# BIG IDEAS

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| User needs and interests drive the design process. | Social, ethical, and sustainability considerations impact design. | 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:*<br>**Applied Design**<br>***Understanding context***<br>• Engage in a period of research and **empathetic observation**<br>***Defining***<br>• Identify potential users and relevant contextual factors for a chosen design opportunity<br>• Identify criteria for success, intended impact, and any **constraints**<br>• Determine whether activity is collaborative or self-directed<br>***Ideating***<br>• Take creative risks in generating ideas and add to others' ideas in ways that enhance them<br>• Identify and use **sources of inspiration**<br>• Screen ideas against criteria and constraints<br>• Critically analyze and prioritize competing **factors** to meet community needs for preferred futures<br>• Maintain an open mind about potentially viable ideas<br>***Prototyping***<br>• Choose a form for prototyping and develop a **plan** that includes key stages and resources<br>• Evaluate a variety of materials for effective use and potential for reuse, recycling, and biodegradability<br>• Prototype, making changes to tools, materials, and procedures as needed<br>• Record **iterations** of prototyping | *Students are expected to know the following:*<br>• design opportunities<br>• proper storage and organization of tools and equipment<br>• selection of metal for size, shape, and finish<br>• common gauges of metal<br>• identification of ferrous and non-ferrous materials and **carbon content**<br>• start-up, shutdown, and handling procedures for compressed gas cylinders<br>• **precision measurement**<br>• **cutting threads**<br>• mechanical fasteners and fastening methods<br>• methods for laying out, forming, and joining metal<br>• precision grinding<br>• computer numerical control (CNC) applications<br>• reading and preparing drawings, plans, and cutting lists<br>• ethics of **cultural appropriation** in design process |

## Learning Standards (continued)

| Curricular Competencies | Content |
|---|---|
| ***Testing***<br>• Identify **sources of feedback**<br>• Develop an appropriate test<br>• Conduct the test, collect and compile data, evaluate data, and decide on changes<br>***Making***<br>• Identify and use appropriate tools, **technologies**, materials, and processes<br>• Make a step-by-step plan and carry it out, making changes as needed<br>• Use materials in ways that minimize waste<br>***Sharing***<br>• Decide on how and with whom to **share** product and processes<br>• Demonstrate product to users and critically evaluate its success<br>• Identify new design goals<br>**Applied Skills**<br>• Demonstrate and document an awareness of precautionary and emergency safety procedures<br>• Develop competency and proficiency in skills at various levels involving manual dexterity and metalwork techniques<br>• Identify the skills needed, individually or collaboratively, in relation to specific projects, and develop and refine them<br>**Applied Technologies**<br>• Choose, adapt, and if necessary learn more about appropriate tools and technologies to use for tasks<br>• Evaluate **impacts**, including unintended negative consequences, of choices made about technology use<br>• Evaluate the influences of land, natural resources, and culture on the development and use of tools and technologies | |

  

- **empathetic observation:** may include experiences; traditional cultural knowledge and approaches of First Peoples and those of other cultures; places, including the land and its natural resources and analogous settings; people, including users, experts, and thought leaders
- **constraints:** limiting factors such as task or user requirements, materials, expense, environmental impact
- **sources of inspiration:** may include personal experiences, exploration of First Peoples perspectives and knowledge, the natural environment, places, cultural influences, and people
- **factors:** including social, ethical, and sustainability
- **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 First Nations, Métis, or Inuit community experts; keepers of other traditional cultural knowledge and approaches; peers, users, and other experts
- **technologies:** tools that extend human capabilities
- **share:** may include showing to others or use by others, giving away, or marketing and selling
- **impacts:** personal, social, and environmental



- **carbon content:** for example, spark and file test
- **precision measurement:** for example, units, standards, conversions, tolerances
- **cutting threads:** for example, tap, die, turning
- **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