

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
<p><i>Students are expected to be able to do the following:</i></p> <p>Applied Design</p> <p><i>Understanding context</i></p> <ul style="list-style-type: none"> • Conduct user-centred research to understand design opportunities and barriers <p><i>Defining</i></p> <ul style="list-style-type: none"> • Establish a point of view for a chosen design opportunity • Identify potential users, intended impact, and possible unintended negative consequences • Make decisions about premises and constraints that define the design space <p><i>Ideating</i></p> <ul style="list-style-type: none"> • Identify gaps to explore a design space • Generate ideas and add to others' ideas to create possibilities, and prioritize them for prototyping • Critically analyze how competing social, ethical, and sustainability considerations impact designed solutions to meet global needs for preferred futures • Work with users throughout the design process <p><i>Prototyping</i></p> <ul style="list-style-type: none"> • Identify and apply sources of inspiration and information • Choose an appropriate form, scale, and level of detail for prototyping, and plan procedures for prototyping multiple ideas 	<p><i>Students are expected to know the following:</i></p> <ul style="list-style-type: none"> • design opportunities • global and societal shifts resulting from emerging technologies, the Internet, and the ubiquity of online access • environmental impacts of technology consumption • design for the life cycle • personalized online portfolios • awareness and understanding of digital security risks • advanced hardware and software troubleshooting techniques • interpersonal skills necessary to work effectively within the IT sector • design requirements of network devices, cabling, test equipment, management plans, operation manuals and documentation, deployment strategies, ongoing upgrades, maintenance, and security • network management tools, including security, imaging, backup, and remote access

Learning Standards (continued)

Curricular Competencies	Content
<ul style="list-style-type: none"> • Analyze the design for the life cycle and evaluate its impacts • Construct prototypes, making changes to tools, materials, and procedures as needed • Record iterations of prototyping <p>Testing</p> <ul style="list-style-type: none"> • Identify feedback most needed 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 <p>Making</p> <ul style="list-style-type: none"> • Identify appropriate tools, technologies, materials, processes, and time needed for production • Use project management processes when working individually or collaboratively to coordinate production <p>Sharing</p> <ul style="list-style-type: none"> • Share their progress while making to increase feedback, collaboration, and, if applicable, marketing • Decide on how and with whom to share or promote their product, creativity, and, if applicable, intellectual property • Consider how others might build upon the design concept • 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 	<ul style="list-style-type: none"> • functional and operational differences between hardware servers • virtual terminal applications • command line operations • appropriate use of technology, including digital citizenship, etiquette, and literacy

Learning Standards (continued)

Curricular Competencies	Content
<p>Applied Skills</p> <ul style="list-style-type: none"> • 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 <p>Applied Technologies</p> <ul style="list-style-type: none"> • Explore existing, new, and emerging tools, technologies, and systems and 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

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

Curricular Competencies – Elaborations

- **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
- **sources of inspiration:** may include experiences, users, experts, and thought leaders
- **information:** may include professionals as experts, secondary sources, collective pools of knowledge in communities and collaborative atmospheres both online and offline
- **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
- **intellectual property:** creations of the intellect such as works of art, invention, discoveries, design ideas to which one has the legal rights of ownership
- **technologies:** tools that extend human capabilities

Content – Elaborations

- **ubiquity of online access:** for example, a globally connected planet; societal and political implications of Internet access as a human right
- **impacts of technology consumption:** for example, paper consumption, e-waste, conflict minerals, fuel use, carbon offsets
- **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
- **digital security risks:** for example, digital footprints, hacking, piracy, identity theft, phishing scams, ransomware
- **interpersonal skills:** for example, people skills, social skills, communication, attitudes, collaboration, follow-ups, courtesies, record keeping
- **documentation:** for example, a network map or blueprint that includes device name, internet protocol (IP) address, and machine access control (MAC) address for each device on the network
- **maintenance:** upgrading a network (e.g., user stations and network hardware and software); protecting data and programs; purchasing, acquiring, licensing, and distributing hardware and software; providing user support (e.g., help desk, technician, LAN tech, online)
- **functional and operational differences between hardware servers:** for example, web applications, file servers, proxy servers, mail servers, dynamic hosts configuration protocol (DHCP), domain name servers (DNS)