K-5 Computer Science

Teacher Notes

Domain Standard (Competency):
Digital Awareness

The Teacher Notes were developed to help teachers understand the depth and breadth of the standards. In some cases, information provided in this document goes beyond the scope of the standards and can be used for background and enrichment information. Please remember that computer science encompasses both fundamental skills, such as computational thinking and digital citizenship, that all students should be introduced to in order to be viable citizens in a digital society as well as discrete skills that are endemic to specific career clusters.
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Digital Awareness

CSS.DA.K-2.9: Understand how people can use technology.

1. Understand that technology is everywhere and changes our lives.
2. Understand that there is a connection between people and devices.
3. Practice using and identifying basic hardware and software using accurate terminology.
4. Create simple artifacts using a computing device.
5. Identify that technological innovation changes how people live and work.
6. Understand that when you are on a networked device you are connected to other people.
7. Practice using a variety of computing hardware and software to achieve personal learning goals.
8. Identify and describe solutions to simple hardware and software problems (ex. volume control).
9. Describe how technology can impact an individual’s life positively and negatively.
10. Use devices appropriately.
11. Choose and use appropriate hardware and software tools for a given purpose using accurate terminology.

CSS.DA.3-5.9: Understand the relationship between technology, lifelong learning, and the appropriate use of information.

1. Discuss computing technologies that have changed the world and express how those technologies influence, and are influenced by, cultural practices.
2. Identify and propose ways to improve usability of technology for diverse users.
Digital Awareness

**CSS.DA.K-2.9:** Understand how people can use technology.

**CSS.KC.3-5.9:** Understand the relationship between technology, lifelong learning, and the appropriate use of information.

Digital Awareness is the domain that focuses on the technology students use, the way technology has shaped our modern way of life, and its relationship to learning. At both the K-2 and 3-5 levels, students should be contemplating the world of technology around them. Students should explore how technology innovations affect and change people’s lives in how they live, work, and learn.

Students also need to think about the connection they have to their devices, how they can be used, and how those devices connect them to other people. Beginning at the K-5 level, students should work on maintaining balance when using devices and media in their daily lives.

As students use technology, they must choose the appropriate software and hardware to produce artifacts that match their learning goals. In order to do this, they need a foundation in technology vocabulary as well as experiences using a variety of different hardware and software. Beginning in Kindergarten with volume control and continuing through the grade levels, students learn basic troubleshooting thought processes and techniques.

Another element in the Digital Awareness domain is the appropriate use of technology. This concept is also addressed in depth in the Digital Citizen domain at both the K-2 and 3-5 levels (CSS.DC.K-2.3, CSS.DC.3-5.3: Identify the rights, responsibilities, and opportunities of living, learning, and working in an interconnected society and model behaviors that are safe, legal, and ethical.)

The Digital Awareness domain helps students examine the role that technology plays in their lives and how they can use it in a positive way as they live and learn.
Understand how people can use technology.

1. Understand that technology is everywhere and changes our lives.


This first element is about understanding that technology helps people do things every day. Technology is part of the school, home, and work lives of everyone. At school, there are computers that help teachers with lessons, grades, and keeping student information organized as well as technology that students use. Less obvious is the technology that keeps the heating and air conditioning running as well as technology that the cafeteria uses to order and organize the food that is served. At home, technology helps people in many ways: making appliances like refrigerators, washing machines, cars, and even light bulbs work, helping people communicate, providing recreation opportunities with games and movies, keeping people healthy with information and reinforcement, and allowing people to shop to buy the things they want and need. Most businesses where students’ families may work use technology for: systems for paying employees, producing, marketing, and inventorying products, providing platforms to create and learn, and much more.

Resource Links:


Article - How technology has changed the world - [https://thriveglobal.com/stories/how-technology-has-changed-the-world/](https://thriveglobal.com/stories/how-technology-has-changed-the-world/)
Understand how people can use technology.

2. Understand that there is a connection between people and devices.

Visit this link http://bit.ly/DA-Peopleanddevices for a quick slideshow version of this element.

This element is about understanding the connection between technology and the people that use it. As explained in element 1, technology is a part of everyone’s lives. One of the most tangible forms of technology is a mobile device. Examples of mobile devices could be phones, tablets, smartwatches, laptops, or other devices that connect people to the internet and provide useful applications. People use devices for entertainment, learning, creating, organization, and communication. Playing games on devices or even reading / listening to books provides entertainment in any location at any time. Researching information or practicing a skill on a device helps people learn. Creating documents, graphics, videos or other items is also possible on devices. Using timers, alarms, reminders, calendars, banking, and other apps on devices help people stay organized. Connected devices also help people communicate with each other via messaging, email, social media, video calling, and more. Facilitating discussions with students about these devices and their uses can help students build the awareness of how we are connected to technology.

Resources:

CSS.DA.K-2.9.3

Understand how people can use technology.

3. Practice using and identifying basic hardware and software using accurate terminology.


This element is about learning common technology terms and applying them to real objects and concepts that students use. Below is a list of common technology terms and their meanings that students may use at the K-2 level. Reinforce these terms as students encounter them. Students should not be expected to memorize these definitions, rather they should be able to identify these items and how they themselves can use them.

Hardware Terms (alphabetical)

**Battery and Charger**

A battery is a container of chemicals that holds electricity for a device to use. All mobile devices have some form of battery that powers it and which allows the battery to be recharged when the electricity has been depleted. These devices must be attached to a charger which then plugs into an electrical outlet.
| **Cable** | A protected wire that connects devices. Cables usually have special connections on the end that help users know where and how to plug them in.  
Examples: a cable that attaches headphones, printers, a mouse, or a keyboard to a computer or other device. |
<p>| <strong>Computer</strong> | An electronic device that performs functions through software or user input. Examples could be personal computers, tablets, or smartphones. |
| <strong>Hardware</strong> | Any physical technological object as well as the parts that make them up. Examples would be computers, screens (monitors), keyboards, mice, as well as hard drives, circuit boards, memory, etc. inside a computer or device. |
| <strong>Headphones and Headsets</strong> (output device) | Earphones connected to a device by a cable or wirelessly to transmit sound to the user. The term headset usually indicates that there is also a microphone present. |
| <strong>Internet</strong> | The connection, or network of computers around the world. Computers and devices can share information and communication across this network. |
| <strong>Keyboard</strong> (input device) | A set of keys that help the user enter words and numbers into a device. |</p>
<table>
<thead>
<tr>
<th><strong>Mobile Device</strong></th>
<th>A device that can be carried and provides wireless to connections to the internet or other devices.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mouse</strong> (input device)</td>
<td>A device connected to a computer (with a cable or wirelessly) that allows the user to move the cursor (arrow) across a screen and to select or move items as needed. There are usually 1-3 buttons on a mouse. The most common set of buttons includes a left button (used for selecting and moving objects), a right button (used for bringing up alternate menu functions), and a scroll wheel (allowing users to scroll up and down through windows).</td>
</tr>
<tr>
<td><strong>Printer</strong> (output device)</td>
<td>A device connected to a computer with a cable or wirelessly that allows information to be printed on paper. 3D printers allow users to print solid objects from a computer or other device.</td>
</tr>
<tr>
<td><strong>Robots</strong></td>
<td>Machines that carry out commands automatically from a program written by a person.</td>
</tr>
</tbody>
</table>

Robot examples that students might encounter: Ozobot, Sphero, BeeBot
| **Screen Monitor**  
(output device) | A computer usually has some form of screen to display information to the user. This screen may also be a touchscreen that allows users to interact with the computer as well as see what is being displayed. |
|-----------------|-------------------------------------------------------------------------------------------------|
| **Trackpad**  
(input device) | Many laptop computers have a trackpad that provides a built-in method for moving and selecting objects with a cursor (arrow) much like a computer mouse. |
| **USB** | Technically, a USB is a “universal serial bus” connection. Current technologies usually include several types of USB connections on computers, phones, and other devices. Students may encounter these when connecting things such as USB drives (flash/thumb drives) to save documents, printers, chargers for mobile devices, keyboards, mice, and even some headphones. |
| **Wireless** | A connection to a device without the use of wires. Students may be familiar with connecting to the internet via a wireless connection to a device. Also, other devices can have wireless connections such as printers, headphones, and even robots. |

### Software Terms (alphabetical by section)

<table>
<thead>
<tr>
<th>Apps</th>
<th>Applications</th>
<th>Programs</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each of these words refer to code written by people to perform a function whether it is used on a computer, phone, or any other device. The terms are basically interchangeable and both refer to software that makes the device usable.</td>
<td></td>
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</tr>
<tr>
<td><strong>Browsers &amp; Websites</strong></td>
<td>Browsers are pieces of software used to allow users to view and interact with websites and applications which are hosted on computers connected to the internet. Examples of common Browsers: Google Chrome, Microsoft Edge, Mozilla Firefox, and Apple’s Safari. Websites are pages of code that can be displayed on a browser. These are hosted on computers around the world and can be written by anyone.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Games</strong></td>
<td>Software which allows users to interact for the purpose of entertainment or learning.</td>
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<tr>
<td><strong>Spreadsheets</strong></td>
<td>A piece of software which helps users organize data in cells (usually numbers) and which can perform complex calculations. Examples of spreadsheets: Google Sheets, Microsoft Excel</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Word Processor</strong></td>
<td>A piece of software which allows users to enter words and graphics in order to create documents. Examples of word processing software: Google Docs, Microsoft Word</td>
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</tr>
<tr>
<td><strong>Virtual Reality &amp; Augmented Reality</strong></td>
<td>Virtual reality (VR) is a mixture of software and hardware that simulates an environment. Examples of virtual reality: PlayStation VR, Oculus Rift, Google Cardboard (these hardware systems can run VR software such as Google Expeditions and games such as Beat Saber). Augmented Reality (AR) is also a mixture of software and hardware that superimposes images onto a user’s view of reality. Usually this software is run on a mobile device. Apps such as Google Maps, Google Translate, Minecraft Earth, and Pokémon Go take advantage of AR. For more information on AR &amp; VR in the Google Cardboard</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Viruses</strong></td>
<td>This term is featured in the Digital Citizen domain, but it is important to know that a virus is a piece of software that was written to cause harm and spread itself.</td>
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<td></td>
</tr>
<tr>
<td><strong>Other Software</strong></td>
<td>Other software that students might encounter would be applications that allow users to create drawings or slideshows. There is also software that will allow users to create their own code or programs.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Parts of Software

<table>
<thead>
<tr>
<th><strong>Backgrounds &amp; Wallpaper</strong></th>
<th>A picture or design behind icons on a screen or behind words on a document.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cursor</strong></td>
<td>A visible arrow or other indicator to show where an action will happen if the user clicks a mouse or enters text on a keyboard.</td>
</tr>
<tr>
<td><strong>Document</strong></td>
<td>An electronic page of text with or without images. Documents are one type of file that users create and can share on computing devices.</td>
</tr>
</tbody>
</table>
| **Files & Folders** | An electronic file holds information, settings, or commands that can be used by the device or the user.

Users commonly organize files, icons, and links into groups called folders which work much like paper folders that hold paper files which are grouped by subject matter in some way. |
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Fonts</strong></td>
<td>The shape or style of text as displayed on a device. Fonts can be changed and customized within software to communicate style, meaning, or tone.</td>
</tr>
<tr>
<td><strong>Graphics &amp; Images</strong></td>
<td>Pictures or video created or modified by a computing device.</td>
</tr>
</tbody>
</table>
| **Icons, Links & Shortcuts** | Icons are graphical representations (small pictures) of applications, files, or links to locations. Shortcuts are further representations to get the user to the application, files, or locations from an easily accessed location. A link usually refers to a connection to a specific website.

Example: A shortcut to a website link on a device’s screen opens the browser software and directs the user to the website desired. |
| **Menu Bar** | Most software contains a list of options which can be clicked to perform certain functions or to take the user to different locations. |

### Functions within Software

- **File**
- **Edit**
- **View**
- **Insert**

3 Common menu representations
### Click, Drag and Select

Using a mouse, touch screen, or trackpad, icons, words, or objects can be clicked (selected) to tell the computer that something should be done to this object. Then the user can drag, open, or otherwise tell the computer to do something to the object.

### Cut, Copy, and Paste

After a word or other object is selected (usually indicated by highlighting), it can be cut (removed from the page but copied into memory), copied (left on the page but also copied into memory), and then pasted (from memory, it can be placed where the user indicates). Examples would be to copy a picture from the internet on a website (don’t forget to give credit) and then pasted in a document.

### Delete & Backspace

Delete means to remove. The delete key will remove something that has been selected.

The backspace key is commonly used in text based documents and will allow the using to remove text as the cursor moves backwards.

### Exit & Quit

Both terms, exit and quit, usually mean to stop the software that is being run.

Frequently on computers, this is done by clicking an “X” at the top left or top right of the screen. Devices handle this differently depending on the operating system.

### Insert

To insert means to add in something.

Students might use the Insert menu item within programs in order to add things like images, charts, text boxes, or other functions.
<table>
<thead>
<tr>
<th><strong>Open</strong></th>
<th>Opening a program or app means to start it. Opening a file means to view or use that file within a program.</th>
<th><strong>Common Open Icons</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Save</strong></td>
<td>To store a digital file on a device or on the internet that can be opened later after closing the software or turning off the device.</td>
<td><strong>Common Save Icons</strong></td>
</tr>
<tr>
<td><strong>Scroll</strong></td>
<td>Using the scroll bar on the side of a window, the scroll wheel on a mouse, or fingers on a screen or trackpad to move up or down a page that is bigger than the screen it is being viewed on.</td>
<td>Animation of scroll bar</td>
</tr>
</tbody>
</table>
| **Undo** | Most software or websites that are designed for creating will include an Undo function. This typically undoes the last action of the user. Some software will allow the user to undo multiple actions and some will only allow 1 action to be undone. | Ctrl Z (Windows)  
Command Z (Mac)  
Common symbols and shortcuts for Undo |
CSS.DA.K-2.9.4

Understand how people can use technology.

4. Create simple artifacts using a computing device.


This element is about facilitating students’ use of devices to create. An artifact could be any type of file or document that students create for themselves. One example would be using an illustration program such as Google Drawing, MS Paint, or a simple whiteboard app to create a drawing that might illustrate understanding in any academic subject area. Another example would be using a program such as Google Docs/Slides or MS Word/Powerpoint to create a document with words and pictures. An artifact could even be a program or a video that students create. It is important that students are not using technology solely to “consume” content but that they are creating content as well.

Examples of activities where students can demonstrate academic learning by creating an artifact using a computing device:

Math:

- a counting activity drawing (see image created by a kindergartener using Google Drawings) or even simple addition or subtraction problems
- a program that makes a robot follow a path to solve a math problem (photo of missing addend activity using Bee Bots by 1st graders)
Science:
- a drawing with pictures of living and nonliving things (see image)
- a slideshow to be printed as a mini-booklet of landforms with photos and definitions (see image)

![Image of Living Things and Non-Living Things](image-url)

- Mountain
- Plateau
- Plain
- My Landform Book

Language Arts:
- a document with pictures and words to create a story
- Create a program that creates an animation that tells a story (ABCya Animate or Scratch)

Other:
- a drawing with pictures and words describing nouns that the students are thankful for (near Thanksgiving)

![Image of Thankful Drawings](image-url)

These examples could then be collected in a digital portfolio such as a Google Folder, a ClassDojo.com portfolio, or by using Google Classroom or other LMS (Learning Management System) that many school systems have in place.
Resources Links

Video - Edutopia.org - that features an elementary school using technology in content learning activities. [https://www.edutopia.org/video/tech-literacy-making-it-relevant-through-content-learning](https://www.edutopia.org/video/tech-literacy-making-it-relevant-through-content-learning)

Blog - Richard Byrne - “The purpose of this site is to share information about free resources that teachers can use in their classrooms.” [https://www.freetech4teachers.com/](https://www.freetech4teachers.com/)

Website - Tammy Worcester Tang - “former classroom teacher, specializes in finding unique and creative, but most of all, effective ways to use technology in the classroom.” [http://tammyworcester.com/](http://tammyworcester.com/)

Understand how people can use technology.

5. Identify that technological innovation changes how people live and work.


This element is about how technological innovation changes how we live and work. Historically, technology has shaped manufacturing, agriculture, transportation, communication, and entertainment, etc. in ways that are familiar such as assembly lines, cars, airplanes, telephones, printing presses, movies, and more. Those areas continue to change as technology changes at an increasing rate. In an article by New England College, it is noted that “When residential electricity and home telephones were first introduced, it took 30 years and 25 years, respectively, for each amenity to be embraced by 10% of U.S. households. Yet, when smartphones were first introduced in 2002, it took just 10 years for the handheld, portable technology to become a daily accessory for 40% of our population” and that number is increasing daily all over the world.
In manufacturing and business, technology has increased productivity by integrating robotics and other automation technologies (West, 2016). Even in businesses such as fast food restaurants, there is an increase in the use of technology to order (kiosk or app), pay (Apple Pay, Google Pay, Venmo, etc.), and they are even beginning to use robots or drones deliver food. Agriculture has also experienced technological change with the use of “robots, temperature and moisture sensors, aerial images, and GPS technology. These advanced devices and precision agriculture and robotic systems allow businesses to be more profitable, efficient, safer, and more environmentally friendly” (Agriculture Technology). With the emergence of self-driving cars and various safety features, transportation is on the cusp of significant change as well. Communication and entertainment have seen the most obvious innovations with the ubiquitous use of internet connected mobile devices. People can video chat (ex. FaceTime, Skype) and instantly message one another across the world. People can also consume entertainment such as videos, TV programs, movies, and games wherever they are. Even shopping has changed with more online buying opportunities and artificial intelligence powered analytics where businesses track and analyze trends of their customers (RIS News). Additionally, the term “smart home” is used to describe homes that include internet devices that control various features such as lighting, entertainment, temperature control, and more. Many of these devices are not only controlled
across apps on mobile devices but also by voice. A survey cited by Forbes (Arnold, 2019) states that “17% of U.S. broadband households now own both an Internet-connected entertainment device and a smart home device” and that number continues to rise. As technological innovations are being developed and adopted, the way people use and interact with that technology will continue to change the way people live and work. Discussions on how technology touches a student's daily life can illustrate how ubiquitous technology has become.

Resources Links

Check out this video from ISTE (International Society of Technology Education). It shows the many ways that technology changes the world.
https://www.youtube.com/watch?time_continue=98&v=VFcUgSYyRPg&feature=emb_logo

Washington Post - What ‘Tech World’ Did You Grow Up In?
article with interactive timeline of entertainment, internet access, cell phone usage, and more over time.

In What Language - 5 Reasons Technology is Changing the World
https://www.inwhatlanguage.com/5-reasons-technology-is-changing-the-world/
article about changes in technology.

10 Future Transportation Innovations
https://www.marshmma.com/blog/top-10-future-transportation-innovations
CSS.DA.K-2.9.6

Understand how people can use technology.

6. Understand that when you are on a networked device you are connected to other people.


This element is about teaching students to recognize when they are interacting with others online, they are talking to actual people like themselves. Everyone, not just students, can forget they are talking to a person rather than a computer when all that is seen is an avatar or screen name. Treating others with respect and using good manners are topics included in most character education programs used in schools. However, it is important to connect those lessons to online communications. Teaching students to stop and think about things they say to others online is vital in today’s world because we make the digital world in which we live.

Resources Links


Common Sense Media - This site contains an entire digital citizenship curriculum K-12. Teachers must create a free account to access the lessons. In 2018 and 2019, Common sense media updated their lessons. Below are current lessons that focus on online communication.

Common Sense Media - Digital Citizenship Curriculum
[https://www.commonsense.org/education/digital-citizenship/curriculum](https://www.commonsense.org/education/digital-citizenship/curriculum)

Look for these lessons that focus on communication at the K-2 level.
1st Grade - Pause & Think Online
2nd Grade - Rings of Responsibility
Netsmartz - [https://www.missingkids.org/netsmartz/resources](https://www.missingkids.org/netsmartz/resources) - Online safety PowerPoint slide show for students K-2 and a teacher guide. Note: etiquette slides begin on slide 25. (NCMEC - National Center for Missing & Exploited Children)
Understand how people can use technology.

7. Practice using a variety of computing hardware and software to achieve personal learning goals.


This element is about providing variety to students' technology experiences as students work toward personal learning goals. Once a learning goal has been set, students can use technology to help them practice skills, monitor and keep track of their growth, as well as providing an end product to reach their goal.

Practice: To practice skills and work toward a personal performance goal, students and teachers can use a variety of software such as:

- **Kahoot!** - [https://kahoot.com/](https://kahoot.com/)
- **Quizlet** - [https://quizlet.com/latest](https://quizlet.com/latest)
- **Quizizz** - [https://quizizz.com/](https://quizizz.com/)
- **Arcademics** - [https://www.arcademics.com/](https://www.arcademics.com/)
- **Turtle Diary** - [https://www.turtlediary.com/](https://www.turtlediary.com/)
- **ABCya** - [https://www.abcya.com/](https://www.abcya.com/)

Monitor and Track Growth: Students and teachers can use technology to monitor and track growth toward a personal learning goal. Students and teachers could use Google Docs or Microsoft Word to create charts or graphs to show growth or create a digital folder (Google Drive) to use as a portfolio to keep student work samples of progress toward a goal. Students could take photos or videos of their work or record self-reflections of their progress. Another example of a website to keep track of simple student behavioral data and to collect artifacts in a digital portfolio would be [Classdojo.com](https://www.classdojo.com).

End Product: Students can use a variety of hardware and software to create artifacts that demonstrate student learning. Hardware examples would be computers, tablets, phones, cameras, printers, 3D printers, robots, etc. Software examples would be Google Docs / Microsoft Word, Google Slides / Microsoft PowerPoint, Google Drawing / Microsoft Publisher, video...
production software (WeVideo, Flipgrid, Microsoft Movie Maker), 3D rendering software (Tinkercad.com), and various robotics programming software. The key is that students can create any kind of product that demonstrates progress toward or mastery of their personal learning goal.

Resources Links

Goal Setting with Elementary Students - Blog https://mrs wintersbliss.com/goal-setting-elementary-students/

CSS.DA.K-2.9.8

Understand how people can use technology.

8. Identify and describe solutions to simple hardware and software problems (ex. volume control).


This element is about empowering students to attempt to solve problems that occur when using technology. It is important that we teach students to stop and think before asking for help. The thought process of troubleshooting should include thinking:

- What am I expecting to happen?
- What is the computer/device trying to do?
- Look around, is there a reason this is happening?

Common issues that K-2 students might encounter and should attempt to troubleshoot:

Volume control:
- Think: I am expecting to hear sounds.
- Think: Is this supposed to be making sound right now? (Sometimes students think there’s supposed to be sound but the program only makes sound after certain actions.)
- Try this: Look around, check the volume control on the screen (there may be more than one - check controls on the software or website as well as the controls, buttons or knobs, on the device itself), and check headphones to make sure they are securely connected.

Program or Website is frozen:
- Think: What is supposed to be happening on the screen?
- Try this: Look around, is the device processing (thinking) for a bit or has it been too long? Is there anything happening on the screen showing that it is still working?
- Try this: If it seems like the program or website has stopped working, refresh the screen or exit / quit out of the program and start it up again.

Device isn’t working or frozen:
- Think: What am I expecting to happen?
- Think: What is the device supposed to be doing? Can I do anything else on the device?
- Try this: If you can’t do anything on the device, try turning it off and on again.
Note: All school rules should be followed while troubleshooting technical issues. Students should not be expected to perform functions that are prohibited by school or classroom rules.

Resources Links

Article - Teaching Kids to Troubleshoot Electronics, Projects & Everything  
https://www.circuitscribe.com/teach-kids-successful-troubleshooting-skills/

Blog - Teaching Students Routines for Computer Use - Angela Martin  
https://thecornerstoneforteachers.com/routines-for-computer-use/

Blog - Troubleshooting Computer Problems: Using Posters In The Classroom - Kathleen Morris  
http://www.kathleenamorris.com/2011/08/01/troubleshooting-computer-problems/
CSS.DA.K-2.9.9

Understand how people can use technology.

9. Describe how technology can impact an individual’s life positively and negatively.


This element is about how the use of technology can have positive or negative impacts on people’s lives. Using technology can help people be productive, be creative, be organized, to communicate, and to have fun. As useful as technology devices are, they can distract people from important people and things in their lives. Finding a balance while using technology is important. It is necessary to teach students how to take a break from technology and how to be present and attentive to people and things around them.

Note: Other considerations involving negative impacts on people’s lives correlate with Digital Citizen domain (CSS.DC.K-2) topics such as: protecting personal information, cyberbullying, and creating a positive digital identity.

Resource Links

Common Sense Media - This site contains an entire digital citizenship curriculum K-12. Teachers must create a free account to access the lessons. In 2018 and 2019, Common sense media updated their lessons. Below are current lessons that focus on media balance and well-being.

- Common Sense Media - Digital Citizenship Curriculum
  https://www.commonsense.org/education/digital-citizenship/curriculum
  Look for these lessons that focus on media balance at the K-2 level.
  - Kindergarten - Media Balance is Important
  - 1st Grade - How Technology Makes You Feel
  - 2nd Grade - Device Free Moments

Google’s Digital Wellbeing program - https://wellbeing.google/ - This is a resource for adults and families to examine their use of technology and provides tips for healthy digital habits. Part of
this program is the Intro to digital well being -

Psychological Science - https://www.psychologicalscience.org/news/releases/how-smartphones-affect-relationships.html article concerning the affect that technology has on interpersonal relationships

Information Age - Modern technology: advantages and disadvantages
https://www.information-age.com/modern-technology-advantages-disadvantages-123465637/ article outlining advantages and disadvantages of technological change

Adventure2Learn - Free Digital Life resources and blog post (October, 2019)
CSS.DA.K-2.9.10

Understand how people can use technology.

10. Use devices appropriately.


This element is about using technology appropriately. While working on projects in other CS domains, this element maintains the expectation that students are using technology responsibly. It is important to reinforce positive uses of technology and address negative issues as they arise. Physically or electronically posting clear and positive expectations of student use of technology can also be helpful in reinforcing this element. Most school systems have acceptable use policies and should be referred to when communicating safe and responsible expectations for students. Clear expectations of technology use will help students use it appropriately.

Resource Links

Netsmartz - https://www.missingkids.org/netsmartz/resources - Technology and online safety PowerPoint slideshow for students K-2 and a teacher guide. (NCMEC - National Center for Missing & Exploited Children)
CSS.DA.K-2.9.11

Understand how people can use technology.

11. Choose and use appropriate hardware and software tools for a given purpose using accurate terminology.


This element is about students choosing which hardware and software to use for a specific purpose. Appropriate terminology information can be found in element 3 above (CSS.DA.K-2.9.3).

With hardware, students could be making choices between using a tablet, laptop, or computer to use an app, play a game, visit a website, or create a document. They would need to decide which device would be the most appropriate or would have the software needed to perform a task. If students are using robots, students might have to choose a device that is compatible with their robot so that they can control or program it.

The most commonly used software on any device is a browser that will allow students to visit websites and therefore, students should be able to recognize and use it appropriately. (Examples: Google Chrome, Microsoft Edge, Mozilla Firefox, Apple Safari, and more).

Students are also frequently unsure which software will allow them to create a particular type of document.

- Drawings can be created on various programs, websites, or mobile apps:
  - ABCya Paint ([https://www.abcya.com/games/abcya_paint](https://www.abcya.com/games/abcya_paint))
  - Google Drawing
  - MS Paint
  - Autodesk SketchBook for iOS (iPad) and Android - Fully functioning, free apps

- Stories or text-based documents can be created with various word processing software (Microsoft Word / Google Docs) and even some websites such as [ReadWriteThink.org](http://ReadWriteThink.org).

- Slideshows can be created on presentation software such as Microsoft PowerPoint and Google Slides. These can be very useful for short writing projects that can include pictures. It is easy to insert and move text and pictures around on the page that is ready to print or share.
CSS.DA.3-5.9.1

Understand the relationship between technology, lifelong learning, and the appropriate use of information.

1. Discuss computing technologies that have changed the world and express how those technologies influence, and are influenced by, cultural practices.


This element is a continuation of the learning from CSS.DA.K-2.9.5 in which K-2 students learned about how technological innovation changes how people live and work.

Recently, many technologies have been introduced that have shaped our culture and the way we live our lives. Students should have discussions or create artifacts outlining some of these developments and their influence.

Examples of emerging technologies with potential to change our lives (some are more evident and relevant to 3rd-5th grade students than others):

- Voice activated technology
- Robot assistants
- Driverless vehicles
- Blockchain and cryptocurrency
- 3D Printing
- Augmented and mixed reality
- Reusable rockets
- Artificial intelligence
- Quantum computing

It is also important to consider technologies that are already widely in use that have influenced our culture as well as technologies that have been influenced by our own cultures. Within this context it is also important to emphasize creating a balance in our lives both digital and offline. (Refer to materials and resources from element CSS.DA.K-2.9.9 above.)
Examples:

- It's common to use text messages instead of doorbells when arriving at someone's home. Or, when using a doorbell it is common for those to be internet-enabled devices that notify the resident of a visitor.
- People rarely send personal letters and instead use some form of electronic communication.
- Consider the way that things like games, movies, etc. are purchased. Instead of being on a disk, those items are usually downloaded or streamed electronically.
- Phones and watches have incorporated features such as “Do Not Disturb” to accommodate our cultural need for courtesy during theater performances or movies.
- Apps have been developed to solve various problems perceived in our society such as apps to track exercise, apps to summon transportation (Uber, Lyft, etc.), translate languages (Google Translate), or apps to request services (TaskRabbit, Fiverr, etc.).

Resources Links

Video - ISTE (International Society of Technology Education). Excellent video that shows the many ways that technology changes the world.
https://www.youtube.com/watch?time_continue=98&v=VFcUgSYyRPg&feature=emb_logo

Article - 10 Incredible New Technologies that have Changed the World -
https://www.forbes.com/sites/forbestechcouncil/2017/05/23/10-incredible-new-technologies-that-have-changed-the-world/#4bb485f1495d

Article - 10 Technologies that are Changing the World
https://www.entrepreneur.com/article/310204

Adventure2Learn - Free Digital Life resources and blog post (October, 2019)

Computer Museum of America - Atlanta, GA - opened July 2019 - open Saturdays and Sundays
https://computermuseumofamerica.org/
CSS.DA.3-5.9.2

Understand the relationship between technology, lifelong learning, and the appropriate use of information.

2. Identify and propose ways to improve usability of technology for diverse users.


This element is about encouraging students to consider the user’s preferences and needs when discussing technology or when creating products. The design of websites, software, robots, machines, or even cities requires empathy with users of diverse abilities, interests and points of view.

User Interface (UI) design is an important topic in the world today. “User Interface (UI) Design focuses on anticipating what users might need to do and ensuring that the interface has elements that are easy to access, understand, and use to facilitate those actions” (Usability.gov). When students are designing any kind of technology artifact (slideshow, poster, website, program, etc.), they should try to put the user/viewer first as advised by UX Planet, “People are the first consideration, and applications should be designed with the needs of everyone in the audience in mind. You should design for people who are young, old, power users, regular users, and those who need additional assistance. Improving your product’s accessibility enhances the usability for everyone who uses it.”

Students can analyze current technology in their lives as well as create artifacts while considering users of different genders, cultures, and disabilities. In industry, companies test their products with a variety of users to ensure it meets their goals. This can also be a part of the design of artifacts created by students. Having students present their work to others for feedback or even working in groups can stimulate a diversity of ideas as they are creating. The content in this element can be used while students are creating artifacts in the CSS.IDC.3-5.4 (Innovative Designer) and CSS.CT.3-5.5 (Computational Thinker) domains.

Discussions on gender stereotypes and biases can create awareness and foster the inclusion of a variety of viewpoints. (See the Common Sense Media lesson below.) Also, when addressing the UI needs of the disabled, there are multiple factors students can consider:
## UI Needs for the Disabled

<table>
<thead>
<tr>
<th>Category</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual Impairment</strong></td>
<td>● Use text and graphics to communicate meaning</td>
</tr>
<tr>
<td>(blindness, low vision, color blindness)</td>
<td>● When using color, ensure it is well contrasted</td>
</tr>
<tr>
<td></td>
<td>● Don’t rely solely on color to communicate meaning</td>
</tr>
<tr>
<td><strong>Hearing Impairment</strong></td>
<td>● Include captions for audio and video</td>
</tr>
<tr>
<td><strong>Physical Impairment</strong></td>
<td>● Consider voice control</td>
</tr>
<tr>
<td></td>
<td>● Consider layout - remember not everyone can use a mouse and click consistently</td>
</tr>
<tr>
<td><strong>Learning Impairment</strong></td>
<td>● Use a uniform design with a minimum of distractions</td>
</tr>
<tr>
<td></td>
<td>● Use simple navigation or choices</td>
</tr>
</tbody>
</table>

### Resource Links

Common Sense Media - This site contains an entire digital citizenship curriculum K-12. Teachers must create a free account to access the lessons. In 2018 and 2019, Common sense media updated their lessons.

Common Sense Media - Digital Citizenship Curriculum  
[https://www.commonsense.org/education/digital-citizenship/curriculum](https://www.commonsense.org/education/digital-citizenship/curriculum)

Look for this lesson at the 3-5 level.  
5th Grade - Beyond Gender Stereotypes

Interaction Design Foundation - User Interface (UI) Design  
[https://www.interaction-design.org/literature/topics/ui-design](https://www.interaction-design.org/literature/topics/ui-design)

Interaction Design Foundation - Key Considerations for User Experience for the Disabled  
[https://www.interaction-design.org/literature/article/key-considerations-for-user-experience-for-the-disabled](https://www.interaction-design.org/literature/article/key-considerations-for-user-experience-for-the-disabled)
Just in Mind - 5 Ways to Achieve Awesome Accessibility in UI Design


UXPlanet - Accessible Interface Design https://uxplanet.org/accessible-interface-design-3c59ee3ec730
Related Vocabulary

K-2
See chart in CSS.DA.K-2.9:3 for K-2 vocabulary terms

3-5

Artificial Intelligence (AI) computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

Augmented Reality (AR) a mixture of software and hardware that superimposes images onto a user’s view of reality. Usually this software is run on a mobile device. Apps such as Google Maps, Google Translate, Minecraft Earth, and Pokémon Go take advantage of AR.

Bias prejudice in favor of or against one thing, person, or group compared with another, usually in a way considered to be unfair.

Diversity the use of many different things such as the perspective of people with different genders or cultures.

Stereotypes a widely held but fixed and oversimplified image or idea of a particular type of person or thing.

User Interface (UI) the way that people (users) interact with a computer, website, piece of software, etc.
Citations


Grade by grade progression

Kindergarten

Description of Digital Awareness for kindergarten: In kindergarten, students should:

- Have discussions about technology around them and how they use it
  - Ask what technology you or your family used yesterday and how did it help or hurt?
  - Show a photo of a new technology and an old method and talk about change
  - Have a conversation about when to pause and put down technology in order to talk to family and friends, enjoy being with others, and to have fun doing other things.
- Follow rules about using technology
- Use a variety of hardware and software
- Create simple artifacts - see sample activity below
- Troubleshoot simple tech issues such as volume control
- Be exposed to accurate technology terms.

Sample activities:
In reference to element CSS.K-2.9.4 (Create simple artifacts using a computing device), artifacts can be any digital creation: illustration (ie. Google drawing, Nearpod Draw it), video (ie. Flipgrid.com), program for a robot ie. (Bee Bots, Sphero, etc.), or writing (ie. ReadWriteThink.org interactives, Google Docs, Storymaker on ABCya, etc). These artifacts could reflect learning in academic areas or learning in any domain of the Computer Science Standards.

Kindergarten activities:

**Computer Science related activity**: Using Google Drawing or any drawing software, students can draw a picture of themselves doing 1-3 things they like to do that doesn’t use technology.

**Kindergarten academic related activity**:

*MGSEK.OA.3 Decompose numbers less than or equal to 10 into pairs in more than one way*
Using Google Drawing or any drawing software that has the ability to create basic shapes and add text, students can draw shapes that to add up to a number less than or equal to 10 in more than one way.
First Grade

Description of Digital Awareness for first grade: In first grade, students should:

- Have discussions about technology around them and how they use it
  - Students could draw a picture illustrating an example of technology in their life and how it helps them or their families
  - Teachers could show pictures of various innovations and students can discuss how it has changed how people live and work.
  - Students could create a drawing of an interaction between two avatars in a game. Then they could give those avatars real names and discuss how each person feels. This is to help students realize the fact that real people are on the other end of those screen names or avatars.
  - Teachers should point out and lead discussions about when it is important to put down technology and interact with others as well as have fun doing other things.
- Follow rules about using technology
- Use a variety of hardware and software and begin to incorporate personal learning goals with the use of technology
- Create simple artifacts - see sample activity below
- Begin to independently troubleshoot simple tech issues such as volume control and begin the troubleshooting thought process of identifying a problem and attempting to solve it.
- Be exposed to and encouraged to use accurate technology terms.

Sample activities:
In reference to element CSS.K-2.9.4 (Create simple artifacts using a computing device), artifacts can be any digital creation: illustration (ie. Google drawing, Nearpod Draw it), video (ie. Flipgrid.com), program for a robot (ie. Bee Bots, Sphero, etc.), or writing (ie. ReadWriteThink.org interactives, Google Docs, Storymaker on ABCya, etc). These artifacts could reflect learning in academic areas or learning in any domain of the Computer Science Standards.
First Grade activities:

**Computer Science related activity:**
Students can create a drawing or story that illustrates a way that technology can be good and bad. (see image)

**1st grade academic related activity:**  
MGSE1.G.1 Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.

Students can use a robot to “draw”/move in a specific shape. Most any robot designed for student use can be programmed to move in specific ways (Sphero, BeeBot, Dash & Dot, Cozmo, Ozobots, and more). For some robots, drawing a circle might be more difficult or impossible. This provides an excellent discussion point for why.

Students could also use drawing software (Google Drawing or any other drawing software) to create drawings of shapes and describing their attributes. (see image)
Second Grade

Description of Digital Awareness for 2nd grade: In 2nd grade, students should:

- Participate in discussion or writing activities about the technology around them and how they use it
  - Students could write about one example of technology in their life and how it helps them do something better than if they didn’t have it.
  - Students could create a diagram to show themselves and as many pieces of technology that they regularly use or come in contact with as they can.
  - Teachers could present a task and students could brainstorm ways that technology could make that task easier. (writing a book, travelling to another country, eating a meal)
  - Ask students about positive and negative interactions with others online. They probably know about an incident on a game or app where someone’s feelings were hurt or worse. Have students brainstorm how those interactions make people feel and how the experience could have been better in order to reinforce the fact that real people are on the other end of those screen names or avatars.
- Students could create goal statements and have them keep track of when they should put down technology to do other things and interact with other people.

- Follow rules about using technology
- Use a variety of hardware and software to achieve personal learning goals
- Create simple artifacts - see sample activity below
- Independently troubleshoot simple tech issues such as volume control and attempt to use a troubleshooting thought process to help with other issues such as reloading or exiting a website or turning a device off/on. (While following classroom and school rules concerning these procedures.)
- Use accurate technology terms.

Sample activities:
In reference to element CSS.K-2.9.4 (Create simple artifacts using a computing device), artifacts can be any digital creation: illustration (ie. Google drawing, Nearpod Draw it), video (ie. Flipgrid.com), program for a robot ie. (Bee Bots, Sphero, etc.), or writing (ie. ReadWriteThink.org interactives, Google Docs, Storymaker on ABCya, etc). These artifacts could reflect learning in academic areas or learning in any domain of the Computer Science Standards.
Second Grade activities:

**Computer Science related activity:**

Students could create a drawing or story to show all the technology they had to use to make it (hardware and software).

![Computer Science Related Activity]

**2nd grade academic related activity:**

*MGSE2.MD.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.*

As a group or individually, students can conduct a simple survey (favorite pizza toppings, ice cream flavors, weather, season, color) with 4 choices. Then students can take that data and create a pictograph using any type of drawing software such as Google Drawing. Then students can take those graphs and share them electronically or by printing in order to ask others questions about the data they represented.

![2nd Grade Academic Related Activity]
Third grade

Description of Digital Awareness at 3rd grade: Students in the 3rd grade should participate in discussions or create artifacts about how technology has changed how people do things in the current world such as communicate, make purchases, and make tasks easier. Students should then extend that discussion to include how to make current technologies better for diverse users of different abilities and cultures.

Sample activity:
Students could make an illustration of past and present ways of doing things such as:
- Getting directions to a location
- Turning on and off appliances
- Communicating with others
Then showing how it could be improved for users with different abilities or cultures.
Fourth grade

Description of Digital Awareness at 3rd grade: Students in the 4th grade should participate in discussions or create artifacts about how technology has changed how people do things in the current world such as communicate, make purchases, and make tasks easier. Students should then extend that discussion to include how to make current technologies better for diverse users of different abilities and cultures.

Sample activity:

Students could examine a commonly used technology such as streaming video, ebooks, streaming music, or downloaded/streaming games to see how that innovation has changed the everyday practices and habits of people in our society. They could look at how that technology has changed things in their own community and homes: libraries, stores, media companies (cable, satellite, newspapers, networks). Then students can explore how those technologies can be better for people with disabilities.
Fifth grade

Description of Digital Awareness at 5th grade: Students in the 5th grade should participate in discussions or create artifacts about how technology has changed how people do things in the current world as well as emerging technologies and how they might change our lives. Students should then extend that discussion to include how to make current technologies better for diverse users of different abilities and cultures.

Sample activity:
Students could do an inquiry based research project about an emerging technology in which they predict possible outcomes (good and bad) of its use. Example: Using voice activated technology at home, work, or school and the implications of privacy concerns, accents and cultural dialects, as well as benefits for the disabled.