### BIG IDEAS

- **User needs and interests drive the design process.**
- **Social, ethical, and sustainability issues are influenced by design.**
- **Complex tasks require different technologies and tools at different stages.**

### Learning Standards

<table>
<thead>
<tr>
<th>Curricular Competencies</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Students are expected to be able to do the following:</strong></td>
<td></td>
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<tr>
<td><strong>Applied Design</strong></td>
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<tr>
<td><strong>Understanding context</strong></td>
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<tr>
<td>• Engage in a period of <em>research</em> and <em>empathetic observation</em></td>
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<tr>
<td><strong>Defining</strong></td>
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<tr>
<td>• Identify potential users, societal impacts, and other relevant contextual factors for a chosen design opportunity</td>
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<td>• Identify criteria for success, intended impact, and any <em>constraints</em> or possible unintended impacts</td>
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<tr>
<td><strong>Ideating</strong></td>
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<tr>
<td>• Screen ideas against criteria and constraints</td>
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<tr>
<td>• Critically analyze and prioritize competing <em>factors</em> to meet community needs for preferred futures</td>
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<td>• Maintain an open mind about potentially viable ideas</td>
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<td><strong>Prototyping</strong></td>
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<td>• Identify and use <em>sources of inspiration</em> and information</td>
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<td>• Choose a form for prototyping and develop a <em>plan</em> that includes key stages and resources</td>
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<td>• Prototype, making changes to tools, materials, and procedures as needed</td>
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<td>• Record <em>iterations</em> of prototyping</td>
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| Students are expected to know the following: |  |
| • design opportunities |  |
| • *computer hardware*, peripherals, internal and external components, and standards |  |
| • distinctions between *software types*, cloud-based and desktop applications |  |
| • intermediate features of *business applications*, including word processing, spreadsheets, and presentations |  |
| • *operating system shortcuts* and *command line operations* |  |
| • *preventive maintenance* of hardware and software |  |
| • *computer security risks* |  |
| • hardware and software *troubleshooting* |  |
| • *wired and wireless computer networking* |  |
| • *evolution of digital technology* and the impact on traditional models of computing |  |
| • *risks and rewards* associated with big data, multi-device connectivity, and the Internet of Things |  |
| • principles of *computational thinking* |  |
| • introductory computer *programming concepts* and *constructs* |  |
## Curricular Competencies

### Testing
- Identify **sources of feedback**
- Develop an **appropriate test** of the prototype
- Conduct the test, collect and compile data, evaluate data, and decide on changes
- Iterate the prototype or abandon the design idea

### Making
- Identify and use appropriate tools, **technologies**, materials, and processes for production
- Make a step-by-step plan for production and carry it out, making changes as needed

### Sharing
- Decide on how and with whom to **share product** and processes
- Demonstrate the product to potential users, providing a rationale for the selected solution, modifications, and procedures
- Use appropriate terminology
- Critically reflect on their design thinking and processes, and identify new design goals
- Assess their ability to work effectively both as individuals and collaboratively in a group, including ability to share and maintain an efficient collaborative workspace

### Applied Skills
- Demonstrate an awareness of precautionary and emergency safety procedures in both physical and digital environments
- Identify the skills needed in relation to specific projects, and develop and refine them

### Applied Technologies
- Choose, adapt, and if necessary learn more about appropriate tools and technologies to use for tasks
- Evaluate **impacts**, including unintended negative consequences, of choices made about technology use
- Evaluate the influences of land, natural resources, and culture on the development and use of tools and technologies

### Content
- **planning and writing** simple programs, including games
- **impacts of computers and technology on society**
- **ethical considerations** of technology use, including **cultural appropriation** and **environmental sustainability**
- **digital literacy** and digital citizenship
- **impacts of technology use on personal health and wellness**
### Curricular Competencies – Elaborations

- **research**: seeking knowledge from other people as experts, secondary sources, and collective pools of knowledge in communities and collaborative atmospheres both online and offline
- **empathetic observation**: may include experiences and people, including users, experts, and thought leaders
- **constraints**: limiting factors such as task or user requirements, materials, expense, environmental impact
- **factors**: including social, ethical, and sustainability
- **sources of inspiration**: may include personal experiences; exploration of First Peoples perspectives and knowledge; the natural environment and places, including the land and its natural resources and analogous settings; cultural influences; people, including users, experts, and thought leaders
- **plan**: for example, pictorial drawings, sketches, flow charts
- **iterations**: repetitions of a process with the aim of approaching a desired result
- **sources of feedback**: may include peers; users; First Nations, Métis, or Inuit community experts; other experts and professionals
- **appropriate test**: consider conditions, number of trials
- **technologies**: tools that extend human capabilities
- **share**: may include showing to others or use by others, giving away, or marketing and selling
- **product**: for example, a physical product, a process, a system, a service, or a designed environment
- **impacts**: personal, social, and environmental

### Content – Elaborations

- **computer hardware**: for example, central processing unit (CPU), random-access memory (RAM), read-only memory (ROM), cache, hard drive, solid-state drive (SSD), motherboard, power supply, video card, sound card, printer, monitor, scanner, keyboard, mouse, speakers, flash memory, universal serial bus (USB) (2, 3, C), megahertz, megabytes, gigabytes
- **software types**: for example, systems software, utility software, application software
- **business applications**: software tools for communicating, presenting, organizing, and formatting data
- **operating system shortcuts**: for example, cut, copy, paste, print, print window, print screen, screen refresh
- **command line operations**: for example, establishing file structures, copying, deleting, moving files
- **preventive maintenance**: for example, physical and cloud data backup solutions, digital security measures, software updates, patches
- **computer security risks**: for example, malware, Trojans, viruses, phishing scams, identity fraud, ransomware
### Content – Elaborations

**APPLIED DESIGN, SKILLS, AND TECHNOLOGIES – Computer Studies**

**Grade 10**

- **troubleshooting**: identifying problem, establishing a theory of probable cause, testing theory to determine cause, taking action, testing and preventing, reporting

- **wired and wireless computer networking**: for example, network cards, routers, switches, cables, modems, network types

- **evolution of digital technology**: for example, introduction of mobile devices, smartphones, tablets, Internet of Things

- **risks and rewards**: for example, data collection, personal information, privacy concerns, remote hacking, information as a commodity, personal safety, convenience, functionality

- **computational thinking**: key components include decomposition, patterns and generalizations, abstraction, and algorithmic thinking

- **programming concepts and constructs**: classes, objects, data types, constants and variables, expressions and instructions, order of operations, precedence of arithmetic operators, assignment and relational operators, decision and looping structures, Boolean operators, comparison operators, arithmetic operators

- **planning and writing**:
  - using visual problem-solving models
  - using variables, expressions, and assignment statements to store and manipulate numbers and text in a program
  - using decision structure for two or more choices
  - effectively using looping structures
  - distinguishing between syntax, logic, and run-time errors

- **impacts of computers and technology on society**: global communication, social media, e-commerce, mobile payment solutions, globalization, human interactions, digital divide, crowdfunding, technology and social change, technology in humanitarian work, technology to assist people with diverse abilities

- **ethical considerations**: may include big data use, equality of access, copyright and fair use, gender issues and technology, cyberbullying, white hat/black hat hacking, hacking for social causes, e-waste, recycling, conflict mineral exploitation

- **cultural appropriation**: use of a cultural motif, theme, “voice”, image, knowledge, story, song, or drama, shared without permission or without appropriate context or in a way that may misrepresent the real experience of the people from whose culture it is drawn

- **environmental sustainability**: e-waste, recycling and disposal, power consumption, renewable energy, server farms

- **digital literacy**: curating a positive online portfolio, digital footprints/dossier, safe online information sharing, cyberbullying, online empathy, reporting online hate/bullying, support and resources, appropriate and professional ways to engage in online forums/communication spaces

- **health and wellness**: for example, cyber addictions; ergonomic issues; and other risks and potential side-effects of overuse of digital tools, including games, gambling, and social media