

# K-6 Science and Technology (2004)

The NWT Science and Technology 2004 Curriculum, Grades K-6 outlines the knowledge, skills, and attitudes in that students must develop in Grades K-6, as well as the levels of achievement at which the students are expected to master these knowledge, skills, and attitudes. Teachers will use these levels of achievement to assess a student's accomplishments. The knowledge, skills, and attitudes outlined in the curriculum are consistent with the goals of science education in Canada, outlined in the Common Framework of Science Learning Outcomes, K-12 (Council of Ministers of Education, Canada, 1997)

## **What is Science and Technology?**

Science = a form of knowledge that seeks to describe and explain the natural and physical world and its place in the universe.

Technology = includes much more than the knowledge, skills, and attitudes related to computers, electronics, and their applications. Technology is both a form of knowledge and application that uses concepts and skills from many disciplines and cultures to design and construct useful "tools" that meet and identified need or solve a specific problem.

## **Goals**

The goals of science and technology education stem from the nature of science and technology and from the needs of NWT students. The goals are intended to ensure that all students acquire a basic scientific literacy and technological capability before entering secondary school. The goals for the students are to:

- Understand the basic concepts of science and technology
- Develop the skills, strategies, and habits of mind required for scientific inquiry and technological design through experiential and discovery learning;
- Relate scientific and technological knowledge to each other and to the world outside the school; and
- Appreciate the contributions and accomplishments of all people in the advancement of science and technology.

## **Curriculum Expectations and Achievement Levels**

The NWT Science and Technology Curriculum has two main elements:

- Expectations – identified for each grade, describe the knowledge, skills, and attitudes. Three sets of expectations are listed for each grade in each strand:
  - o Understanding Basic Concepts
  - o Developing Skills of Inquiry, Design, and Communication
  - o Relating Science and Technology to the World Outside the School
- Achievement Levels – brief describes of the four different degrees of achievement within the territorial curriculum expectations for any given grade

## Strands and Topics: Science and Technology, Grades K-6

*The knowledge, skills, and attitudes outlined in the expectations for the science and technology program are mandatory.*

Strand	K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Life Systems	Senses and the body	Character and Needs of Living Things	Growth and changes in Animals	Growth and changes in Plants	Habitat and Community	Human Organ Systems	Diversity of Living Things
Matter Materials	Creating Colour	Characteristics of Objects and Properties of Materials	Properties of Liquids and Solids	Magnetic and Charged Materials	Materials that Transmit, Reflect or Absorb Light or Sound	Properties of Change in Matter	Properties of Air and Characteristics of Flight
Energy and Control	Keeping Warm	Energy in our Lives	Energy from Wind and Water	Forces and Movement	Light and Sound Energy	Conservation of Energy	Electricity
Structures and Mechanisms	Machines Around Us	Everyday Structures	Movement	Stability	Pulleys and Gears	Forces Acting on Structures and Mechanisms	Motion
Earth and Space Systems	Dinosaurs	Daily and Seasonal Cycles	Air and Water in the Environment	Soil in the Environment	Rocks, Minerals and Erosion	Weather	Space

# Addison Wesley Science and Technology Books

<p><u>Grade 1</u> Flip Chart Book Teachers Guide Student Books:</p> <ul style="list-style-type: none"><li>- Changes All Around Me</li><li>- It's Alive</li><li>- Looking at Shoes</li><li>- At the Playground</li><li>- Energy for Work and Play</li></ul>	<p><u>Grade 4</u> Teachers Guide Student Books:</p> <ul style="list-style-type: none"><li>- Habitats</li><li>- Light</li><li>- Sound</li><li>- Pulleys and Gears</li><li>- Rocks and Minerals</li></ul>
<p><u>Grade 2</u> Flip Chart Book Teacher's Guide Student Books</p> <ul style="list-style-type: none"><li>- Weather Watch</li><li>- All About Animals</li><li>- In the Kitchen</li><li>- Mechanics at Work</li><li>- On the Move</li></ul>	<p><u>Grade 5</u> Teacher's Guide Student Books</p> <ul style="list-style-type: none"><li>- The Human Body</li><li>- Changes in Matter</li><li>- Conservation of Energy</li><li>- Forces on Structures</li></ul>
<p><u>Grade 3</u> Each with Teacher's guide:</p> <ul style="list-style-type: none"><li>- Plant Growth</li><li>- Magnetism</li><li>- Forces and Movement</li><li>- Stability</li><li>- Soil</li></ul>	<p><u>Grade 6</u> Teacher's Guide:</p> <ul style="list-style-type: none"><li>- Diversity of Living Things</li><li>- Air and Flight</li><li>- Electricity</li><li>- Motion</li><li>- Space</li></ul>

## Achievement Levels: Science and Technology, Grades K- 6

*The characteristics given for level 3 represent achievement that is considered to be the standard for the grade.*

Knowledge /Skills/Attitudes <i>The student will demonstrate:</i>	Level 1	Level 2	Level 3	Level 4
Understanding of Concept	<ul style="list-style-type: none"> <li>- shows understand of a few basic concepts</li> <li>- demonstrates significant misconceptions.</li> <li>- gives explanations showing limited understanding of the concept</li> </ul>	<ul style="list-style-type: none"> <li>- shows understand of some of the basic concepts</li> <li>-demonstrates minor misconceptions.</li> <li>-gives partial explanations.</li> </ul>	<ul style="list-style-type: none"> <li>- shows understanding of most of the basic concepts</li> <li>- demonstrates no significant misconceptions.</li> </ul> <p>Usually gives complete or nearly complete explanations</p>	<ul style="list-style-type: none"> <li>- shows understand of all basic concepts</li> <li>- demonstrates no misconceptions</li> <li>-always gives complete explanations.</li> </ul>
Inquiry, design and attitude skills	<ul style="list-style-type: none"> <li>- applies few of the required skills and strategies</li> <li>-show little awareness of safety procedures</li> <li>- uses tools, equipment and materials correctly only with assistance.</li> </ul>	<ul style="list-style-type: none"> <li>- applies some of the required skills and strategies.</li> <li>-shows some awareness of safety procedures.</li> <li>-uses tools, equipment and materials correctly with some assistance.</li> </ul>	<ul style="list-style-type: none"> <li>- applies most of the required skills and strategies.</li> <li>-usually shows awareness of safety procedures</li> <li>-uses tools, equipment and materials correctly with one occasional assistance.</li> </ul>	<ul style="list-style-type: none"> <li>- applies all (or almost all) of the required skills and strategies.</li> <li>-consistently shows awareness of safety procedures</li> <li>- uses tools, equipment and materials correctly with little or no assistance.</li> </ul>

<p>Communication of Required Knowledge</p>	<ul style="list-style-type: none"> <li>- communicates with little clarity and precision.</li> <li>- rarely uses appropriate science and technology and units of measure</li> </ul>	<ul style="list-style-type: none"> <li>- communicates with some clarity and precision.</li> <li>-sometimes uses appropriate science and technology and units of measure.</li> </ul>	<ul style="list-style-type: none"> <li>- generally communicates with clarity and precision.</li> <li>-usually uses appropriate science and technology and units of measure</li> </ul>	<ul style="list-style-type: none"> <li>- consistently communicates with clarity and precision.</li> <li>- consistently uses appropriate science and technology and units of measure.</li> </ul>
<p>Relating Science and Technology to each other and to the world outside</p>	<ul style="list-style-type: none"> <li>- shows little understand of connections between science and technology in familiar contexts</li> </ul>	<ul style="list-style-type: none"> <li>- shows some understanding of connections between science and technology in familiar contexts</li> <li>- shows some understanding of connections between science and technology and the world outside the school.</li> </ul>	<ul style="list-style-type: none"> <li>- shows understanding of connections between science and technology and the world outside the school</li> </ul>	<ul style="list-style-type: none"> <li>- shows understanding of connections between science and technology in both familiar and unfamiliar contexts.</li> <li>- shows understanding of connections between science and technology and the world outside the school as well as their implications.</li> </ul>

## Notes:

### Resources:

- The Addison Wesley resources, Science and Technology, are deemed as the core resources for the teaching of science and technology K-6.

### Selection of activities:

- The Science and Technology K-6 resources from Addison Wesley incorporate numerous hands-on / discovery learning activities into their program of studies. Some of the activities can be used as classroom activity centres, while others are used as either small group / individual explorations or teacher demonstrations.
- Each Teacher Resource Manual (TRM) includes a Curriculum Correlation page that outlines the matching learning outcomes (or expectations) covered through each activity. Although there are many activities described for each unit, teachers are given the freedom to choose which activities to use, as long as the learning outcomes are covered in enough depth to ensure student understanding.
- Each unit ends with a Design Project. It is strongly recommended that teachers include the design project into their unit activities. Many of the learning outcomes are achieved through this project.
- Teachers should feel comfortable using alternative activities from other resources to supplement their program (like Project Wild games, internet websites, etc). When using supplemental resources, teachers need to ensure that the curriculum learning outcomes are being achieved.

### Integration:

- Students in K- 6 will benefit from a program in which their immediate world is integrated in the understanding and applications of science and technology. An integrated program can help students make connections between the concepts, skills, and attitudes of other disciplines and their culture.
- Cross-curricular learning demonstrates the connection to other subject areas. Teachers should emphasize this cross-curricular learning by:
  - Coordinating the teaching of related content in two or more subjects. (Example: Data management in mathematics can be linked to making a graph of data collected in a science and technology activity; Comprehension of non-fiction texts can be linked to the reading of science-related articles.)
  - Providing opportunities for students to work towards expectations in two or more subject with one lesson. (For example, social studies teachers developing a unit on what type of houses people have around the world could give students opportunities to learn about the properties of materials (science and technology), the characters of geometric shapes (mathematics), and the aesthetics of design (visual art and technology). At the end of the unit, students could be asked to write a paper (language) assessing the impact of a scientific or technological innovation on the lifestyle of people (science and technology/social studies).
  - Linking English Language Arts to Science is often overlooked but there are numerous texts, fiction and non-fiction, that can be used to broaden student understanding of science concepts. A list is being developed and will be posted on the NWT web site.

### Safety:

- Teachers are responsible for ensuring the safety of students during classroom and outdoor activities and also for encouraging and motivating students to assume responsibility for safety as an individual and as a group. (other important notes within curriculum)

### Attitudes in Science and Technology:

- Students need to develop the attitudes or 'habits of mind' that are considered essential for meaningful work in science and technology. These include:
  - Commitment to accuracy, precision, and integrity in observation, experimentation, and reporting
  - Respect for evidence
  - Concern for the observance of safety procedures

- Respect of others point of view
- Respect for living things and the environment

### **Communication**

- Communication is an essential component of the science and technology curriculum because many of the activities and tasks that students undertake involve the use of communication skills, written, pictorial, graphical and/or oral.
- The language of science and technology includes special terms that are recognized as belonging to these fields. The use of aboriginal language, in context, will also enable students to appreciate and better understand the sciences from a variety of cultural contexts.

### **Use of Computers**

- The use of computers can extend and enrich students' learning in science and technology. Whenever possible, students should be encouraged to use computers in a purposeful manner to enhance their understanding of the science and technology program.
- Ideas include:
  - Use the World Wide Web to enable students and teachers to research and learn about science and technology in the world beyond the school.
  - Use the internet to communicate with students in other schools and in other parts of the world.
  - Use the internet to broaden their understanding of global scientific issues.
  - Use computer programs to compile, organize and store data gathered through investigations;
  - Use computer programs to write reports and papers;
  - Use computer programs to work with simulations in areas of study in which hands-on activities are not feasible (e.g. astronomy) or in which there is too great a safety risk (e.g. investigations involving toxic substances).

## **Great Science Resources:**

*Found in all schools:*

### **Books:**

- Canadian Wildlife Federation resources:
  - Project Wild
  - Below Zero
- NWT Renewable Resources:
  - NWT's Focus on Forests
- WILD Education:
  - Wild Sheep of North America
  - Project Caribou
- Science is. . . A source book of fascinating facts, projects and activities by Susan Bosak
- Keepers of the Earth: Native American Stories and Environmental Activities for Children by Michael J. Caduto

### **Video:**

- Ernie's Earth – The Wonders of Winter
- National Film Board videos
- DCSB Dogrib Skin Lodge

### **Internet:**

[www.lessonsoftheland.ca](http://www.lessonsoftheland.ca)