BIG IDEAS

Design for the life cycle includes consideration of social and **environmental impacts**.	Personal design choices require self-exploration, collaboration, and evaluation and refinement of skills.	Tools and technologies can be adapted for specific purposes.

Learning Standards

Curricular Competencies	Content
Students are expected to be able to do the following: **Applied Design** ***Understanding context*** • Conduct **user-centred research** to determine technology design opportunities and barriers ***Defining*** • Establish a point of view for a chosen design opportunity • Identify potential users, intended impact, and possible unintended negative consequences • Make inferences about premises and **constraints** that define the technologies ***Ideating*** • Identify gaps to explore a design • Critically analyze how competing social, ethical, and sustainability considerations impact design • Generate ideas and add to others' ideas to create possibilities, and prioritize them for prototyping • Work with users throughout the design process	*Students are expected to know the following:* • design opportunities • evolution of computer technology, including hardware, software, networks, and the Internet • lab procedures, electrical safety, and appropriate tool use • internal and external **components** of computer systems, including **peripheral devices** • computer **troubleshooting**, including the incorporation of **digital tools** to aid and assist with research and diagnostics • computer assembly and disassembly best practices • ongoing **preventive maintenance**, including data security and online/offline backup solutions • installation and configuration of operating systems • proprietary versus **open-source** applications • software installations and configurations • use of correct terminology to describe the units, rates, and encoding of data communication • network planning, setup, and diagnostics • key aspects of network protocols and **standards**

Learning Standards (continued)

Curricular Competencies	Content
Prototyping • Analyze the design for life cycle and evaluate its **impacts** • Construct prototypes, making changes to tools, materials, and procedures as needed • Record **iterations** of prototyping ***Testing*** • Identify most appropriate feedback and possible **sources of feedback** • Develop an **appropriate test** of the prototype • Collect feedback to critically evaluate design and make changes to product design or processes • Iterate the prototype or abandon the design idea ***Making*** • Identify appropriate tools, technologies, materials, processes, and time needed for production, and where/how these could be available • Use **project management processes** when working individually or collaboratively to coordinate production ***Sharing*** • **Share** progress while creating to increase opportunities for feedback • Critically reflect on their design thinking and processes, and identify new design goals • Assess ability to work effectively both as individuals and collaboratively while implementing project management processes **Applied Skills** • Apply safety procedures for themselves, co-workers, and users in both physical and digital environments • Identify and assess skills needed for design interests, and develop specific plans to learn or refine them over time	• laptops and mobile device technology • **design for the life cycle** • careers in information and communication technology (ICT), including **roles and responsibilities** of ICT professionals • future technologies and potential societal impacts • appropriate use of technology, including digital citizenship, etiquette, and literacy

Learning Standards (continued)

Curricular Competencies	Content
Applied Technologies • Explore existing, new, and emerging tools, **technologies**, and systems to evaluate their suitability for their design interests • Evaluate impacts, including unintended negative consequences, of choices made about technology use • Analyze the role technologies play in societal change	

Big Ideas – Elaborations	APPLIED DESIGN, SKILLS, AND TECHNOLOGIES – Computer Information Systems Grade 11

- **environmental impacts:** including manufacturing, packaging, disposal, and recycling considerations

Curricular Competencies – Elaborations	APPLIED DESIGN, SKILLS, AND TECHNOLOGIES – Computer Information Systems Grade 11

- **user-centred research:** research done directly with potential users to understand how they do things and why, their physical and emotional needs, how they think about the world, and what is meaningful to them
- **constraints:** limiting factors, such as available technology, expense, environmental impact, copyright
- **impacts:** including the social and environmental impacts of extraction and transportation of raw materials, manufacturing, packaging, transportation to markets, servicing or providing replacement parts, expected usable lifetime, and reuse or recycling of component materials
- **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 both online and offline
- **appropriate test:** includes evaluating the degree of authenticity required for the setting of the test, deciding on an appropriate type and number of trials, and collecting and compiling data
- **project management processes:** setting goals, planning, organizing, constructing, monitoring, and leading during execution
- **Share:** may include showing to others, use by others, giving away, or marketing and selling
- **technologies:** tools that extend human capabilities

- **components:** functionality, and interdependence of internal and external components; for example, central processing units (CPUs), random access memory (RAM), video cards, printers, scanners
- **peripheral devices:** input/output devices, including devices to increase accessibility for those with physical challenges, 2D and 3D printers, scanners, and printers
- **troubleshooting:** identify the problem, establish a theory of probable cause, test the theory to determine cause, determine the next steps to resolve problem, report findings
- **digital tools:** for example, help and discussion forums, tutorial videos, online help databases, lists of frequently asked questions (FAQs)
- **preventive maintenance:** comprehensive backup plan, measures to secure the system against malicious exploits, periodic hardware and software maintenance, and steps to maintain general system tidiness. Goals of preventative maintenance are to reduce the likelihood of hardware failures, extend the useful life of the system, minimize system crashes caused by outdated drivers and other software problems, secure the system against viruses and other malware, and prevent data loss.
- **open-source:** software with source code that anyone can inspect, modify, and enhance
- **standards:** International Organization for Standardization (ISO) in the creation of open standards for networking; seven layers of the Open System Interconnection (OSI) reference model; "interoperability" in the functioning of the Internet; four layers of the Transmission Control Protocol/Internet Protocol (TCP/IP); model-wide area networks (WANs) and local area networks (LANs); logical and physical network topologies, including the segmentation of networks
- **design for the life cycle:** taking into account in the design process, economic costs, and social and environmental impacts of the product, from the extraction of raw materials to eventual reuse or recycling of component materials
- **roles and responsibilities:** for example, communication, articulation of problems, collaboration, conflict resolution, workplace courtesies, interpersonal relations within digital platforms