BIG IDEAS

Social, ethical, and sustainability considerations impact design.	Complex tasks require the sequencing of skills.	Complex tasks require different technologies and tools at different stages.

Learning Standards

Curricular Competencies	Content
Students are expected to be able to do the following: **Applied Design** *Understanding context* • Engage in a period of **research** and **empathetic observation** in order to understand design opportunities ***Defining*** • Choose a design opportunity • Identify potential users and relevant contextual factors • Identify criteria for success, intended impact, and any **constraints** ***Ideating*** • Take creative risks in generating ideas and add to others' ideas in ways that enhance them • Screen ideas against criteria and constraints • Critically analyze and prioritize competing factors, including social, ethical, and sustainability considerations, to meet community needs for preferred futures • Choose an idea to pursue, keeping other potentially viable ideas open *Prototyping* • Identify and use **sources of inspiration** and information • Choose a form for prototyping and develop a **plan** that includes key stages and resources • Evaluate a variety of materials for effective use and potential for reuse, recycling, and biodegradability • Prototype, making changes to tools, materials, and procedures as needed • Record **iterations** of prototyping	*Students are expected to know the following:* • **computer hardware**, peripherals, internal and external components, and standards • distinctions between **software types,** cloud-based and desktop applications • **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 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** • computer **programming concepts and constructs** • **planning and writing** simple programs • **code maintenance and documentation** • **impacts of computers and technology on society** and **ethical issues** of technology use and environmental sustainability • **digital literacy** and digital citizenship

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Learning Standards (continued)

Curricular Competencies	Content
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 • Use materials in ways that minimize waste *Sharing* • Decide on how and with whom to **share** their **product** and processes • Demonstrate their product to potential users, providing a rationale for the selected solution, modifications, and procedures, using appropriate terminology • Critically evaluate the success of their product, and explain how their design ideas contribute to the individual, family, community, and/or environment • Critically reflect on their design thinking and processes, and evaluate their ability to work effectively both as individuals and collaboratively in a group, including their ability to share and maintain an efficient co-operative work space • Identify new design issues **Applied Skills** • Demonstrate an awareness of precautionary and emergency safety procedures in both physical and digital environments • Identify the skills and skill levels needed, individually or as a group, in relation to specific projects, and develop and refine them as needed **Applied Technologies** • Choose, adapt, and if necessary learn about appropriate tools and technologies to use for tasks • Evaluate the personal, social, and environmental impacts, including unintended negative consequences, of the choices they make about technology use • Evaluate how the land, natural resources, and culture influence the development and use of tools and technologies	

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Curricular Competencies – Elaborations

- **research:** seeking knowledge from other people as experts (e.g., First Peoples Elders), secondary sources, and collective pools of knowledge in communities and collaborative atmospheres
- **empathetic observation:** aimed at understanding the values and beliefs of other cultures and the diverse motivations and needs of different people
- **Defining:** setting parameters
- **constraints:** limiting factors such as task or user requirements, materials, expense, environmental impact, issues of appropriation, and knowledge that is considered sacred
- **Ideating:** forming ideas or concepts
- **sources of inspiration:** may include experiences; traditional cultural knowledge and approaches, including those of First Peoples; places, including the land and its natural resources and analogous settings; and 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; keepers of traditional cultural knowledge and approaches, including those of First Peoples; and other experts
- **appropriate test:** consider conditions, number of trials
- **technologies:** things that extend human capabilities
- **share:** may include showing to others, 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

APPLIED DESIGN, SKILLS, AND TECHNOLOGIES – Computer Studies
Grade 10

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
- **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, identify fraud, ransomware
- **troubleshooting:** identifying the problem, establishing a theory of probable cause, testing the 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

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Content – Elaborations

- **evolution of technology:** for example, 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:** formulating problems and their solutions so they are represented in a form that can be solved through an algorithmic process
- **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
- **code maintenance and documentation:** external (indentation, naming conventions for constants, variables, and expressions); internal (program header, author, revision date, program name, program description); table of variable names and descriptions
- **impacts of computers and technology on society:** global communication, social media, e-commerce, mobile payment solutions, globalization, human interactions, digital divide, digital immigrants versus digital natives, crowdfunding, technology and social change
- **ethical issues:** for example, 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 minerals
- **digital literacy:** curating a positive online portfolio, digital footprints/dossier, safe online information sharing, cyberbullying, online empathy, reporting online hate/bullying, support and resources

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