NEVADA DEPARTMENT OF EDUCATION

GUIDANCE DOCUMENT FOR

Computer Science Education

Computer Education and Technology
Half-credit graduation requirement

August 1, 2023

(current version supersedes earlier versions)

Nevada Department of Education

Nevada Ready!

Effective School Year 2023-2024

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Overview

Note to Districts

Please use this document to inform your scope and goals for your teachers. Curriculum and instructional material resources are available on the Nevada Department of Education website.

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Purpose & Background

Senate Bill 200 was passed by the Nevada Legislature during the 79th legislative session (2017) and was signed into law by Governor Brian Sandoval on June 15, 2017. This bill broadens access and participation of students in computer science (CS) education and outlines certain changes in Nevada's Computer Education and Technology instruction to include computer science and computational thinking (NRS 389.072), applying credit in certain CS courses towards high school graduation (NRS 389.0186), certain CS courses to fulfil requirements for Millennium Scholarship eligibility, teacher professional development (PD) requirements for computer education and technology (NRS 391A.370), the appointment of a computer science subcommittee under the Governor's Advisory Council on Science, Technology, Engineering, and Mathematics (STEM) to make recommendations concerning instruction, and to provide appropriations for districts to satisfy the requirements of this bill.

Statute and Regulation

Prior to the passage of NRS 389.072, the computer course required for high school graduation, formerly referred to as "use of computers" or "computer literacy", consisted primarily of basic computing skills, such as keyboarding, document creation, presentations, or applications. Current regulations (NAC 389.450) prescribe at least 50% of instruction time dedicated to computer science and computational thinking, shifting the focus of the course from basic skills to essential skills necessary for workplace and higher education readiness. To meet high school graduation requirements for all diploma types, Nevada students must pass the updated computer education and technology course, which must be taught for at least one semester or trimester, or the equivalent (NRS 389.018, NAC 390.440). The course may not be part of another course of study, such as Cybersecurity, IT Essentials, STEM-related courses, or Photography (NAC 390.440).

Definitions

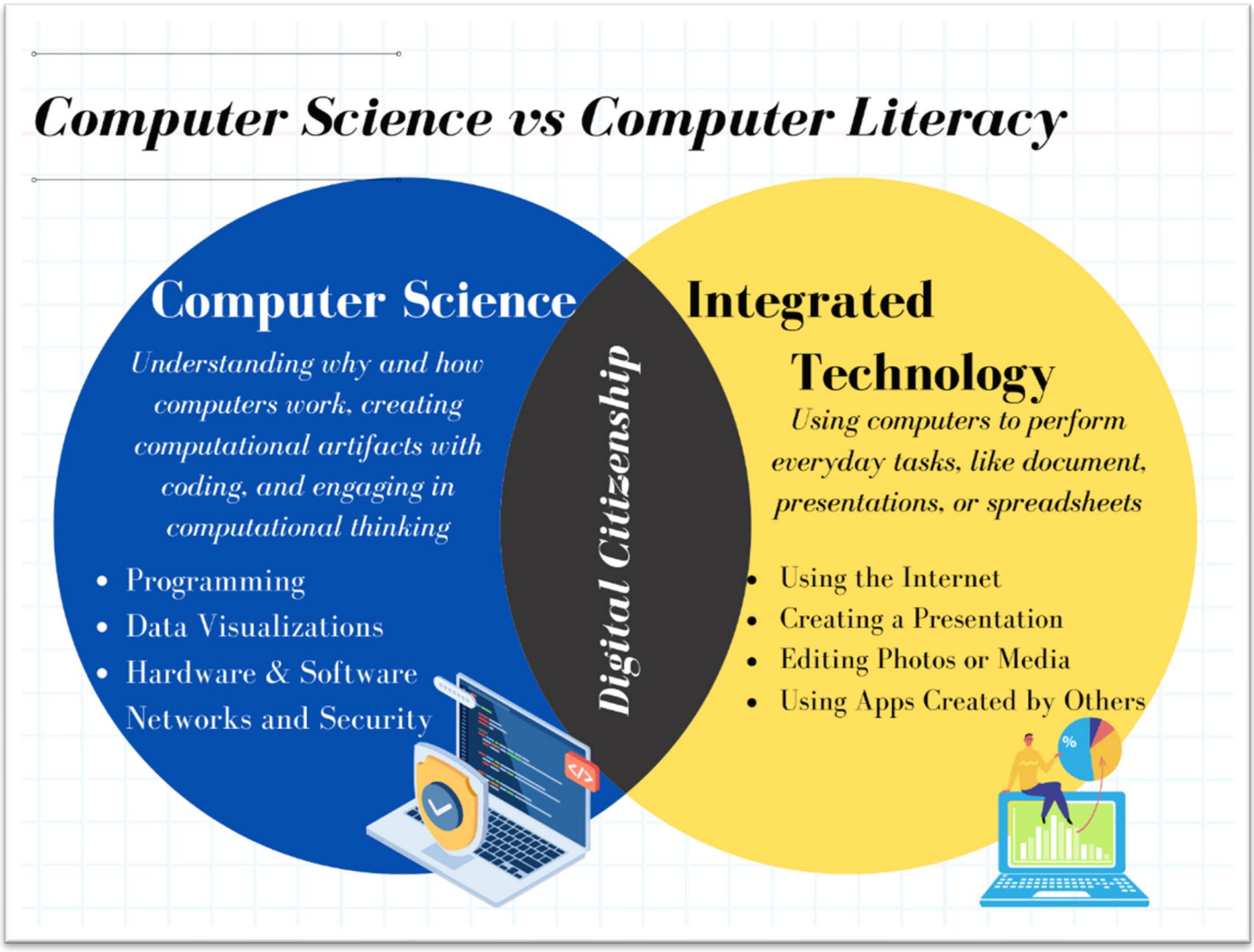
Computer Literacy: the general use of computers and programs, such as productivity software. Examples include performing an internet search and creating a digital presentation.[1]

Educational Technology: applies computer literacy to school subjects. For example, students in an English class can use a web-based application to collaboratively create, edit, and store an essay online.[1]

Digital Citizenship: refers to the appropriate and responsible use of technology, such as choosing an appropriate password and keeping it secure.[1]

Computer Science: the study of computers and algorithmic processes, including their principles, their hardware and software designs, their applications, and their impact on society.[2]

Computational Thinking: is a way of solving problems, designing systems, and understanding human behavior that draws on concepts fundamental to computer science… a fundamental skill for everyone, not just computer scientists.[3]



Computer Education and Technology (CET)

The revised requirements for the computer education and technology course were effective July 1, 2018, with full implementation for the 2019-202 school year.

NRS 389.072, Instruction in computer education and technology; regulations, states:

> ***If the state Board prescribes a course in computer education and technology pursuant to NRS 385.114 for pupils enrolled in high school, the State board shall adopt regulation prescribing the percentage of the instructional time for the course that must be dedicated to computer science and computational thinking, which may include, without limitation, instruction in logic, coding, robotics, and cyber security.***

Course Name and SCED Code

Regulation R078-18, approved by the State Board of Education on August 30, 2018, renamed the subject area of computing education required for high school graduation to **Computer Education and Technology**, representing the 50% of instruction in computer science and computational thinking and 50% instruction in integrated technology. Some districts have used the course title "Computer Science and Applications" and may continue to do so, but must use the correct SCED code assigned for the course.

The correct SCED code for this course is **10049**. This SCED code should be used consistently in all districts, including instances where the course is offered in middle schools.

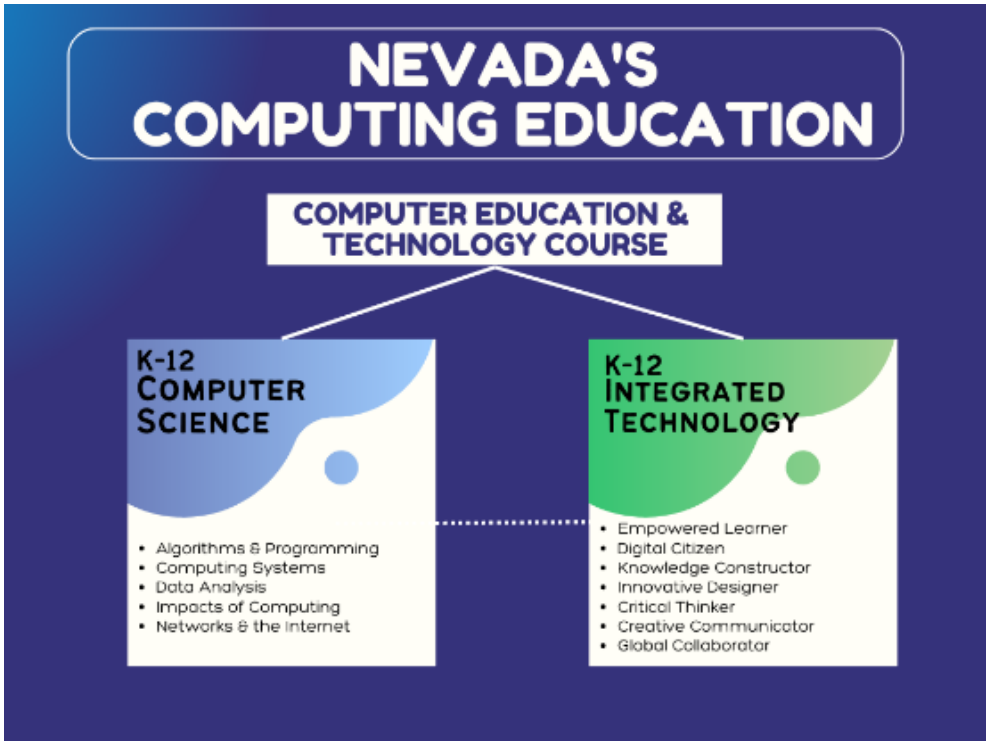
Grade Levels

The half-credit course required for high school graduation is taught in middle school in some districts. The standards used, however, consist of the high school set of standards (K-12 Computer Science AND K-12 Technology). Prior to 2023, some middle school standards were incorporated for continuity of subject matter and to bridge learning gaps during the implementation of the K-8 CS standards. Those standards are no longer included in the course requirements. As such, it is highly recommended that the course is offered only to students in **grades eight through twelve**.

This is a high school graduation requirement and the course created MUST be built upon the high school level standards and taught at that same level a student would attain in a high school level course. In addition, as a high school graduation requirement, this course must receive a letter grade (A-F), not a Pass/Fail, no matter what grade level it is taught in.

Computer Education and Technology Standards (CET)

The prescribed set of standards to be used in the Computer Education and Technology course include both computer science (CS) and integrated technology standards. The blend of standards includes a comprehensive set of skills students need to know and be able to do throughout high school and extend to higher education and workforce readiness. This subset of standards required for developing this half-credit course can be found in Appendix A of this document.



Frequently Asked Questions

There have been many questions surrounding the changes to this course requirement. This document will attempt to answer those questions.

- What is this required course for graduation in computer education and technology being called now?
    - Computer Education and Technology (formally called Use of Computers) is the subject area. It is recommended that districts use this course name, or a name representative of the skills addressed in the course, like Computer Science and Applications. The SCED code 10049 must be used for this course regardless of the course name.

- What are the regulations pertaining to this course?
    - NRS 389.072
    - NAC 389.450
    - NAC 390.440

- What is the percentage of computer science being taught in the course, versus (for example) application software?
    - The State Board of Education has prescribed at least 50% instructional time in computer science and computational thinking and 50% instructional time on learning the productivity tools. Digital citizenship is a component of both.

- Which high school standards are being used in this course?
    - The standards that comprise this subject area are a subset of the Nevada K-12 Computer Science Standards and Nevada K-12 Technology Standards (see Appendix A). The developed course can be an entire half-credit course or part of a year-long computer science course as long as these standards are covered at the appropriate level.

- What is the content level of this course?
    - This course is a requirement for graduation from high school; therefore the standards included are a subset of the high school level K-12 Computer Science standards and K-12 Computer Technology standards.

- Can this half credit class towards graduation still be taught in middle school?
    - Yes. This high school course may still be taught middle school, but it is strongly recommended that the course only be taught in grades 8 and up due to the complex content included in the course. If a student has taken this course in 8th grade, they DO NOT take it again in high school.

- What training/license endorsement will a teacher need to teach this course?
    - We have a document that outlines what an educator needs to have to teach specific computer science courses. Please click here to view that document.

- Will this semester-long half credit class count towards the requirement in NRS 389.037 that states all high schools must offer a computer science course by July 1, 2022?
    - No. Schools must offer computer science courses that focus on all high school standards and provide more in-depth CS learning opportunities for students, like CS Principles, AP CS Principles, or any CS course in the CTE pathway.

- Can this semester-long half credit class count in any way towards a fourth-math or third-science credit?
    - No

- Are there any other courses that may count as a substitution for this course, either in middle school or in high school?
    - A course that covers the same standards as outlined in Appendix A for the Computer Education and Technology course may count towards the half-credit graduation requirement. Districts must submit the course syllabus to the Office of Standards and Instructional Support at the Department of Education for approval.

- Can a dual credit Computer Science course satisfy the half-credit graduation requirement?
    - Districts must submit, in writing, a request for a dual credit course to be approved for the half-credit graduation requirement. The request must include the higher education institution, course name, course code (aligned with appropriate SCED code), and instructional content of the course.

- Does the current AP Computer Science Principles course satisfy the half-credit graduation requirement?
    - The current AP Computer Science Principles (AP CSP) course only includes computer science concepts and does not include the subset of technology standards outlined in Appendix A.
    - The following criteria must be met to count AP CSP towards the half-credit graduation requirement:
        - The course must meet all requirements of the College Board for AP coursework.
        - The course must be enhanced to include all prescribed standards in the half-credit graduation requirement (see Appendix A).
    - This enhanced AP CSP course (inclusion of the College Board requirements and the prescribed standards for the half-credit graduation course) may still count towards a fourth-math or third-science credit and satisfy the NRS 389.037 requirement that all high schools must offer a computer science course by July 1, 2022.
    - If this enhanced AP CSP course is going to be used to satisfy both the half-credit graduation requirement and count as a fourth-math or third-science credit, this course will still only count for 1-credit, so the student will need to make up that half-credit towards their total graduation credit requirements through another elective half-credit course.

- Can a course in the CTE Advanced Computer Science pathway satisfy the half-credit graduation requirement?

- One of the CTE Advanced Computer Science courses identified below can satisfy the half-credit graduation requirement if the following conditions are met:
  - It is not recommended that students enroll in a CTE computer science pathway course unless all other options have been exhausted.
  - If no other options are available, a student may enroll in the course. The course can satisfy either the half-credit graduation requirement OR the CTE pathway, not both.
  - If a student plans to complete the CTE CS Pathway, the student should complete the half-credit course in the traditional course, through an approved distance education course, or through the NV Course Access Partnership (NV-CAP) offered by the NV Department of Education.

Appendix A – Prescribed Standards

Computer Science and Computational Thinking Concepts

2018 K-12 Computer Science Standards to be included in the Computer Science and Applications half-credit course required for graduation are as follows:

Algorithms and Programming

Algorithms

9-12.AP.A.1 – Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests.

Variables

None

Control

9-12.AP.C.1 - Justify the selection of specific control structures when tradeoffs involve implementation, readability, and program performance, and explain the benefits and drawbacks of choices made.

9-12.AP.C.2 –Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue by using events to initiate instructions.

Modularity

9-12.AP.M.1 - Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.

Program Development

9-12.AP.PD.2 - Evaluate licenses that limit or restrict use of computational artifacts when using resources such as libraries.

9-12.AP.PD.4 - Design and develop computational artifacts working in team roles using collaborative tools.

Computing Systems

Devices

9-12. CS.D.1 - Explain how abstractions hide the underlying implementation details of computing systems embedded in everyday objects.

Hardware/Software

9-12.CS.HS.1 - Compare levels of abstraction and interactions between application software, system software, and hardware layers.

Troubleshooting

9-12.CS.T.1 - Develop guidelines that convey systematic troubleshooting strategies that others can use to identify and fix errors.

Data and Analysis

Storage

9-12.DA.S.1 - Translate between different bit representations of real-world phenomena, such as characters, numbers, and images (e.g., convert hexadecimal colors to decimal percentages, ASCII/Unicode representation).

9-12.DA.S.2 - Evaluate the tradeoffs in how data elements are organized and where data is stored.

Collection/Visualization/Transformation

9-12.DA.CVT.1 - Create interactive data visualizations or alternative representations using software tools to help others better understand real-world phenomena.

Inference/Models

None

Impacts of Computing

Culture

9-12.IC.C.1 - Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.

9-12.IC.C.2 - Test and refine computational artifacts to reduce bias and equity deficits.
Social Interactions

9-12.IC.SI.1 - Use tools and methods for collaboration on a project to increase connectivity of people in different cultures and career fields.

Safety, Law, and Ethics

9-12.IC.SLE.2 - Explain the privacy concerns related to the collection and generation of data through automated processes that may not be evident to users.

9-12.IC.SLE.3 - Evaluate the social and economic implications of privacy in the context of safety, law, or ethics.

Networks and the Internet

Network/Communication/Organization

9-12.NI.NCO.1 - Evaluate the scalability and reliability of networks, by describing the relationship between routers, switches, servers, topology, and addressing.

Cybersecurity

9-12.NI.C.1 - Give examples to illustrate how sensitive data can be affected by malware and other attacks.

Computer Science & Computational Thinking topics covered:

TOPIC	TOPIC	TOPIC	TOPIC	TOPIC	TOPIC
flowcharts	creating prototypes	giving attribution	using libraries	collaborating and project management	working in teams to develop an artifact
creating variables	designing programs with loops and conditionals	justifying the selection of control structures	designing artifacts to address a societal issue	using procedures with parameters	exchanging data
abstraction within system software/ hardware layers	recommending improvements to a device based on user analysis	how to identify and fix errors,	where data is stored	collect and visualize data	discuss bias and accessibility
test artifacts to reduce bias	evaluate ways people use computing	identify risks with identity theft/hacking	evaluate privacy concerns	explain security measures needed to protect data	describe relationship between routers and switches

Integrated Technology Concepts

2018 Nevada Integrated Technology Standards to be included in the Computer Education and Technology half-credit course required for graduation are as follows:

Empowered Learner

9-12.EL.A.1 – Actively assimilate and revise personal and career goals, select and manage current and emerging technologies to achieve them, and reflect on their successes and areas of improvement in working toward their goals.

9-12.EL.B.1 - Consistently engage in online social networks as a means to access and promote lifelong learning in collaboration with global peers.

9-12.EL.C.1 – Regularly revise their work habits and attitudes based on feedback from others and from functionalities embedded in digital tools to improve their learning process, and they select or creatively use technologies to share their learning in ways that are useful to others.

9-12.EL.D.1 - Successfully use a variety of existing technologies to develop criteria and identify new digital tools and resources from emerging technologies to accomplish a defined task with fluency and ease

Digital Citizen

9-12.DC.A.1 - Analyze their digital identities and reputations within school policy to consider social media's impact on society, including demonstrating an understanding of how digital actions may have positive or negative implications for their future.

9-12.DC.B.1 - Demonstrate and advocate for positive, safe, legal, and ethical habits when using technology and when interacting with others online.

9-12.DC.B.2 - Distinguish potential dangers while online (e.g., malicious actors, phishing, impersonation) to prevent, detect, and combat cybersecurity threats while practicing safe and secure techniques, tactics, and practices recognizing cybersecurity is everyone's responsibility.

9-12.DC.C.1 - Advocate and demonstrate a respect for intellectual property with both print and digital media—including copyright, permission, and fair use—by creating a variety of media products that include appropriate citation and attribution elements.

9-12.DC.D.1 - Demonstrate an understanding of what personal data is and how to keep it private and secure, including the awareness of terms such as encryption, HTTPS, password strength, cookies, phishing, and computer viruses; understand the limitations of data management and how data-collection technologies work.

Knowledge Constructor

9-12.KC.A.1 - Plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.

9-12.KC.B.1 - Evaluate the accuracy, perspective, credibility, and relevance of information, media, data, or other resources in the school and career setting.

9-12.KC.C.1 - Curate information from digital resources, including online databases and catalogs, for research using a variety of tools and methods to create collections of artifacts that support their learning and career goals.

9-12.KC.D.1 - Explore real-world issues and problems through inquiry and analysis, develop ideas, actively create solutions for them, and evaluate and revise through the use of digital tools.

Innovative Designer

9-12.ID.A.1 - Engage in a design process and employ it to inquire and analyze, generate ideas, create innovative products or solve authentic problems, and evaluate the process to revise if needed.

9-12.ID.B.1 - Creatively use digital tools to support a design process and expand their understanding to identify constraints, trade-offs, and to weigh risks.

9-12.ID.C.1 - Engage in a cyclical design process to inquire and analyze, develop ideas, test, and revise prototypes, presenting finished products and best practices learned during the development.

9-12.ID.D.1 - Demonstrate an ability to persevere and handle greater ambiguity as they work to solve open-ended problems.

Computational Thinker

9-12.CT.A.1 - Define complex issues, create a plan, and select appropriate technology-assisted methods such as data analysis, abstract models, and algorithmic thinking in exploring and finding solutions.

9-12.CT.B.1 - Evaluate created or given data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.

9-12.CT.B.2 - Evaluate and justify the formats for reporting results to a variety of audiences.

9-12.CT.C.1 - Collaborate to break problems into component parts, identify key pieces, and use that information to problem-solve.

9-12.CT.C.2 - Use 3D design tools to create prototypes, models, and simulations to demonstrate solutions and ideas.

9-12.CT.D.1 - Collaborate to develop an automated process by using algorithmic thinking to develop a sequence of steps to create and test automated solutions.

Creative Communicator

9-12.CC.A.1 - Use digital learning tools and resources to identify communication needs considering goals, audience, content, access to tools or devices, and timing of communication, to involve teams in diverse locales for effective communication.

9-12.CC.B.1 - Create an original work using multiple digital tools, including planning, research, editing, and production.

9-12.CC.C.1 - Create digital graphic visualizations, data driven models, and simulations to succinctly communicate complex ideas and problems; justify methods and tools used.

9-12.CC.D.1 – Publish or present content designed for specific audiences using online meeting tools to asynchronous and synchronous audiences.

Global Collaborator

9-12.GC.A.1 - Use digital tools to interact with others to develop a richer understanding of different perspectives and cultures; publish electronic artifacts that communicate to a culturally diverse and global community.

9-12.GC.B.1 - Use collaborative technologies (live and recorded) to connect with global stakeholders including peers, not excluding other languages, experts, and community members, to learn about issues and problems or to gain a broader perspective; develop multiple viewpoints that may be electronically published and accessible to all audiences.

9-12.GC.C.1 - Learn project management roles on a team to meet goals, based on their knowledge of technology and content, as well as personal preference; goals in project, timelines and milestones, will be monitored with tools and shared globally.

9-12.GC.D.1 - Select and justify the effective collaborative technologies (live video conference, online forums, social media, and other emerging communication methods) to investigate, develop, and publish solutions related to local and global issues.

9-12.GC.D.2 - Understand that digital tools such as blogs and social media can be used to crowd source, crowd fund, and mobilize a community toward a goal

Integrated Technology topics covered:

TOPIC	TOPIC	TOPIC	TOPIC	TOPIC	TOPIC
emerging technologies to track goal progress	safe and ethical habits when using technology	evaluate resources	create and revise prototypes through an iterative design process	collaboration	digital graphic visualizations and simulations
online social networks to access and promote collaboration	potential dangers in internet use	curate information from digital resources	perseverance in open-ended problems	3D prototype design	presenting using online meeting tools
revise technologies based on feedback	respect for intellectual property	real-world issues, problems, and solutions	data analysis, abstract models, and algorithmic thinking	automated processes	interacting with others of different perspectives and cultures
Select and use appropriate technologies	protecting personal data and encryption	design process	data representation	communication	using collaborative technologies to connect globally
Analyze digital identities	research strategies	trade-offs and risks	formatting for different audiences	creating original works	using digital tools for crowdsourcing

References

1 K-12 Computer Science Framework. (2016). Retrieved from K-12 Computer Science Framework

2 Tucker, A., Deek, F., Jones, J., McCowan, D., Stephenson, C., & Verno, A. (2003). A model curriculum for K-12 computer science. *Final Report of the ACM K-12 Task Force Curriculum Committee, CSTA.*

3 Wing, J. M. (2006). Computational thinking. *Communications of the ACM, 49(3)*, 33-35.