicative and physical technology must include instruction designed to teach the pupil by the completion of the eighth grade to:~~

- ~~1. Demonstrate how the evolution in each area of technology has contributed to a progression from the agricultural era to the industrial era to the information era.~~
- ~~2. Describe the evolution of a modern tool, device or method within each area of technology and describe how each has changed daily routines and contributed to human progress.~~
- ~~3. Describe examples of technological innovation in each area of technology.~~
- ~~4. List examples of the seven resources of technology—people, information, tools, materials, capital, energy and time—and identify their different forms.~~
- ~~5. Use technological resources to produce a given product.~~
- ~~6. Identify technological alternatives for satisfying a given human need in two selected nations of differing cultural conditions and differing amounts of nonrenewable resources.~~
- ~~7. Design and carry out an optimal solution to a given technological problem.~~
- ~~8. Recognize the limitations of resources which limit solutions to technological problems.~~
- ~~9. Describe examples of common technological systems in each area of technology.~~
- ~~10. Apply the model for technological systems to the safe assembly or construction and operation of a technological system.~~
- ~~11. Demonstrate a functional open loop system, add feedback to close the loop and operate the system to produce a given result.~~
- ~~12. Identify the subsystems of a modern, complex technological system in each area of technology and describe how each is combined to generate a new system resulting in improved or additional human capabilities.~~
- ~~13. Demonstrate a technological system in each area of technology and describe results that are desired, undesired, expected and unexpected in one of the areas.~~
- ~~14. Identify instances of conflict between a technological system, the human user and the resulting environment made by humans in each area of technology and demonstrate techniques for resolving each instance of conflict.~~
- ~~15. Identify instances of conflict between a technological system and the natural environment in each area of technology, and demonstrate techniques for improving each instance of conflict.~~
- ~~16. Demonstrate a solution to a problem within each area of technology and identify needed and alternative resources to solve the problem.~~
- ~~17. Investigate the properties of various synthetic, raw and biological materials through testing and describe why materials are often chosen on the basis of their properties.~~
- ~~18. Demonstrate a functional technological system by substituting the use of different resources to optimize the results of the system within given constraints.~~
- ~~19. Demonstrate a variety of traditional and modern processes for converting materials within each area of technology.~~
- ~~20. Process information and communicate a message using graphic, photographic or electronic means.~~
- ~~21. Use information from data stored in a computer to solve a problem in a technological system.~~
- ~~22. Perform a variety of processes for converting energy within each area of technology.~~
- ~~23. Use a computer to apply computer software to verify the solution to a problem related to processing resources in a technological system.~~
- ~~24. Describe examples of open loop and closed loop systems in each area of technology using graphic illustrations.~~

- ~~———— 25. Demonstrate how human and technological sensors are used to monitor the results of a technological process.~~
- ~~———— 26. Assemble and operate a closed-loop technological system.~~
- ~~———— 27. Use a computer to control a technological system.~~
- ~~———— 28. Use techniques of extrapolating the effect of changes in society on the future to anticipate the consequences of a new technology.~~
- ~~———— 29. Describe how technology has created new jobs and made other jobs obsolete.~~
- ~~———— 30. Describe a local, national and global problem, propose alternative technological solutions to each problem and demonstrate a solution to one of the problems.~~
- ~~———— 31. Draw and label a diagram depicting a systems approach to solving a problem in each area of technology.~~
- ~~———— 32. Use a systems approach to solve a technological problem.~~
- ~~———— 33. Use a computer to document progress toward reaching the optimal solution to a technological problem.~~
- ~~———— 34. Demonstrate basic math skills and concepts regarding whole numbers, common fractions, decimal fractions and percents in the solution of a technological problem.]~~

~~[NAC 389.6533 — Introduction to keyboarding. (NRS 385.080, 385.110) — A course of study in an introduction to keyboarding must include instruction designed to teach the pupil to:~~

- ~~———— 1. Demonstrate the correct method of inserting paper, adjusting the paper guides and adjusting the margins.~~
- ~~———— 2. Demonstrate the use of function keys to operate a printer.~~
- ~~———— 3. Type a paragraph without mistakes.~~
- ~~———— 4. Demonstrate the operation of a keyboard by touch without watching the keys.~~
- ~~———— 5. Demonstrate keyboard operations using number keys.]~~