

Science 1

Curriculum Guide 2015



Education and Early Childhood Development

***Department of Education and Early
Childhood Development
Mission Statement***

***By March 31, 2017, the Department of Education and
Early Childhood Development will have improved
provincial early childhood learning and the K-12
education system to further opportunities for the
people of Newfoundland and Labrador.***

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Section One: Newfoundland and Labrador Curriculum

Introduction

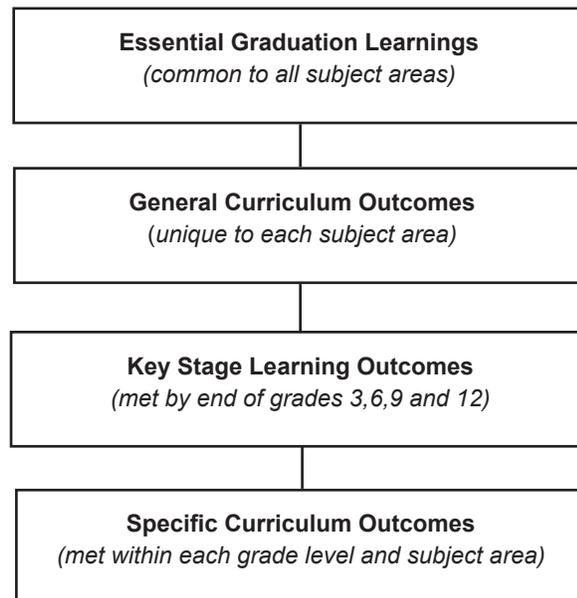
There are multiple factors that impact education including: technological developments, increased emphasis on accountability, and globalization. These factors point to the need to consider carefully the education our children receive.

The Newfoundland and Labrador Department of Education believes that curriculum design with the following characteristics will help teachers address the needs of students served by the provincially prescribed curriculum:

- Curriculum guides must clearly articulate what students are expected to know and be able to do by the time they graduate from high school.
- There must be purposeful assessment of students' performance in relation to the curriculum outcomes.

Outcomes Based Education

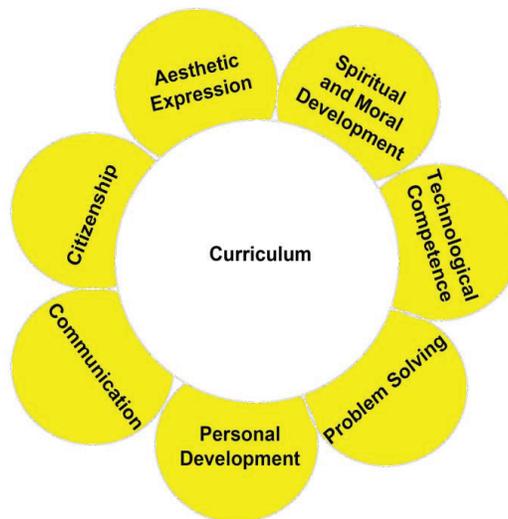
The K-12 curriculum in Newfoundland and Labrador is organized by outcomes and is based on *The Atlantic Canada Framework for Essential Graduation Learning in Schools* (1997). This framework consists of Essential Graduation Learnings (EGLs), General Curriculum Outcomes (GCOs), Key Stage Curriculum Outcomes (KSCOs) and Specific Curriculum Outcomes (SCOs).



Essential Graduation Learnings

Essential Graduation Learnings (EGLs) provide vision for the development of a coherent and relevant curriculum. The EGLs are statements that offer students clear goals and a powerful rationale for education. The EGLs are delineated by general, key stage, and specific curriculum outcomes.

EGLs describe the knowledge, skills, and attitudes expected of all students who graduate from high school. Achievement of the EGLs will prepare students to continue to learn throughout their lives. EGLs describe expectations, not in terms of individual subject areas, but in terms of knowledge, skills, and attitudes developed throughout the curriculum. They confirm that students need to make connections and develop abilities across subject areas if they are to be ready to meet the shifting and ongoing demands of life, work, and study.



Aesthetic Expression - Graduates will be able to respond with critical awareness to various forms of the arts and be able to express themselves through the arts.

Citizenship - Graduates will be able to assess social, cultural, economic, and environmental interdependence in a local and global context.

Communication - Graduates will be able to think, learn, and communicate effectively by using listening, viewing, speaking, reading, and writing modes of language(s), and mathematical and scientific concepts and symbols.

Problem Solving - Graduates will be able to use the strategies and processes needed to solve a wide variety of problems, including those requiring language, and mathematical and scientific concepts.

Personal Development - Graduates will be able to continue to learn and to pursue an active, healthy lifestyle.

Spiritual and Moral Development - Graduates will demonstrate understanding and appreciation for the place of belief systems in shaping the development of moral values and ethical conduct.

Technological Competence - Graduates will be able to use a variety of technologies, demonstrate an understanding of technological applications, and apply appropriate technologies for solving problems.

Curriculum Outcomes

Curriculum outcomes are statements that articulate what students are expected to know and be able to do in each program area in terms of knowledge, skills, and attitudes.

Curriculum outcomes may be subdivided into General Curriculum Outcomes, Key Stage Curriculum Outcomes, and Specific Curriculum Outcomes.

General Curriculum Outcomes (GCOs)

Each program has a set of GCOs which describe what knowledge, skills, and attitudes students are expected to demonstrate as a result of their cumulative learning experiences within a subject area. GCOs serve as conceptual organizers or frameworks which guide study within a program area. Often, GCOs are further delineated into KSCOs.

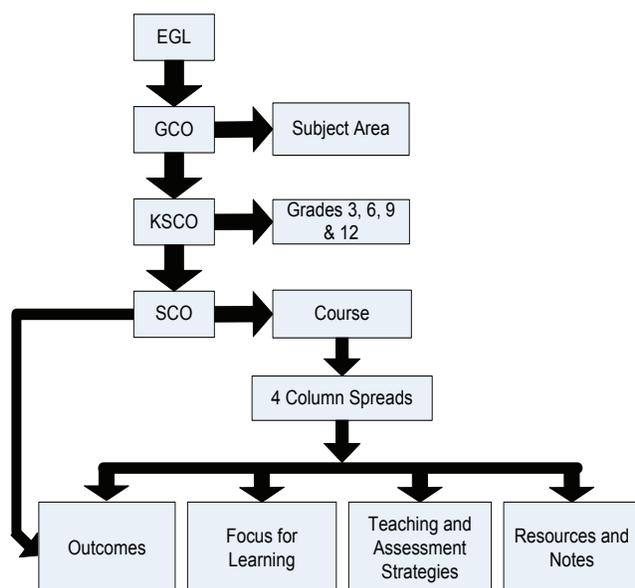
Key Stage Curriculum Outcomes (KSCOs)

Key Stage Curriculum Outcomes (KSCOs) summarize what is expected of students at each of the four key stages of Grades Three, Six, Nine, and Twelve.

Specific Curriculum Outcomes (SCOs)

SCOs set out what students are expected to know and be able to do as a result of their learning experiences in a course, at a specific grade level. In some program areas, SCOs are further articulated into delineations. **It is expected that all SCOs will be addressed during the course of study covered by the curriculum guide.**

EGLs to Curriculum Guides



Context for Teaching and Learning

Teachers are responsible to help students achieve outcomes. This responsibility is a constant in a changing world. As programs change over time so does educational context. Factors that make up the educational context in Newfoundland and Labrador today: inclusive education, support for gradual release of responsibility teaching model, focus on literacy and learning skills in all programs, and support for education for sustainable development.

Inclusive Education

Valuing Equity and Diversity

Effective inclusive schools have the following characteristics: supportive environment, positive relationships, feelings of competence, and opportunities to participate (The Centre for Inclusive Education, 2009).

All students need to see their lives and experiences reflected in their school community. It is important that the curriculum reflect the experiences and values of all genders and that learning resources include and reflect the interests, achievements, and perspectives of all students. An inclusive classroom values the varied experiences, abilities, social, and ethno-cultural backgrounds of all students while creating opportunities for community building. Inclusive policies and practices promote mutual respect, positive interdependencies, and diverse perspectives. Learning resources should include a range of materials that allow students to consider many viewpoints and to celebrate the diverse aspects of the school community.



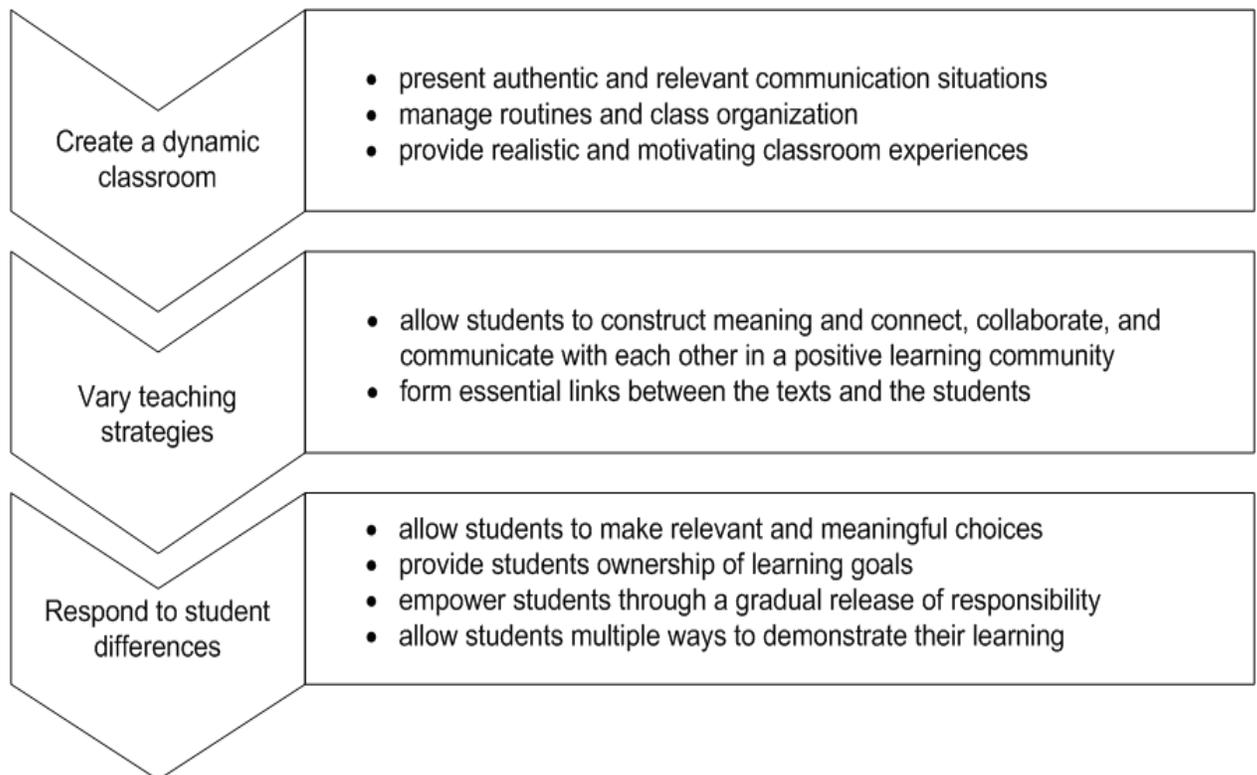
Differentiated Instruction

Differentiated instruction is a teaching philosophy based on the premise that teachers should adapt instruction to student differences. Rather than marching students through the curriculum lockstep, teachers should modify their instruction to meet students' varying readiness levels, learning preferences, and interests. Therefore, the teacher proactively plans a variety of ways to 'get it' and express learning (Carol Ann Tomlinson).

Curriculum is designed and implemented to provide learning opportunities for all according to student abilities, needs, and interests. Teachers must be aware of and responsive to the diverse range of learners in their classes. Differentiated instruction is a useful tool in addressing this diversity.

Differentiated instruction responds to different readiness levels, abilities, and learning profiles of students. It involves actively planning so that: the process by which content is delivered, the way the resource is used, and the products students create are in response to the teacher's knowledge of whom he or she is interacting with. Learning environments should be flexible to accommodate various learning preferences of the students. Teachers continually make decisions about selecting teaching strategies and structuring learning activities to provide all students with a safe and supportive place to learn and succeed.

Teachers should...



Differentiating the Content

Differentiating content requires teachers to pre-assess students to identify those who require pre-requisite instruction, as well as those who have already mastered the concept and may, therefore, proceed to apply the concepts to problem solving or further use. Another way to differentiate content is to permit students to adjust the pace at which they may progress through the material. Some students may require additional time while others may move through at an increased pace and thus create opportunities for

enrichment or more indepth consideration of a topic of particular interest.

Teachers should consider the following examples of differentiating content:

- meet with small groups to re-teach an idea or skill or to extend the thinking or skills
- present ideas through auditory, visual, and tactile means
- use reading materials such as novels, web sites, and other reference materials at varying reading levels

Differentiating the Process

Differentiating the process involves varying learning activities or strategies to provide appropriate methods for students to explore and make sense of concepts. A teacher might assign all students the same product (e.g., giving a presentation) but the process students use to create the presentation may differ. Some students could work in groups while others meet with the teacher alone. The same assessment criteria can be used for all students.

Teachers should consider flexible groupings of students such as whole class, small group, or individual instruction. Students can be grouped according to their learning styles, readiness levels, interest areas, and the requirements of the content or activity presented. Groups should be formed for specific purposes and be flexible in composition and short-term in duration.

Teachers should consider the following examples of differentiating the process:

- offer hands-on activities for students who need them
- provide activities and resources that encourage students to further explore a topic of particular interest to them
- use activities in which all learners work with the same learning outcomes, but proceed with different levels of support, challenge, or complexity

Differentiating the Product

Differentiating the product involves varying the complexity and type of product that students create to demonstrate learning outcomes. Teachers provide a variety of opportunities for students to demonstrate and show evidence of what they have learned.

Teachers should consider the following examples of differentiating by product:

- encourage students to create their own products as long as the assignments contain required elements
- give students options of how to express their learning (e.g., create an online presentation, write a letter, or develop a mural)

Allowing students to choose how they demonstrate their understanding in ways that are appropriate to their learning needs, readiness, and interests is a powerful way to engage them.

Differentiating the Learning Environment

The learning environment includes the physical and the affective tone or atmosphere in which teaching and learning take place, and can include the noise level in the room, whether student activities are static or mobile, or how the room is furnished and arranged. Classrooms may include tables of different shapes and sizes, space for quiet individual work, and areas for collaboration.

Teachers can divide the classroom into sections, create learning centres, or have students work both independently or in groups. The structure should allow students to move from whole group, to small group, pairs, and individual learning experiences and support a variety of ways to engage in learning. Teachers should be sensitive and alert to ways in which the classroom environment supports their ability to interact with students.

Teachers should consider the following examples of differentiating the learning environment:

- develop routines that allow students to seek help when teachers are with other students and cannot provide immediate attention
- ensure there are places in the room for students to work quietly and without distraction, as well as places that invite student collaboration
- establish clear guidelines for independent work that match individual needs
- provide materials that reflect diversity of student background, interests, and abilities

The physical learning environment must be structured in such a way that all students can gain access to information and develop confidence and competence.

Meeting the Needs of Students With Exceptionalities

All students have individual learning needs. Some students, however, have exceptionalities (defined by the Department of Education) which impact their learning. The majority of students with exceptionalities access the prescribed curriculum. Details of these exceptionalities are available at:

www.gov.nl.ca/edu/k12/studentsupportservices/exceptionalities.html

Supports for these students may include:

1. accommodations
2. modified prescribed courses
3. alternate courses
4. alternate programs
5. alternate curriculum

For further information, see Service Delivery Model for Students with Exceptionalities at www.cdli.ca/sdm/

Classroom teachers should collaborate with instructional resource teachers to select and develop strategies which target specific learning needs.

Meeting the Needs of Students Who are Highly Able

** includes gifted and
talented*

Some students begin a course or topic with a vast amount of prior experience and knowledge. They may know a large portion of the material before it is presented to the class or be capable of processing it at a rate much faster than their classmates. All students are expected to move forward from their starting point. Many elements of differentiated instruction are useful in addressing the needs of students who are highly able.

Some strategies which are often effective include:

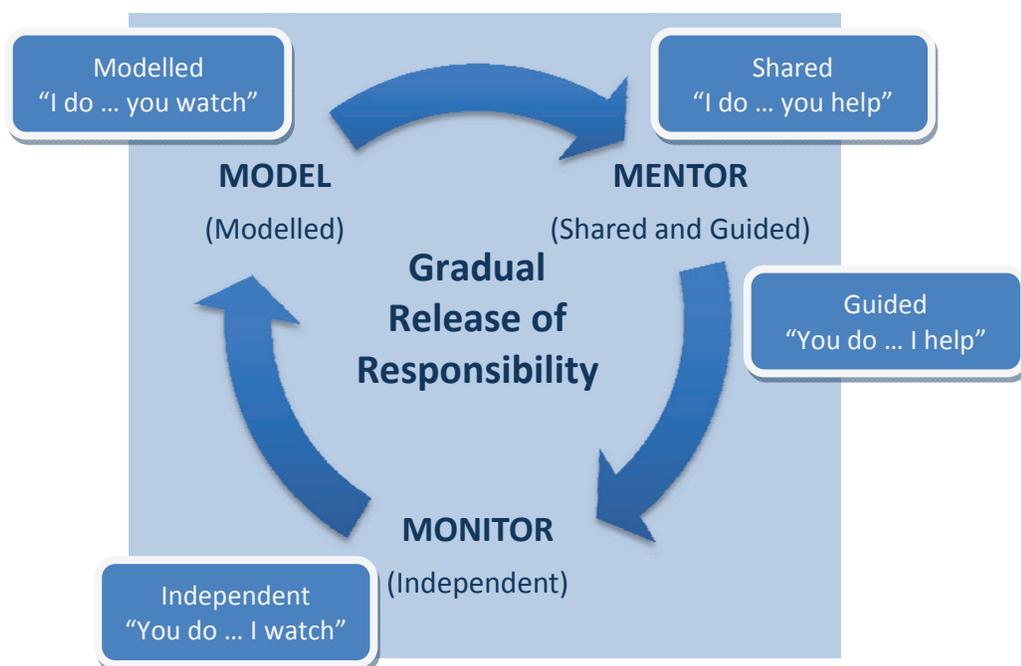
- independent study to increase depth of exploration in an area of particular interest .
- curriculum compacting to allow for an increased rate of content coverage commensurate with a student's ability or degree of prior knowledge.
- similar ability grouping to provide the opportunity for students to work with their intellectual peers and elevate discussion and thinking, or delve deeper into a particular topic
- tiering of instruction to pursue a topic to a greater depth or to make connections between various spheres of knowledge

Highly able students require the opportunity for authentic investigation and become familiar with the tools and practices of the field of study. Authentic audiences and tasks are vital for these learners. Some highly able learners may be identified as gifted and talented in a particular domain. These students may also require supports through the Service Delivery Model for Students with Exceptionalities.

Gradual Release of Responsibility

Teachers must determine when students can work independently and when they require assistance. In an effective learning environment, teachers choose their instructional activities to model and scaffold composition, comprehension and metacognition that is just beyond the students' independence level. In the gradual release of responsibility approach, students move from a high level of teacher support to independent work. If necessary, the teacher increases the level of support when students need assistance. The goal is to empower students with their own learning strategies, and to know how, when, and why to apply them to support their individual growth. Guided practice supports student independence. As a student demonstrates success, the teacher should gradually decrease his or her support.

Gradual Release of Responsibility Model



Literacy

UNESCO has proposed an operational definition which states, "Literacy is the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying contexts. Literacy involves a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in their community and wider society". To be successful, students require a set of interrelated skills, strategies and knowledge in multiple literacies that facilitate their ability to participate fully in a variety of roles and contexts in their lives, in order to explore and interpret the world and communicate meaning (The Plurality of Literacy and its Implications for Policies and Programmes, 2004, p.13).

Literacy is:

- a process of receiving information and making meaning from it
- the ability to identify, understand, interpret, communicate, compute, and create text, images, and sounds

Literacy development is a lifelong learning enterprise beginning at birth that involves many complex concepts and understandings. It is not limited to the ability to read and write; no longer are we exposed only to printed text. It includes the capacity to learn to communicate, read, write, think, explore, and solve problems. Literacy skills are used in paper, digital, and live interactions where people:

- analyze critically and solve problems
- comprehend and communicate meaning
- create a variety of texts
- read and view for enjoyment
- make connections both personally and inter-textually
- participate in the socio-cultural world of the community
- respond personally

These expectations are identified in curriculum documents for specific subject areas as well as in supporting documents, such as *Cross-Curricular Reading Tools (CAMET)*.

With modelling, support, and practice, students' thinking and understandings are deepened as they work with engaging content and participate in focused conversations.

Reading in the Content Areas

The focus for reading in the content areas is on teaching strategies for understanding content. Teaching strategies for reading comprehension benefits all students, as they develop transferable skills that apply across curriculum areas.

When interacting with different texts, students must read words, view and interpret text features and navigate through information presented in a variety of ways including, but not limited to:

- | | | |
|---------------------|------------------|--------------------|
| • Books | • Documentaries | • Speeches |
| • Poems | • Movies | • Podcasts |
| • Songs | • Music videos | • Plays |
| • Video games | • Advertisements | • Web pages |
| • Magazine articles | • Blogs | • Online databases |

Students should be able to interact with and comprehend different texts at different levels.

There are three levels of text comprehension:

- Independent level – students are able to read, view, and understand texts without assistance
- Instructional level – students are able to read, view, and understand most texts but need assistance to fully comprehend some texts
- Frustration level – students are not able to read or view with understanding (i.e., texts may be beyond their current reading level)

Teachers will encounter students working at all reading levels in their classrooms and will need to differentiate instruction to meet their needs. For example, print texts may be presented in audio form; physical movement may be associated with synthesizing new information with prior knowledge; graphic organizers may be created to present large amounts of print text in a visual manner.

When interacting with information that is unfamiliar to students, it is important for teachers to monitor how effectively students are using strategies to read and view texts. Students will need to:

- analyze and think critically about information
- determine importance to prioritize information
- engage in questioning before, during, and after an activity related to a task, text, or problem
- make inferences about what is meant but not said
- make predictions
- synthesize information to create new meaning
- visualize ideas and concepts

Learning Skills for Generation Next

Generation Next is the group of students who have not known a world without personal computers, cell phones and the Internet. They were born into this technology. They are digital natives.

Students need content and skills to be successful. Education helps students learn content and develop skills needed to be successful in school and in all learning contexts and situations. Effective learning environments and curricula challenge learners to develop and apply key skills within the content areas and across interdisciplinary themes.

Learning Skills for Generation Next encompasses three broad areas:

Learning and Innovation Skills

Learning and innovation skills enhance a person's ability to learn, create new ideas, problem solve, and collaborate. These skills will help foster lifelong learning. They include:

- Collaboration
- Communication
- Creative Thinking
- Critical Thinking

Literacy Skills

In addition to the literacy aspects outlined in the previous section, three areas are crucial for Generation Next. These areas are:

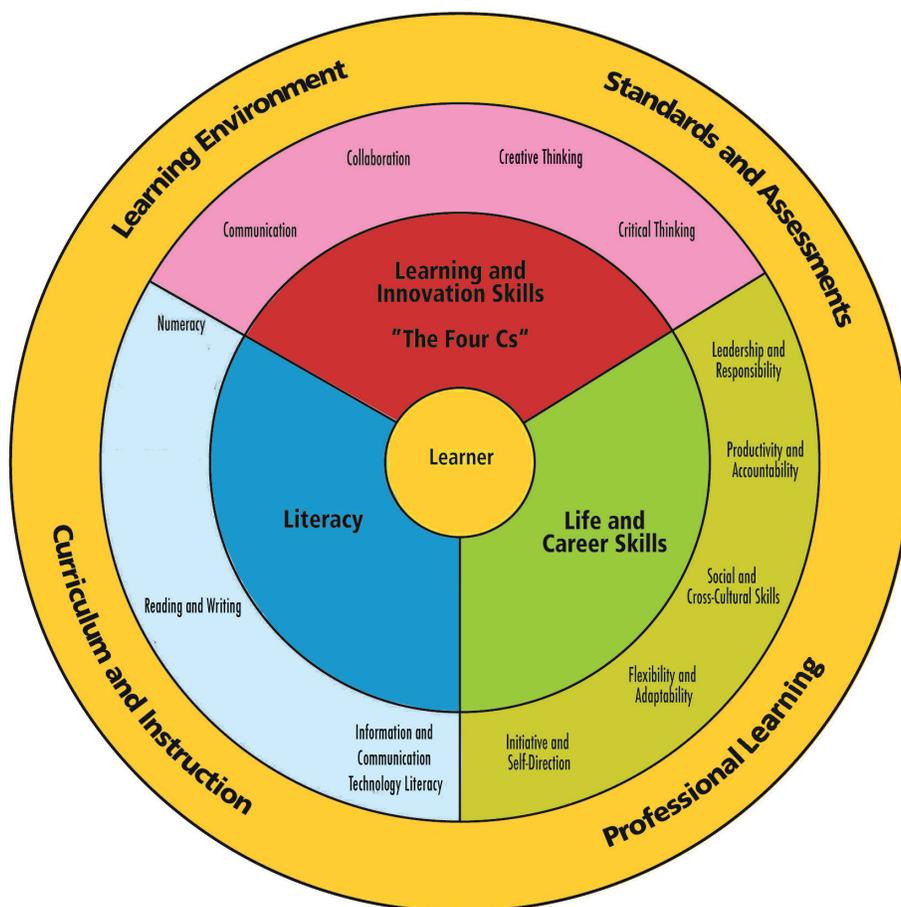
- Information and Communication Technology Literacy
- Numeracy
- Reading and Writing

Life and Career Skills

Life and career skills are skills that address leadership, the interpersonal, and the affective domains. These skills include:

- Flexibility and Adaptability
- Initiative and Self-Direction
- Leadership and Responsibility
- Productivity and Accountability
- Social and Cross-Cultural Skills

The diagram below illustrates the relationship between these areas. A 21st century curriculum employs methods that integrate innovative and research-driven teaching strategies, modern learning technologies, and relevant resources and contexts.



Support for students to develop these abilities and skills is important across curriculum areas and should be integrated into teaching, learning, and assessment strategies. Opportunities for integration of these skills and abilities should be planned with engaging and experiential activities that support the gradual release of responsibility model. For example, lessons in a variety of content areas can be infused with learning skills for Generation Next by using open-ended questioning, role plays, inquiry approaches, self-directed learning, student role rotation, and Internet-based technologies.

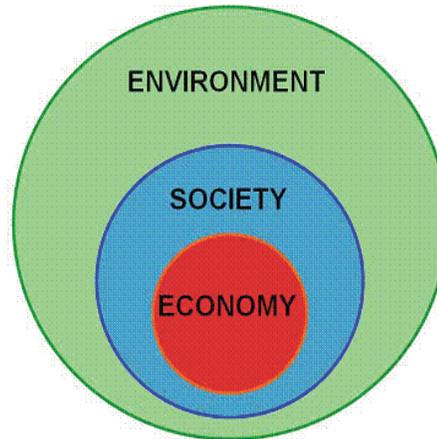
All programs have a shared responsibility in developing students' capabilities within all three skill areas.

Education for Sustainable Development

Sustainable development is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Our Common Future, 43).

Sustainable development is comprised of three integrally connected areas: economy, society, and environment.

3-Nested-Dependencies Model



Based on Bob Doppelt, *The Power of Sustainable Thinking*; Peter Senge et al., *The Necessary Revolution*.

As conceived by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) the overall goal of Education for Sustainable Development (ESD) is to integrate the knowledge, skills, values, and perspectives of sustainable development into all aspects of education and learning. Changes in human behaviour should create a more sustainable future – a future that provides for environmental integrity, economic viability, and results in a just society for both the present and future generations.

ESD is not teaching about sustainable development. Rather, ESD involves teaching for sustainable development – helping students develop the skills, attitudes, and perspectives to meet their present needs without compromising the ability of future generations to meet their needs.

Within ESD, the knowledge component spans an understanding of the interconnectedness of our political, economic, environmental, and social worlds, to the role of science and technology in the development of societies and their impact on the environment. The skills necessary include being able to assess bias, analyze consequences of choices, ask questions, and solve problems. ESD values and perspectives include an appreciation for the interdependence of all life forms, the importance of individual responsibility and action, an understanding of global issues as well as local issues in a global context. Students need to be aware that every issue has a history, and that many global issues are linked.

Assessment and Evaluation

Assessment

Assessment is the process of gathering information on student learning.

How learning is assessed and evaluated and how results are communicated send clear messages to students and others about what is valued.

Assessment instruments are used to gather information for evaluation. Information gathered through assessment helps teachers determine students' strengths and needs, and guides future instruction.

Teachers are encouraged to be flexible in assessing student learning and to seek diverse ways students might demonstrate what they know and are able to do.

Evaluation involves the weighing of the assessment information against a standard in order to make a judgement about student achievement.

Assessment can be used for different purposes:

1. assessment for learning guides and informs instruction
2. assessment as learning focuses on what students are doing well, what they are struggling with, where the areas of challenge are, and what to do next
3. assessment of learning makes judgements about student performance in relation to curriculum outcomes.

1. Assessment for Learning

Assessment for learning involves frequent, interactive assessments designed to make student learning visible. This enables teachers to identify learning needs and adjust teaching accordingly. It is an ongoing process of teaching and learning.

Assessment for learning:

- includes pre-assessments that provide teachers with information of what students already know and can do
- involves students in self-assessment and setting goals for their own learning
- is not about a score or mark
- is used to inform student learning
- provides descriptive and specific feedback to students and parents regarding the next stage of learning
- requires the collection of data, during the learning process, from a range of tools to learn as much as possible about what a student knows and is able to do

2. Assessment as Learning

Assessment as learning involves students' reflecting on their learning and monitoring of their own progress. It focuses on the role of the student in developing and supporting metacognition.

Assessment as learning:

- enables students to use information gathered to make adaptations to their learning processes and to develop new understandings
- engages students in their own learning as they assess themselves and understand how to improve performance
- prompts students to consider how they can continue to improve their learning
- supports students in analyzing their learning in relation to learning outcomes

3. Assessment of Learning

Assessment of learning involves strategies designed to confirm what students know, in terms of curriculum outcomes. It also assists teachers to determine student proficiency and their future learning needs. Assessment of learning occurs at the end of a learning experience that contributes directly to reported results.

Traditionally, teachers relied on this type of assessment to make judgements about student performance by measuring learning after the fact and then reporting it to others. Used in conjunction with the other assessment processes previously outlined, however, assessment of learning is strengthened.

Assessment of learning:

- confirms what students know and can do
- occurs at the end of a learning experience using a variety of tools
- provides opportunities to report evidence to date of student achievement in relation to learning outcomes, to parents/guardians, and other stakeholders
- reports student learning accurately and fairly, based on evidence obtained from a variety of contexts and sources

Involving Students in the Assessment Process

Students should know what they are expected to learn as outlined in the specific curriculum outcomes of a course as well as the criteria that will be used to determine the quality of their achievement. This information allows students to make informed choices about the most effective ways to demonstrate what they know and are able to do.

It is important that students participate actively in assessment by co-creating criteria and standards which can be used to make judgements about their own learning. Students may benefit from examining various scoring criteria, rubrics, and student exemplars.

Students are more likely to perceive learning as its own reward when they have opportunities to assess their own progress. Rather

than asking teachers, “What do you want?”, students should be asking themselves questions such as:

- What have I learned?
- What can I do now that I couldn’t do before?
- What do I need to learn next?

Assessment must provide opportunities for students to reflect on their own progress, evaluate their learning, and set goals for future learning.

Assessment Tools

In planning assessment, teachers should use a broad range of tools to give students multiple opportunities to demonstrate their knowledge, skills, and attitudes. The different levels of achievement or performance may be expressed as written or oral comments, ratings, categorizations, letters, numbers, or as some combination of these forms.

The grade level and the activity being assessed will inform the types of assessment teachers will choose.

Types of Assessment Tools:

- | | | |
|-----------------------------------|----------------------|--------------------|
| • Anecdotal Records | • Exemplars | • Projects |
| • Audio/video clips | • Graphic Organizers | • Questions |
| • Case Studies | • Journals | • Quizzes |
| • Checklists | • Literacy Profiles | • Role Plays |
| • Conferences | • Observations | • Rubrics |
| • Debates | • Podcasts | • Self Assessments |
| • Demonstrations | • Portfolios | • Tests |
| • Documentation using photographs | • Presentations | • Wikis |

Assessment Guidelines

It is important that students know the purpose of an assessment, the type, and the marking scheme being used. The following criteria should be considered:

- a rationale should be developed for undertaking a particular assessment of learning at a particular point in time
- all students should be provided with the opportunity to demonstrate the extent and depth of their learning
- assessments should measure what they intend to measure
- criteria used in the assessment should be shared with students so that they know the expectations
- evidence of student learning should be collected through a variety of methods and not be based solely on tests and paper and pencil activities
- feedback should be descriptive and individualized to students
- learning outcomes and assessment criteria together should provide a clear target for student success

Evaluation

Evaluation is the process of analyzing, reflecting upon, and summarizing assessment information, and making judgements or decisions based on the information gathered. Evaluation is conducted within the context of the outcomes, which should be clearly understood by learners before teaching and evaluation take place. Students must understand the basis on which they will be evaluated and what teachers expect of them.

During evaluation, the teacher:

- interprets the assessment information and makes judgements about student progress
- makes decisions about student learning programs

Section Two: Curriculum Design

Rationale

The vision of science education in Newfoundland and Labrador is to develop scientific literacy.

Scientific literacy is an evolving combination of the science-related attitudes, skills, and knowledge students need to develop inquiry, problem solving, and decision making abilities; to become lifelong learners; and to maintain a sense of wonder about the world around them.

To develop scientific literacy, students require diverse learning experiences which provide opportunities to explore, analyse, evaluate, synthesize, appreciate, and understand the interrelationships among science, technology, society, and the environment that will affect their personal lives, careers, futures.

Science education which strives for scientific literacy must engage students in science inquiry, problem solving, and decision making.

Science Inquiry

Science inquiry involves posing questions and developing explanations for phenomena. While there is general agreement that there is no such thing as “the” scientific method, students require certain skills to participate in the activities of science. Skills such as questioning, observing, inferring, predicting, measuring, hypothesizing, classifying, designing experiments, collecting data, analyzing data, and interpreting data are fundamental to engaging in science. These skills are often represented as a cycle which involves the posing of questions, the generation of possible explanations, and the collection of evidence to determine which of these explanations is most useful in accounting for the phenomenon under investigation. Teachers should engage students in science inquiry activities to develop these skills.

Problem Solving

Problem solving involves seeking solutions to human problems. It may be represented as a cycle consisting of the proposing, creating, and testing of prototypes, products, and techniques in and attempt to reach an optimum solution to a given problem. The skills involved in this cycle facilitate a process which has different aims and procedures from science inquiry. Students should be given opportunities to propose, perform, and evaluate solutions to problem solving or technological tasks.

Decision Making

Decision making involves determining what we should do in a particular context or in response to a given situation. Increasingly, the types of problems that we deal with, both individually and collectively, require an understanding of the processes and products of science and technology. The process of decision making involves identification of the problem or situation, generation of possible solutions or courses of action, evaluation of the alternatives, and a thoughtful decision based on the information available. Students should be actively involved in decision making situations. While important in their own right, decision making situations also provide a relevant context for engaging in science inquiry and/or problem solving.

Curriculum Outcomes Framework

The basis of the curriculum outcomes framework are the general curriculum outcomes (GCOs). Four general curriculum outcomes have been identified to delineate the four critical aspects of students' scientific literacy: science, technology, society, and the environment (STSE), skills, knowledge, and attitudes. These four GCOs are common to all science courses.

General Curriculum Outcomes

GCO 1: Science, Technology, Society, and the Environment

Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology.

GCO 2: Skills

Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions.

GCO 3: Knowledge

Students will construct knowledge and understandings of concepts in life science, physical science, and Earth and space science, and apply these understandings to interpret, integrate, and extend their knowledge.

GCO 4: Attitudes

Students will be encouraged to develop attitudes that support the responsible acquisition and application of scientific and technological knowledge to the mutual benefit of self, society, and the environment.

Key Stage Curriculum Outcomes

Key stage curriculum outcomes (KSCOs) align with the GCOs and summarize what students are expected to know and be able to do by the end of Science 3.

Please note that for Science Kindergarten to Science 3, key stage curriculum outcomes for GCO 1 and GCO 3 are combined under one heading STSE/Knowledge.

GCO 1/3: STSE/Knowledge

By the end of Science 3, students will be expected to

- investigate objects and events in their immediate environment, and use appropriate language to develop understandings and to communicate results
- demonstrate and describe ways of using materials and tools to help answer science questions and to solve practical problems
- describe how science and technology affect their lives and those of people and other living things in their community
- undertake personal actions to care for the immediate environment and contribute to responsible group decisions

GCO 2: Skills

By the end of Science 3, students will be expected to

- ask questions about objects and events in the immediate environment and develop ideas about how those questions might be answered
- observe and explore materials and events in the immediate environment and record the results
- identify patterns and order in objects and events studied
- work with others and share and communicate ideas about their explorations

GCO 4: Attitudes

By the end of Science 3, students will be expected to

- recognize the role and contribution of science in their understanding of the world
- show interest in and curiosity about objects and events within their immediate environment
- willingly observe, question, and explore
- consider their own observations and ideas when drawing a conclusion
- appreciate the importance of accuracy
- be open-minded while exploring and investigating
- work with others in exploring and investigating
- be sensitive to the needs of other people, other living things, and the local environment
- show concern for their safety and that of others while exploring and investigating

*Specific Curriculum
Outcomes*

Specific curriculum outcomes (SCOs) align with the KSCOs and describe what students should know and be able to do at the end of each course. They are intended to serve as the focus for the design of learning experiences and assessment tasks.

SCOs are organized into units for each course.

Course Overview

The vision of scientific literacy sets out the need for students to acquire science-related skills, knowledge, and attitudes, and emphasizes that this is best done through the study and analysis of the interrelationships among science, technology, society, and the environment.

Science 1 SCOs are organized into four units:

- Daily and Seasonal Changes
- Materials and Our Senses
- Properties of Objects and Materials
- Needs and Characteristics of Living Things

Suggested Yearly Plan

The order in which the units appear in the Science 1 curriculum guide is the recommended sequence.

Unit 1 - Daily and Seasonal Changes

Unit 2 - Materials and Our Senses

Unit 3 - Properties of Objects and Materials

Unit 4 - Needs and Characteristics of Living Things

| | | | | | | | | | |
|----------------------------|---------|--------------------------|----------|---------|-------------------------------------|-------|--|-----|------|
| September | October | November | December | January | February | March | April | May | June |
| Daily and Seasonal Changes | | Materials and Our Senses | | | Properties of Objects and Materials | | Needs and Characteristics of Living Things | | |

How to Use the Four Column Curriculum Layout

Outcomes

Column one contains specific curriculum outcomes (SCO) and accompanying delineations where appropriate. The delineations provide specificity in relation to key ideas.

Outcomes are numbered in ascending order

Delineations are indented and numbered as a subset of the originating SCO.

All outcomes are related to general curriculum outcomes.

Focus for Learning

Column two is intended to assist teachers with instructional planning. It also provides context and elaboration of the ideas identified in the first column.

This may include:

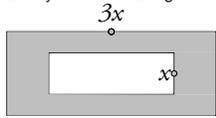
- references to prior knowledge
- clarity in terms of scope
- depth of treatment
- common misconceptions
- cautionary notes
- knowledge required to scaffold and challenge student's learning

Sample Performance Indicator(s)

This provides a summative, higher order activity, where the response would serve as a data source to help teachers assess the degree to which the student has achieved the outcome.

Performance indicators are typically presented as a task, which may include an introduction to establish a context. They would be assigned at the end of the teaching period allocated for the outcome.

Performance indicators would be assigned when students have attained a level of competence, with suggestions for teaching and assessment identified in column three.

| SPECIFIC CURRICULUM OUTCOMES | |
|---|---|
| Patterns and Relations (Variables and Equations) | |
| Outcomes | Focus for Learning |
| <p><i>Students will be expected to</i></p> <p>1.0 model, record and explain the operations of multiplication and division of polynomial expressions (limited to polynomials of degree less than or equal to 2) by monomials, concretely, pictorially and symbolically. [GCO 1]</p> <p>1.4 Provide examples of equivalent polynomial expressions.</p> <p>1.5 Identify the error(s) in a given simplification of a given polynomial expression.</p> | <p>Students should be encouraged to simplify all polynomials. Students should realize that it is often difficult to compare polynomials for equivalency until they are presented in simplified form. This is also an opportunity to highlight the value of expressing solutions in descending order.</p> <p>Questions requiring error analysis can be effective tools to assess students' understanding of simplifying polynomial expressions because it requires a deeper understanding than simply "doing the problem". Analyzing errors is a good way to focus discussion on "How did you get that?" rather than being limited to "Is my answer right?" This reinforces the idea that the process is as important as the solution.</p> |
| | <p>Sample Performance Indicator</p> <ul style="list-style-type: none"> • The inside rectangle in the diagram below is a flower garden. The shaded area is a concrete walkway around it. The area of the flower garden is given by the expression $2x^2 + 4x$ and the area of the large rectangle, including the walkway and the flower garden, is $3x^2 + 6x$.  <p>(i) Ask students to write an expression for the missing dimensions of each rectangle.</p> <p>(ii) Ask students to determine the area of the walkway.</p> |

| SPECIFIC CURRICULUM OUTCOMES | |
|--|---|
| Patterns and Relations (Variables and Equations) | |
| Suggestions for Teaching and Assessment | Resources and Notes |
| <p>Teachers may use the following activities and/or strategies aligned with the corresponding assessment tasks:</p> <p>As students become comfortable with the addition, subtraction, multiplication and division of polynomial expressions, they should progress from concrete to symbolic representations. The distributive property is a common application when simplifying polynomials.</p> <p>Activation</p> <p>Students may</p> <ul style="list-style-type: none"> determine which of the following polynomials are equivalent: <ol style="list-style-type: none"> $2(6x^2 - 4x - 2)$ $4x(3x - 2 - 1)$ $2(6x^2 - x - 2)$ $2(6x^2 - 4x - 2)$ <p>Connection</p> <p>Students may</p> <ul style="list-style-type: none"> write two other polynomials which are equivalent to $2(6x^2 - 4)$ <p>Consolidation</p> <p>Teachers may</p> <ul style="list-style-type: none"> present a variety of multiplication and division problems, such as the one below, which are not properly simplified, discuss the errors and correct the solutions $\begin{aligned} & (12x^2 - 4x) \div (-2x) \\ &= \frac{12x^2}{-2x} - \frac{4x}{-2x} \\ &= -6x - 2 \\ &= -8x \end{aligned}$ <p>Students may</p> <ul style="list-style-type: none"> explain how to fix this simplification: $\begin{aligned} & 5x(3 - x) \\ &= 15x - x \\ &= 14x \end{aligned}$ | <p>Authorized Resources</p> <p><i>Math Makes Sense 9</i></p> <p>Lesson 5.5: Multiplying and Dividing a Polynomial by a Constant</p> <p>Lesson 5.6: Multiplying and Dividing a Polynomial by a Constant</p> <p>ProGuide: pp. 35-42, 43-51</p> <p>CD-ROM: Master 5.23, 5.24</p> <p>SB: pp. 241-248, 249-257</p> <p>PB: pp. 206-213, 214-219</p> <p>Suggested Resources</p> <p>"Using Error Analysis to Teach Equation Solving" <i>Mathematics Teaching in the Middle School</i> 12, 5 (December 2006/January 2007), pp. 238-242</p> |

Resources and Notes

Column four references supplementary information and possible resources for use by teachers.

These references will provide details of resources suggested in column two and column three.

Suggestions for Teaching and Assessment

This column contains specific sample tasks, activities, and strategies that enable students to meet the goals of the SCOs and be successful with performance indicators. Instructional activities are recognized as possible sources of data for assessment purposes. Frequently, appropriate techniques and instruments for assessment purposes are recommended.

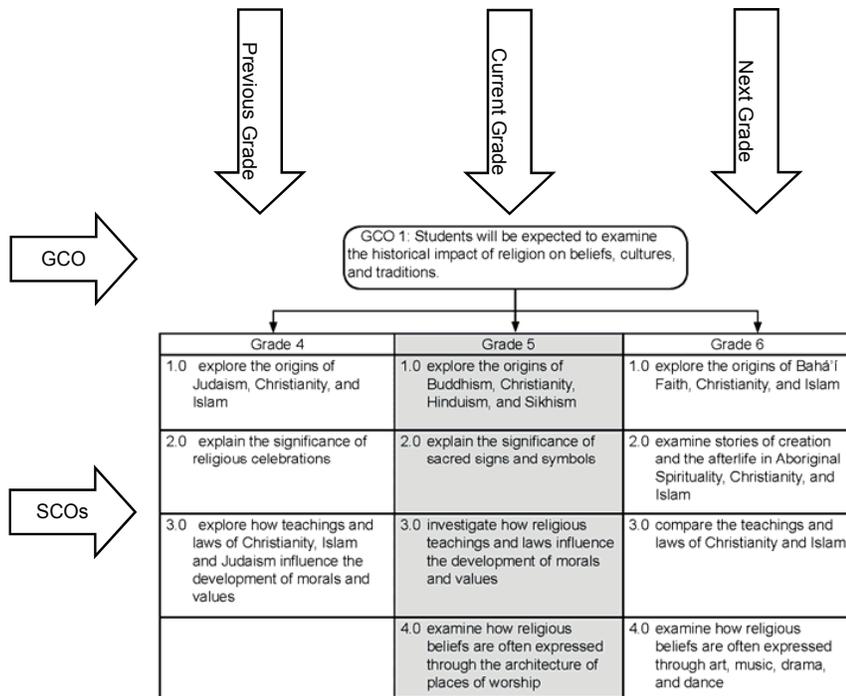
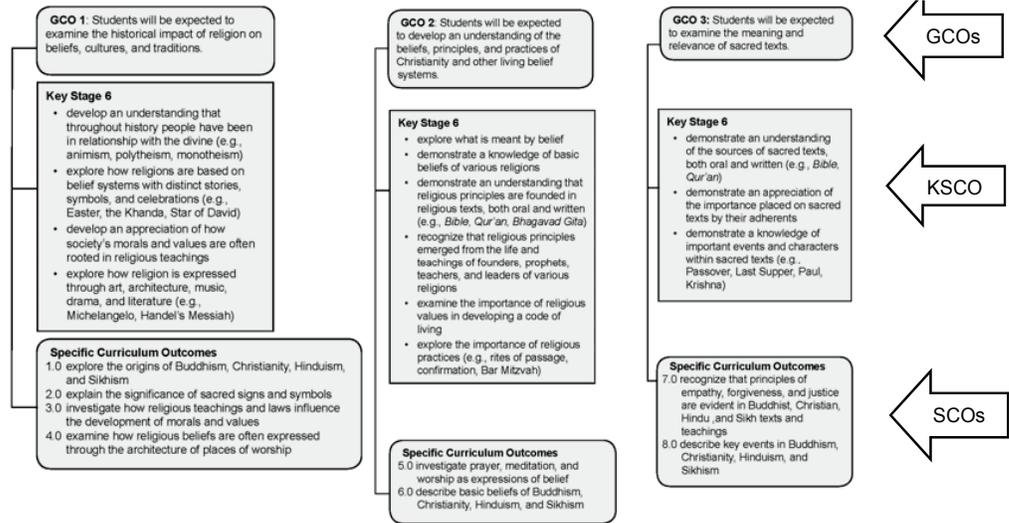
Suggestions for instruction and assessment are organized sequentially:

- Activation - suggestions that may be used to activate prior learning and establish a context for the instruction
- Connection - linking new information and experiences to existing knowledge inside or outside the curriculum area
- Consolidation - synthesizing and making new understandings
- Extension - suggestions that go beyond the scope of the outcome

These suggestions provide opportunities for differentiated learning and assessment.

How to use a Unit overview

At the beginning of each unit there is explanation of the focus for the unit and a flow chart identifying the relevant GCOs, KSCOs and SCOs.



The SCOs Continuum follows the chart to provide context for teaching and assessment for the grade/course in question. The current grade is highlighted in the chart.

Section Three:
Specific Curriculum Outcomes

Unit 1: Daily and Seasonal Changes

Focus

In observing their environment, students become aware of things that change, including changes in environmental factors such as temperature, wind, or light, and changes in plants and animals found near their home. With guidance, students learn that changes often occur in cycles, including the relatively short cycle of day and night and the longer cycle of the seasons. Recognizing these patterns prepares students to discover relationships among events in their environment, and between the environment and living things, including themselves.

Scientific inquiry is the process focus of this unit. The unit emphasizes the development of skills related to posing questions, making predictions, making and recording observations and measurements, analyzing and interpreting recorded data to identify emerging patterns, and communicating what was learned. Through exploration and investigation, students learn that many things in life occur in daily cycles and seasonal cycles and knowledge of these cycles helps us make predictions and plan for the future.

Outcomes Framework

GCO 1 (STSE): Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology.

GCO 3 (Knowledge): Students will construct knowledge and understandings of concepts in life science, physical science, and Earth and space science, and apply these understandings to interpret, integrate, and extend their knowledge.

- 4.0 explore and investigate changes in heat and light from the sun
- 6.0 devise ways to measure and record daily and seasonal environmental changes
- 11.0 explore how changes in sunlight affect living things
- 12.0 investigate daily changes in the characteristics, behaviours, and location of living things
- 14.0 investigate seasonal changes in the characteristics, behaviours, and location of living things
- 15.0 investigate human preparations for seasonal changes

GCO 2 (Skills): Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions.

- 1.0 pose questions that lead to exploration and investigation
- 2.0 pose new questions that arise from what was learned
- 3.0 communicate using scientific terminology
- 5.0 follow safety procedures and rules
- 7.0 make and record observations and measurements
- 8.0 communicate while exploring and investigating
- 9.0 sequence or group materials and objects
- 10.0 predict based on an observed pattern
- 13.0 propose an answer to an initial question or problem and draw a simple conclusion

GCO 4 (Attitudes): Students will be encouraged to develop attitudes that support the responsible acquisition and application of scientific and technological knowledge to the mutual benefit of self, society, and the environment.

- recognize the role and contribution of science in their understanding of the world
- show interest in and curiosity about objects and events within their immediate environment
- willingly observe, question, and explore
- consider their own observations and ideas when drawing a conclusion
- be open-minded in their explorations and investigations
- show concern for their safety and that of others while exploring and investigating

SCO Continuum

GCO 1 (STSE): Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology.

GCO 3 (Knowledge): Students will construct knowledge and understandings of concepts in life science, physical science, and Earth and space science, and apply these understandings to interpret, integrate, and extend their knowledge.

| Science K | Science 1 | Science 2 |
|-----------|---|---|
| | <i>Daily and Seasonal Changes</i> | <i>Air and Water in the Environment</i> |
| | <ul style="list-style-type: none"> investigate changes in heat and light from the sun devise ways to measure daily and seasonal environmental changes explore how changes in sunlight affect living things investigate daily changes in living things investigate seasonal changes in living things investigate human preparations for seasonal changes | <ul style="list-style-type: none"> observe and describe changes in air conditions describe effects of weather and ways to protect things under different conditions |
| | | <i>Animal Growth and Changes</i> |
| | | <ul style="list-style-type: none"> compare animal life cycles observe and describe changes in animal appearance and activity during its life cycle |

GCO 2 (Skills): Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions.

| Science K | Science 1 | Science 2 |
|---|---|---|
| <ul style="list-style-type: none"> pose questions that lead to exploration and investigation sequence or group materials and objects communicate while exploring and investigating communicate using scientific terminology | <ul style="list-style-type: none"> pose questions that lead to exploration and investigation predict based on an observed pattern make and record observations and measurements follow safety procedures and rules sequence or group materials and objects propose an answer to an initial question or problem and draw a simple conclusion pose new questions that arise from what was learned communicate while exploring and investigating communicate using scientific terminology | <ul style="list-style-type: none"> pose questions that lead to exploration and investigation predict based on an observed pattern make and record observations and measurements sequence or group materials and objects propose an answer to an initial question or problem and draw a simple conclusion pose new questions that arise from what was learned communicate while exploring and investigating communicate using scientific terminology |

Suggested Unit Plan

The Daily and Seasonal Changes unit is positioned at the start of the school year to capitalize on the dramatic environmental changes that can be observed during the fall season and opportunities for outdoor learning. The fall equinox, harvest time, and the approach of the winter season provide real world contexts to address curriculum outcomes.

As this unit deals with seasonal changes, aspects of some STSE/Knowledge outcomes should be addressed as the seasons change from fall to winter, winter to spring, and spring to summer.

| September | October | November | December | January | February | March | April | May | June |
|-----------|---------|----------|----------|---------|----------|-------|-------|-----|------|
| | | | | | | | | | |

Daily and Seasonal Changes

Initiating Exploration and Investigation

Outcomes

Students will be expected to

1.0 pose questions that lead to exploration and investigation
[GCO 2]

2.0 pose new questions that arise from what was learned
[GCO 2]

Focus for Learning

Science is often presented as a body of knowledge to be learned; however, it is more than this. Science is a way of learning. Science is asking questions about the things we observe and exploring and investigating to find answers.

The expectation of Skill outcome 1.0 is for students to pose inquiry questions that lead to exploration and investigation. Asking questions initiates the process of science inquiry. In the context of this unit, student questions may include:

- What are day and night? How are they different? How do you know when it is daytime? What activities do you do during the day and at night? What do animals do at night? How long are day and night?
- What does the sun do? What happens to the sun each day? Does the sun always rise and set at the same time? How is sun different from shade? What happens to the sun at night? Where are the moon and stars during the day? Is it warmer or colder at night? Is it brighter or darker during the day?
- How do you describe the weather? What are the different types of weather? Does the weather change? Can you predict it? What tools can you use to measure the weather? How does the weather affect me? Where is the sun on cloudy days? What are the different types of precipitation?
- What are the seasons? How are they different? Why do they change? What happens in fall? Why does fall follow summer? How do you know when it is winter? What clothes do you wear in spring? What outdoor sports do you play in summer? Which season is the coldest? How do animals prepare for winter?

Provide daily opportunities for students to be scientists; to observe, question, explore, investigate, and to communicate what they learn.

Cross curricular connections may be made to English Language Arts 1 outcomes related to formulating questions that lead to inquiry.

Students should repeatedly analyze what they learn through exploration and investigation to identify new inquiry questions. Through this cyclical learning process, students construct knowledge and add to their growing understanding of the world around them.

Attitude

Encourage students to recognize the role and contribution of science in their understanding of the world. [GCO 4]

Initiating Exploration and Investigation

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Ask “What is science?” and “What do Scientists do?” to highlight the role of asking questions to science inquiry.

Connection

Teachers may

- Model, posing “I Wonder” inquiry questions from observations.
- Create a “curiosity centre” and interact with students as they explore the objects. Prompt them to pose inquiry questions by asking “What are you thinking about?” or “What I Wonder questions do you have?”. Curiosity centre objects may include
 - children’s literature related to the sun, weather, and seasons
 - calendar, clock, globe, flashlight or headlamp
 - flashcards (e.g., seasons, labelled weather symbols, days of the weeks, months of the year)
 - weather measuring tools (e.g., anemometer, barometer, rain gauge, thermometer, windsock, wind vane), and maps
 - rubber boots, umbrella, tulip, sunglasses, sandals, sun block, fall leaves, pumpkin, carrot, wool hat, winter boots, ear muffs

Alternatively, present curiosity objects as an individual lesson focus. Objects may be placed inside a curiosity or mystery box.

- Use question generators (i.e., who, what, when, where, why and how) or a question matrix to assist students with posing inquiry questions.

Consolidation

Teachers may

- Record student inquiry questions on a class “I Wonder” wall, adding new inquiry questions as they arise.
- Incorporate student inquiry questions into writing activities (e.g., Daily 5 work on writing).

Students may

- Investigate science inquiry questions. Questions and observations may be recorded or represented in their science learning journal. Students should communicate what was learned and identify new inquiry questions that arise.

Resources and Notes

Authorized

Let’s Do Science (Teacher Resource [TR])

- Teachers Website
 - Anchor Video - *Daily and Seasonal Changes*

Supplementary

Science Library

- *Scientists Ask Questions*

What Is the Inquiry Process? (poster)

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/changes.html

- Skill - Questioning
- Question Generator
- I Wonder (video)

Communicating using Scientific Terminology

Outcomes

Students will be expected to

- 3.0 communicate using scientific terminology [GCO 2]

Focus for Learning

Whether engaged in science inquiry or problem solving, the ability to communicate so that others understand is an essential skill. Effective communication in science requires students to use appropriate scientific terminology.

Students are expected to use scientific terminology when communicating about objects and events.

Preassess student use of scientific terminology and introduce new terms gradually as the need emerges. Model the use of appropriate scientific terms and encourage students to adopt them.

Memorizing definitions for terminology is not an expectation.

Daily and seasonal change terminology may include

- explore, investigate, observe, predict, measure, record, sequence, group, conclude
- seasons, months of the year, days of the week
- yesterday, today, tomorrow, tonight
- day, night, daytime, nighttime, morning, noon, afternoon, evening
- sun, sunrise, sunset, light, bright, dark, shade, shadow
- heat, temperature, hot, warm, cool, cold, thermometer
- weather, sunny, raining, snowing, cloudy, foggy, windy, stormy
- change, pattern, cycle
- living thing, animal, plant, characteristic, behaviour, location
- migration, hibernation, nocturnal, diurnal (i.e., opposite of nocturnal; more active during the day)
- Earth, orbit, tilt, rotation

Communicating using scientific terminology is a constant expectation for students in Science 1, regardless of whether the outcome is specifically addressed within a unit.

Sample Performance Indicator

As part of the morning message, communicate the season, month, day, and personal observations of weather, using appropriate scientific terminology.

Communicating using Scientific Terminology

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Display anchor charts of unit terminology or add terms to existing word walls.
- Introduce weather and seasonal terminology using relevant children's literature from the science library.

Connection

Teachers may

- Incorporate science terminology into Daily 5 word work activities.

Students may

- Sing days of the week and months of the year songs.
- Deliver a morning message that includes the season, month, day, and weather observations. The morning message and collected observational data provide a context to address and assess many unit outcomes. Continue the morning message throughout the school year to enable investigation of seasonal changes.
- Collaboratively create a monthly weather calendar using symbols to represent types of weather. Digital weather calendars will facilitate analysis and interpretation of data as seasons change.
- Compare personal observations of weather to data obtained from the school's weather station or online weather sources.
- Interpret daily weather maps from print or online sources.

Consolidation

Teachers may

- Assess student use of terminology during
 - the morning message, using question prompts as needed
 - collaborative explorations and investigations where students orally communicate their questions, ideas, and intentions. Audio record group communication to facilitate assessment.

Students may

- Individually create a weather calendar for an entire week or record daily observations in their science learning journal.
- Predict weather for specific days (e.g., birthday, fall equinox, Halloween, winter solstice, Groundhog Day, spring equinox).

Extension

Students may

- Create, perform, and record a weather or seasonal forecast.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Daily and Seasonal Changes*
 - pp. 9-19
- Science Card 1
- Teachers Website
 - IWB Activities 1 & 2

Supplementary

Science Library

- *Hi Koo! A Year of Seasons*
- *Let It Fall*
- *Let It Snow*
- *Weather*
- *Weather Words and What They Mean*
- *What Will the Weather be like Today?*

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/changes.html

- Explorations or Investigations
- Skill - Using Appropriate Vocabulary
- Weather information sites

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *Spring is Here!*
 - *What Do I Need?*
 - *What Do You See? A Book About the Seasons*

Changes in Heat and Light from the Sun

Outcomes

Students will be expected to

4.0 explore and investigate changes in heat and light from the sun
[GCO 1/3]

5.0 follow safety procedures and rules
[GCO 2]

Focus for Learning

The expectation of Science, Technology, Society, and the Environment/Knowledge (STSE/K) outcome 4.0 is for students to observe and describe changes in the sun's heat and light through exploration of their environment and investigation of inquiry questions.

Observable changes in heat and light include

- bright and warm during the day, darker and colder at night
- bright and warm in sun, darker and cooler in shade
- bright and warm when sunny, darker and cooler when cloudy
- brightest and warmest around noontime (i.e., midday)

Thermometers may be used qualitatively to measure temperature by marking the level of the coloured alcohol inside the thermometer and observing if it goes up (i.e., getting warmer) or goes down (i.e., getting colder).

Students should follow safety procedures and rules when exploring and investigating and explain why they are needed.

In the context of this unit, procedures and rules may include

- general school safety rules (e.g., no running)
- rules related to exploration of an outdoor environment (e.g., do not go outside the fenced area, wear appropriate clothing and footwear for the weather)
- rules regarding observation of the sun (e.g., do not look directly at the sun, wear sunglasses)
- procedures and rules regarding use of tools and technology for observing, measuring, and recording

Cross curricular connections may be made to Health 1 outcomes related to safety in the environment (i.e., at home, school, and play).

Attitude

Encourage students to show concern for their safety and that of others while exploring and investigating. [GCO 4]

Sample Performance Indicator

Describe how the sun's heat and light change from

- daytime to nighttime
- sunny days to cloudy days, or sun to shade
- summer to fall, fall to winter, winter to spring, or spring to summer

Changes in Heat and Light from the Sun

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Ask “I wonder what the sun does?” to generate discussion.
- Incorporate relevant children’s literature to
 - highlight the sun’s importance as a source of heat and light
 - explore differences between day and night
- Create and present a time-lapse video of the view outside the classroom window over an entire day and night.

Connection

Students may

- Explore the outdoor environment on a sunny day and pose “I Wonder” questions about heat and light from the sun.
- Safely observe the sun and record observations in their science learning journal.
- View time-lapse, sunrise or sunset videos and describe observed changes in light using the terms brighter and darker.
- View daytime and nighttime images, infer if the temperature is hot, warm, cool, or cold, and explain their reasoning.

Consolidation

Teachers may

- Assess student compliance with safety procedures and rules within curricular and non-curricular settings.

Students may

- Collaborate in small groups to investigate whether heat and light from the sun changes from
 - sun to shade
 - sunny days to cloudy days
 - morning to noontime, afternoon, and evening

Students may record their science inquiry question and observations in their science learning journal.

Extension

Students may

- Communicate what it would be like to live in a world with no sun or no night.

Resources and Notes

Authorized

Let’s Do Science (TR)

- *Daily and Seasonal Changes*
 - pp. 20-25
- Science Card 2
- Teachers Website
 - Image Bank

Supplementary

Science Library

- *How do you Know It’s Fall?*
- *How do you Know It’s Spring?*
- *How do you Know It’s Summer?*
- *How do you Know It’s Winter?*

What Is the Inquiry Process? (poster)

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/changes.html

- Sunrise/Sunset (video)

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *A Hot Day*

Measuring and Recording Environmental Changes

Outcomes

Students will be expected to

6.0 devise ways to measure and record daily and seasonal environmental changes
[GCO 1/3]

7.0 make and record observations and measurements
[GCO 2]

8.0 communicate while exploring and investigating
[GCO 2]

Focus for Learning

Environmental changes may occur in daily or seasonal cycles.

Examples include

- daily cycle of day and night
- daily movement of the sun across the sky
- daily changes in heat and light (i.e., increasing through the day, then decreasing through the late afternoon and evening)
- seasonal changes of weather and temperature
- seasonal changes in day length
- seasonal changes in the position of the sun relative to the horizon

Investigate daily and seasonal environmental changes by making repeated observations and measurements during a day, over a series of days, and over the course of the school year.

Students are expected to collaboratively plan ways to measure and record changes in environmental factors and determine if the changes follow a daily or seasonal cycle. For example, to investigate

- daytime changes in temperature, students may plan to measure temperature hourly with a thermometer and record measurements in a chart
- seasonal changes in precipitation, students may plan to construct a rain gauge and measure the amount of precipitation daily for several weeks during different seasons

The expectation of Skill outcome 7.0 is for students to make and record observations and measurements while investigating. Observing involves using all appropriate senses to identify changes. Measuring is assigning numbers to observed changes using tools and techniques. Recording creates a permanent record of observations and measurements for future analysis and includes written language, drawings, charts, graphic organizers, digital photographs and video.

Cross curricular connections may be made to Mathematics 1 outcomes related to measurement.

While collaboratively exploring and investigating, students should communicate aloud. Science is a social activity. Students should orally communicate their questions, share their ideas, and describe what they are doing or intend to do.

Cross curricular connections may be made to English Language Arts 1 outcomes related to speaking and listening.

Attitude

Encourage students to willingly observe, question, and explore.
[GCO 4]

Measuring and Recording Environmental Changes

Sample Teaching and Assessment Strategies

While not a curriculum expectation, teachers may choose to provide explanations for the cycles of day and night and the seasons. Day and night are caused by the Earth's daily rotation around its axis. Seasons are caused by the tilt of the Earth as it annually orbits the sun. Earth's northern hemisphere is tilted toward the sun in summer and away during winter.

Connection

Teachers may

- Incorporate children's literature from the science library related to the cycles of day and night and the seasons.

Students may

- Make and record observations and measurements as part of the morning message (e.g., describe the weather, measure temperature, describe wind speed and direction, measure precipitation).
- Brainstorm how to observe, measure, and record specific environmental factors (e.g., temperature, weather, amount of light, apparent position of the sun in the sky, day length).

Consolidation

Students may

- Collaborate in small groups to investigate
 - the sun's position in the sky, relative to a landmark, by recording observations (e.g., digital photographs, drawings) at regular time intervals throughout a day. Alternatively, students may investigate changes in an object's shadow over the course of a school day.
 - daily changes in outdoor temperature by measuring temperature hourly with a thermometer and recording measurements in a chart. This procedure can be repeated over a series of days to identify and confirm patterns.
 - seasonal changes in weather by analyzing recorded data compiled from the morning message. For example, students may count the number of snowy days for each month.
 - seasonal changes in temperature by analyzing data recorded from the morning message. For example, students may compare temperatures on the first school day of each month.
 - seasonal changes in sunrise and sunset times by comparing online data for the first school day of each month or season.
 - seasonal change in the sun's position by affixing a small object to a sun facing window and observing and recording the location of the object's shadow at exactly the same time on sunny days in different seasons.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Daily and Seasonal Changes*
 - pp. 26-32
- Science Cards 3 & 4
- Teachers Website
 - IWB Activities 3-5

Supplementary

Science Library

- *Groundhog Weather School*
- *How do you Know It's Fall?*
- *How do you Know It's Spring?*
- *How do you Know It's Summer?*
- *How do you Know It's Winter?*
- *Scientists Ask Questions*

What is the Inquiry Process?
(poster)

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/changes.html

- Skill - Observing
- STEM Connection

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *Rain*

Daily and Seasonal Cycles

Outcomes

Students will be expected to

9.0 sequence or group materials and objects [GCO 2]

10.0 predict based on an observed pattern [GCO 2]

Focus for Learning

Students are expected to be able to place materials and objects in a sequence (i.e., place in an order) or in groups (i.e., sort) according to their attributes.

Sequencing and grouping are analyzing and interpreting skills that require students to observe objects in detail to identify similarities, differences, changes, and patterns.

Sequencing opportunities include

- time (i.e., seasons, months, days of the week, time of day)
- apparent position of the sun in the sky through a day
- daily activities (e.g., waking up, having breakfast, going to school)
- seasonal changes in animals and plants

Grouping opportunities include

- activities and images as daytime or nighttime
- outerwear, footwear, and recreational activities by season
- daily activities as morning, afternoon, or evening activities
- images by season or type of weather

Cross curricular connections may be made to English Language Arts 1 outcomes related to sequencing and Mathematics 1 outcomes related to sorting and ordering.

Students should make predictions; testable statements about what may occur in the future. Predictions are based on observed patterns or prior knowledge (e.g., predicting that it is going to rain having observed dark clouds in the sky). Students should make predictions when initiating science inquiry investigations. Requiring students to explain the reasoning behind their prediction will foster critical thinking.

Students may predict

- changes in weather
- changes in temperature (i.e., warmer or cooler)
- changes in light (i.e., brighter or darker)
- changes in day length or sunrise and sunset times
- which season, month, or day comes next in sequence
- how animals and plants change their characteristics, behaviours, and location to adapt to daily and seasonal change

Sample Performance Indicators

Sequence seasonal images of a deciduous tree.

Group outerwear and footwear by type of weather.

Predict the weather and temperature at lunchtime based on observations made during the morning message.

Daily and Seasonal Cycles

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Incorporate children's literature from the science library related to sequencing, grouping, or predicting.

Connection

Teachers may

- Introduce months of the year and days of the week songs to the morning routine as examples of sequencing.
- Display anchor charts of seasons, months of the year, and days of the week represented as cycles.
- Model making predictions based on observed patterns.

Students may

- Sequence cards denoting seasons, days of the week, and times of day (i.e., morning, afternoon, evening, night).
- Use cycle graphic organizers to record seasons, days of the week, and times of day in sequence.
- Group themselves according to favourite season or time of day.

Consolidation

Teachers may

- Prompt students to make predictions as part of the morning message. Ask students to predict
 - what the weather will be like at recess
 - if temperature at lunchtime will be warmer or colder
 - if day length next week will be longer or shorter
 - what ducks do when the sun goes down
 - how the maple tree will look next month

Require students to record predictions and explain their reasoning. Test predictions by making future observations.

Students may

- Sequence personal daily activities, yearly events, or images of an object's shadow at various times of the day.
- Group activities as daytime or nighttime, or summer or winter, using a Venn diagram.
- Predict the timing of first snowfall, the spring arrival of robins, or if the ground hog will see his shadow on Groundhog Day.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Daily and Seasonal Changes*
 - pp. 33-41
- Science Cards 5 & 6
- Teachers Website
 - IWB Activities 6-8
 - Image Bank

Supplementary

Science Library

- *Groundhog Weather School*
- *Leaves! Leaves! Leaves!*
- *Seeds! Seeds! Seeds!*

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/changes.html

- Sequence Organizer
- Skill - Classifying and Organizing
- Skill - Predicting

How Changes in Sunlight Affect Living Things

Outcomes

Students will be expected to

11.0 explore how changes in sunlight affect living things [GCO 1/3]

Focus for Learning

Students are expected to explore how daily and seasonal changes in sunlight affect living things (i.e., animals and plants).

Initially explore how changes in sunlight affect students personally. Changes in sunlight affect their

- sleep and activity patterns (e.g., wake after sunrise, tire at sunset, active during daytime, sleep during nighttime)
- activity choices (e.g., playing hop scotch during the day and spotlight at night, riding a bicycle in summer and sliding in winter)
- clothing and footwear choices (e.g., wearing an extra clothing layer on cool evenings, wearing shorts and sandals in summer)

Continue exploration of how changes in sunlight affect other animals and plants. Examples include

- sleep and activity patterns (i.e., nocturnal and diurnal animals)
- hibernation and migration
- animal fur changes (i.e., changing colour, thickening, shedding)
- blooming times of flowering plants
- budding, leafing, and shedding times of deciduous trees

Many of these affects on living things will be investigated in subsequent outcomes.

Attitude

Encourage students to be open-minded in their explorations and investigations. [GCO 4]

Sample Performance Indicator

Communicate how the

- daily rising and setting of the sun may affect the sleep and activity patterns of a gull, crow, or bat
- days getting shorter and colder in fall may affect a snowshoe hare, black bear, or Canada goose
- days getting longer and warmer in spring may affect grasses, dandelions, or a deciduous tree

How Changes in Sunlight Affect Living Things

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Incorporate children’s literature from the science library related to nocturnal and diurnal animals.

Connection

Teachers may

- Take a monthly class photo by the same deciduous tree and have students analyze the images in sequence to observe the affect of seasonal sunlight changes on both the tree and themselves.
- Present local examples of nocturnal animals. Beavers, coyotes, Canadian lynx, little brown bats, great horned owls, pine martens, and wolves are all more active at night than during the day.
- Present online, time-lapse videos of a sunflower tracking the sun or the petals of morning glory or poppy flowers opening and closing daily.

Students may

- Record their daytime and nighttime activities for analysis and conclude if they are nocturnal or diurnal.
- Communicate the daytime and nighttime activities of a family pet.
- Explore how changes in sunlight affect the little brown bat.

Consolidation

Students may

- View images of
 - living things and represent how the image would be different if taken at a different time of day and a different time of year.
 - nocturnal animals and communicate how they are affected by the rising and setting of the sun
 - animals that migrate or hibernate and communicate how they are affected by seasonal changes in sunlight
- Sequence seasonal images of a flowering plant and communicate how it is affected by seasonal changes in sunlight.

Extension

Students may

- Represent and recount a story about
 - a nocturnal child who sleeps all day and stays up all night
 - everything you would miss if you hibernated all winter
 - an animal that refused to migrate

Resources and Notes

Authorized

Let’s Do Science (TR)

- *Daily and Seasonal Changes*
 - pp. 33-41
- Science Cards 5 & 6
- Teachers Website
 - IWB Activities 6-8

Supplementary

Science Library

- *Owl Moon*
- *When the Sun Comes Up*
- *When the Sun is Going Down*

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/changes.html

- STEM Connection

Daily Cycles of Living Things

Outcomes

Students will be expected to

12.0 investigate daily changes in the characteristics, behaviours, and location of living things
[GCO 1/3]

13.0 propose an answer to an initial question or problem and draw a simple conclusion
[GCO 2]

Focus for Learning

The expectation of STSE/K outcome 12.0 is for students to investigate living things to determine if observed changes in their physical characteristics, behaviours, and location follow a daily cycle. For example, investigating hermit crabs will reveal that they hide all day tucked inside their shells. As the sun sets they wake up, eat and drink, explore, dig, and try on new shells. Their location and behaviour changes according to the time of day. Hermit crabs are nocturnal.

Living things for students to investigate may include

- classroom pets (e.g., beta fish, aquarium fish, frogs, hermit crabs)
- collected insects (e.g., carpenters), earthworms, slugs, or snails in an aquarium/terrarium
- household pets and farm animals
- birds visible on or near school grounds

Students should pose science inquiry questions about the appearance, behaviour, and location of living things at different times of the day and collaboratively devise ways to find answers to their questions. Observations of living things may be recorded as drawings, charts, digital photographs and video, or written language. Time-lapse video or photography may allow for evening and nighttime observation of the activity of nocturnal animals. Alternatively, students may observe evidence of nighttime activity (e.g., reduction in food, slime trails of slugs, hermit crab tracks in the sand).

Prior to initiating their investigations, students should make a prediction and explain their reasoning.

Students should propose an answer to their initial inquiry question and draw a simple, evidence-based conclusion. A conclusion is a statement that explains the results of an investigation and indicates if the prediction is supported or contradicted.

Attitude

Encourage students to consider their own observations and ideas when drawing a conclusion. [GCO 4]

Sample Performance Indicator

Describe daily changes in the physical characteristics, behaviours, and/or location of an investigated living thing.

Daily Cycles of Living Things

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Present examples of animals and plants that display behaviours at a specific time each day (e.g., roosters crowing, trout feeding, and poppy flowers opening their petals at dawn).

Connection

Teachers may

- Guide students to investigate their daily cycle by observing and recording where they are, and what they are doing at different times of day (i.e., nighttime, morning, noon, afternoon, evening). Records may take the form of a daily diary. Analysis should identify cyclical patterns in their location and behaviour:
 - home at night; at school during the day
 - asleep at night; active during the day
 - daily routine of morning, afternoon, and evening activities

Students may

- Group daily activities by time of day and identify activities that occur at more than one time during the day.
- Sequence activities from their daily routine.

Consolidation

Students may

- Collaborate in small groups to investigate
 - if aquarium fish are located in different parts of the aquarium at specific times of day
 - what time of day slugs or snails feed
 - whether the location and behaviour of a household pet follows a daily pattern. Observations may be recorded as digital images
 - zoo or wild animals via live web cams and communicate findings related to observed patterns in daily behaviour and location
- Create a “day in the life” flip book for an investigated living thing.
- Compare their daily cycle to that of a nocturnal animal.

Extension

Students may

- Interview community elders and ask them to share personal knowledge of the daily cycles of local, wild animals.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Daily and Seasonal Changes*
 - pp. 42-48
- Science Card 7

Supplementary

Science Library

- *Scientists Ask Questions*

What Is the Inquiry Process?
(poster)

Suggested

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *Daytime, Nighttime*
- *Visual Field Guides for The Environment of Newfoundland and Labrador* (Science 4 & Science 7)

Seasonal Cycles of Living Things

Outcomes

Students will be expected to

14.0 investigate seasonal changes in the characteristics, behaviours, and location of living things [GCO 1/3]

Focus for Learning

Students are expected to investigate seasonal changes in the physical characteristics, behaviours, and location of living things.

Diverse examples of local animals and plants, including terrestrial, freshwater, and marine organisms, should be investigated:

- Deciduous trees (e.g., white birch, dogberry) - seasonal change in physical characteristics; leafing, growing, leaves changing colour, shedding leaves, winter dormancy
- Flowering plants (e.g., partridgeberry, fireweed) - seasonal change in physical characteristics; new growth, flowering, producing fruit/seeds, dying back, winter dormancy
- Humpback whales, capelin, harp seals, robins, and Canada Geese - seasonal change in location (i.e., migration)
- Snowshoe hare, arctic hare, arctic fox, and ptarmigan - seasonal change in a physical characteristic; coat or plumage colouration
- Black bears, woodchuck, little brown bat, and frog - seasonal change in behaviour (i.e., hibernation)
- Moose and caribou - seasonal change in physical characteristics; growing and shedding of antlers, thickening and shedding of fur

Skill outcome 2.0 (i.e., pose new questions that arise from what was learned) may be readdressed at this time. Encourage students to pose new questions based on what was learned about how animals and plants adapt to daily and seasonal changes.

Attitude

Encourage students to show interest in and curiosity about objects and events within their immediate environment. [GCO 4]

Sample Performance Indicator

Describe seasonal changes in the physical characteristics, behaviours, and/or location of an investigated living thing.

Seasonal Cycles of Living Things

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Use the read aloud *First Snow in the Woods* to activate prior knowledge of how animals prepare for seasonal change.

Students may

- Generate examples of living things that look or behave differently in summer than in winter, based on prior knowledge.

Connection

Teachers may

- Incorporate children's literature from the science library related to seasonal changes, hibernation, and migration.

Students may

- Compare and contrast images of an animal or plant taken in summer and winter (e.g., snowshoe hares showing winter and summer colouration, male moose with and without antlers, birch trees with and without leaves).

Consolidation

Students may

- Collaborate in small groups to investigate, using non-fiction books, posters, videos, or websites, seasonal changes in the characteristics, behaviours, and/or location of a living thing.
- Collaborate in small groups to investigate what living things do to prepare for seasonal change. Living things considered could include the black bear, arctic hare, squirrel or chipmunk, trout, beaver, larch (juniper) tree, and mallard duck.
- Create representations of animals and plants at different times of year to illustrate how they adapt to seasonal changes.
- Explore why we observe fewer birds during winter months.
- Contribute to a chart listing local animals that hibernate, migrate, or are adapted to survive winter in some other way.

Extension

Students may

- Interview community elders and ask them to share personal knowledge of the seasonal cycles of local, wild animals.
- Create seasonal murals depicting how a natural landscape changes through the seasons.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Daily and Seasonal Changes*
 - pp. 55-67
- Science Cards 9 & 10
- Teachers Website
 - Image Bank
- Read Aloud
 - *First Snow in the Woods*

Supplementary

Science Library

- *Getting Ready for Winter*
- *Leaves! Leaves! Leaves!*
- *Over and Under the Snow*
- *Scientists Ask Questions*

What Is the Inquiry Process?
(poster)

Cultural Connections Resource
Acquisition Program (RAP)

- *A Newfoundland Year*

Suggested

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *What Do You Do in the Cold?*
 - *Winter Animals Are Sleeping*
- *Visual Field Guides for The Environment of Newfoundland and Labrador*, (Science 4 & Science 7)

Preparations for Seasonal Changes

Outcomes

Students will be expected to

15.0 investigate human preparations for seasonal changes
[GCO 1/3]

Focus for Learning

The expectation of STSE/K outcome 15.0 is for students to investigate how humans prepare for seasonal changes.

Initial investigation may focus on how families prepare for winter. Preparations may include

- replacing summer wear in closets with winter wear
- storing foods (i.e., root vegetables, bottled food and preserves, freezing cod or moose)
- storing away summer patio furniture, barbecues, lawn mowers, and garden hoses, removing window screens
- raking leaves and wrapping shrubs
- turning up the heat in our homes, cutting and storing firewood
- pulling up boats, storing trailers, closing up summer cabins
- installing winter tires, purchasing salt or sand for ice control
- tuning up generators, snowblowers, and snowmobiles

Treatment may be extended to consider how gardeners, farmers, and fisherpeople, or cities, towns, and local service districts prepare for winter.

Human preparations for spring, summer, and fall should also be investigated. Consider readdressing this outcome as the seasons change (e.g., spring equinox, summer solstice).

Skill outcome 5.0 (i.e., follow safety procedures and rules) may be readdressed at this time. Approaching winter weather provides a context to consider procedures and rules that are followed at home, in school, and in our community to ensure that we remain safe.

Sample Performance Indicator

Communicate preparations their family makes to get ready for winter.

Preparations for Seasonal Changes

Sample Teaching and Assessment Strategies

Activation

Students may

- Generate examples of how animals and plants prepare for winter, based on prior knowledge.

Teachers may

- Incorporate children’s literature from the science library related to animal preparations for seasonal changes.
- Ask the question “Do humans prepare for winter?”.

Connection

Students may

- Investigate the characteristics of clothing and footwear worn in different seasons.
- Dress paper dolls with appropriate seasonal outdoor and footwear.
- Divide into teams based on seasons and collaboratively create a collage of appropriate clothing, footwear, toys, and sporting equipment for each season.
- Compare images of the treads of snow tires and all season tires.

Consolidation

Teachers may

- Invite a gardener, farmer, or fisherperson to present how they prepare for seasonal changes.

Students may

- Divide into teams based on seasons and interview family members to identify things they do to prepare for a specific season. Findings for each season can be compiled to create seasonal “to do” lists.
- Write and illustrate how their family prepares for winter on an index card which can be displayed as a pictorial “to do” list.
- Collaboratively compile a list of items to place in a seasonal survival kit (e.g., a summer kit may contain sunscreen, sun glasses, hat, and a bottle of water).
- Investigate different methods of preparing shrubs for winter and communicate what is learned through drawings.

Extension

Students may

- Recount a funny story or draw a silly picture about a family that forgets to prepare for winter.

Resources and Notes

Authorized

Let’s Do Science (TR)

- *Daily and Seasonal Changes*
- pp. 49-54
- Science Card 8

Supplementary

Science Library

- *Caps, Hats, Socks, and Mittens. A Book about the Four Seasons*
- *Getting Ready for Winter*

Suggested

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
- *Camping at the Lake*

Section Three:

Specific Curriculum Outcomes

Unit 2: Materials and Our Senses

Focus

Our awareness of our environment, and the many materials found within it, are based on our sensory experiences. Through the wonders of our senses, we can recognize things that may be good to eat, things that may pose dangers, or things that we may want to use. Our senses are immediate and automatic, but the ability to use our senses safely and effectively involves focus, discernment, awareness, and judgement. Through guided experiences that require careful and critical use of the senses, students can be encouraged to refine and become aware of their skills of observation.

Scientific inquiry is the process focus of this unit. The unit emphasizes exploring and investigating materials; using our senses, seeing, hearing, tasting, touching, and smelling, to recognize the attributes of materials. Through guided inquiry experiences, skills related to posing questions, making observations, following procedures, selecting materials, using tools, drawing conclusions, communicating procedures and results, and communicating using descriptive sensory terminology can be developed.

Exploring the taste and smell of materials involves the use of foods, beverages, and scented materials. Be aware of potential student allergies. Where an allergy to a specific material is identified, alternative materials should be sought.

Outcomes Framework

GCO 1 (STSE): Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology.

GCO 3 (Knowledge): Students will construct knowledge and understandings of concepts in life science, physical science, and Earth and space science, and apply these understandings to interpret, integrate, and extend their knowledge.

16.0 explore how each of the senses helps us recognize and safely use materials
17.0 explore attributes of materials we can learn to recognize through each of our senses
19.0 investigate ways that materials can be changed to alter their smell and taste
21.0 investigate ways that materials can be changed to alter their appearance and texture
23.0 investigate ways that materials can be changed to alter the sound they make

GCO 2 (Skills): Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions.

- 1.0 pose questions that lead to exploration and investigation
- 3.0 communicate using scientific terminology
- 5.0 follow safety procedures and rules
- 8.0 communicate while exploring and investigating
- 9.0 sequence or group materials and objects
- 13.0 propose an answer to an initial question or problem and draw a simple conclusion
- 18.0 communicate procedures and results
- 20.0 follow a simple procedure
- 22.0 use appropriate tools
- 24.0 select and use materials to carry out their own explorations and investigations

GCO 4 (Attitudes): Students will be encouraged to develop attitudes that support the responsible acquisition and application of scientific and technological knowledge to the mutual benefit of self, society, and the environment.

- willingly observe, question, and explore
- consider their own observations and ideas when drawing a conclusion
- appreciate the importance of accuracy
- work with others in exploring and investigating
- show concern for their safety and that of others while exploring and investigating

SCO Continuum

GCO 1 (STSE): Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology.

GCO 3 (Knowledge): Students will construct knowledge and understandings of concepts in life science, physical science, and Earth and space science, and apply these understandings to interpret, integrate, and extend their knowledge.

| Science K | Science 1 | Science 2 |
|---|--|--|
| <i>Exploring the World with Our Senses</i> | <i>Materials and Our Senses</i> | <i>Liquids and Solids</i> |
| <ul style="list-style-type: none"> describe what is seen, felt, heard, tasted, and thought explore how characteristics of materials may change as a result of manipulating them | <ul style="list-style-type: none"> explore how senses help us recognize and safely use materials explore attributes of materials we can recognize with our senses investigate ways to alter smell and taste of materials investigate ways to alter appearance and texture of materials investigate ways to alter the sounds made by materials | <ul style="list-style-type: none"> investigate and compare properties of liquids and solids investigate and describe the interactions of solids and liquids investigate changes resulting from the interaction of materials and describe how their characteristics have changed |

GCO 2 (Skills): Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions.

| Science K | Science 1 | Science 2 |
|--|---|---|
| <ul style="list-style-type: none"> • pose questions that lead to exploration and investigation • select and use materials to carry out their own explorations • follow a simple procedure • sequence or group materials and objects • communicate while exploring and investigating • communicate using scientific terminology | <ul style="list-style-type: none"> • pose questions that lead to exploration and investigation • select and use materials to carry out their own explorations • follow a simple procedure • use appropriate tools • follow safety procedures and rules • sequence or group materials and objects • propose an answer to an initial question or problem and draw a simple conclusion • communicate while exploring and investigating • communicate using scientific terminology • communicate procedures and results | <ul style="list-style-type: none"> • pose questions that lead to exploration and investigation • select and use materials to carry out their own explorations • follow a simple procedure • use appropriate tools • sequence or group materials and objects • propose an answer to an initial question or problem and draw a simple conclusion • communicate while exploring and investigating • communicate using scientific terminology • communicate procedures and results |

Suggested Unit Plan

The Materials and Our Senses unit precedes Properties of Objects and Materials. Recognizing the attributes of materials is a prerequisite for comparing and describing the physical properties of objects and the materials they are made from.

| September | October | November | December | January | February | March | April | May | June |
|-----------|---------|----------|----------|---------|----------|-------|-------|-----|------|
| | | | | | | | | | |

**Materials and
Our Senses**

Exploring With Our Senses

Outcomes

Students will be expected to

16.0 explore how each of the senses helps us recognize and safely use materials [GCO 1/3]

5.0 *follow safety procedures and rules* [GCO 2]

Focus for Learning

Students are expected to

- identify the senses and associated body parts (i.e., sight - eyes, hearing - ears, smell - nose, taste - tongue/nose, touch - skin)
- explore how senses help us recognize and safely use materials

Making observations using the five senses was an expectation in Kindergarten. Assess students' prior knowledge of senses and adjust instructional plans as deemed necessary.

Engage students in initial opportunities to explore their surroundings, make observations, and communicate what they see, hear, smell, and feel. Then, through teacher directed explorations, have students carefully and critically use each sense to recognize materials.

Limit exploration to materials. Objects and the materials they are made from are addressed in Unit 3.

Additionally, students should explore how they use each sense to help keep them safe by recognizing safe and dangerous materials and situations in their environment. For example, recognizing

- when fruit is healthy or bruised, ripe or overripe
- when foods or beverages are too hot
- when it is safe to cross a road
- danger (e.g., smelling smoke, hearing sirens)

Discuss with students the dangers that may be associated with using their senses to explore materials (e.g., eating foods may cause allergic reactions, touching sharp materials may cut your finger).

Safety procedures and rules to follow include

- smell odours using the appropriate procedure (i.e., waft odours toward your nose passing a cupped hand over the material and gently sniff the air)
- never taste materials unless instructed to do so
- wash hands after handling materials

Cross curricular connections may be made to Health 1 outcomes related to safety in the environment (i.e., at home, school, and play).

Attitude

Encourage students to show concern for their safety and that of others while exploring and investigating. [GCO 4]

Sample Performance Indicator

Use appropriate senses to recognize and describe materials (e.g., macaroni pasta, raisins, sandpaper) while blindfolded.

Exploring With Our Senses

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Mime sensory experiences (e.g., smelling something foul) and ask students to guess what sense and body part are being used.
- Incorporate children’s literature from the science library and videos related to the senses.
- Create a “curiosity centre” of sensory materials.

Connection

Teachers may

- Introduce and discuss safety procedures and rules to follow when using senses to explore materials (e.g., wafting procedure).
- Provide a collection of materials for students to briefly view. Then cover the materials and have students recall what they saw.
- Use materials to make sounds for students to identify with their eyes closed. Alternatively, digitally recorded sounds may be used.
- Add scented materials (e.g., vinegar, cinnamon, vanilla extract, lemon extract, pickling juice) to cotton balls and place inside small, sealable, plastic containers (e.g., pill bottles, plastic eggs). Have students identify scents by smell. Be aware of scent allergies.
- Provide samples of flavoured foods or beverages for students to taste and identify while blindfolded (e.g., jelly beans, flavoured water, flavoured yogurt). Be aware of food allergies.
- Place materials inside socks for students to identify by touch.

Students may

- Brainstorm dangerous materials and situations they can recognize with each of their senses.

Consolidation

Students may

- Observe fruit (e.g., bananas, pears, or tomatoes) at various stages of ripeness and recognize when it is safe to eat.
- Use the appropriate procedure for smelling odours to recognize fresh and sour milk.

Extension

Students may

- Brainstorm ways to simulate loss of one of the five senses.
- Debate which sense is most important to helping keep them safe.
- Explore the sense of sight, hearing, and smell in other animals.

Resources and Notes

Authorized

Let’s Do Science (Teachers Resource [TR])

- *Materials and Our Senses*
 - pp. 10-16, 17-24
- Science Cards 1 & 2
- Teachers Website
 - Anchor Video
 - IWB Activities 1 & 2

Supplementary

Science Library

- *My Five Senses*
- *You Can’t Taste a Pickle With Your Ear*

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/senses.html

- Explorations or Investigations
- Skill - Observing
- Senses (video)

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *Mmm, Lemon!*

Recognizing Attributes of Materials

Outcomes

Students will be expected to

17.0 explore attributes of materials we can learn to recognize through each of our senses
[GCO 1/3]

3.0 *communicate using scientific terminology*
[GCO 2]

Focus for Learning

Students should explore a range of attributes they can learn to recognize with each of their senses.

- appearance in terms of colour, shape, and lustre
- sounds as loud or quiet, high pitch or low pitch
- tastes as sweet, salty, sour, or bitter
- smells as aromatic, musky, pungent, or putrid
- textures as hard or soft, rough or smooth, sticky or not sticky

Engage students in guided exploration activities using one sense at a time. Carefully select diverse materials that provide a range of observations (e.g., textures of fleece, metal, sandpaper, and beach rocks). As the need emerges, introduce sensory terminology to enable students to bring meaning to what they see, hear, taste, smell, and feel (e.g., beach rocks feel smooth). Encourage students to adopt these terms when communicating their observations of materials.

With practice, students can learn to recognize a variety of material attributes using each of their senses (e.g., textures that are hard, soft, rough, smooth, sticky).

Students should communicate about the attributes of materials using descriptive, sensory terminology (e.g., the round, green, smooth, sour tasting apple). Model appropriate use of descriptive, sensory terminology and discourage student use of simple, overused words, with little descriptive value (e.g., pretty, nice, good).

Introduce the terms colourless, tasteless, and odourless as the need emerges.

Some descriptive terms can be ascribed to more than one sense and may cause confusion for some students. The term soft, for example, can be used to describe textures, colours, sounds, and tastes. Avoid confusion by limiting its use to describing texture.

Refer to the previous elaboration for this skill on pages 34-35.

Attitude

Encourage students to appreciate the importance of accuracy.
[GCO 4]

Sample Performance Indicator

Observe carrot coins and describe them using sensory terminology.

Recognizing Attributes of Materials

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Incorporate children’s literature from the science library related to sensing the attributes of materials.

Connection

Teachers may

- Use pitched musical instruments (e.g., piano) to play loud, quiet, high pitch, and low pitch sounds for students to recognize.
- Provide students samples of sweet, sour, bitter, and salty foods to taste (e.g., honey, sour candy, cocoa, salted pretzel).
- Introduce sensory terminology to describe odours
 - aromatic - pleasant, fragrant, distinctive scents (e.g., citrus, floral, mint, spicy, sweet)
 - musky - old, damp, mouldy, woody scents
 - pungent - sharp, strong scents (e.g., body odour, garlic, Parmesan cheese, sour milk, vinegar)
 - putrid - sickening scents (e.g., sewage, rotting materials)

Students may

- Identify the sounds materials make as loud, quiet, high pitch or low pitch and describe them using descriptive terms (e.g., bang, boing, click, crunch, ding, fizz, pop, snap, scratch).
- Describe the contents of their lunch as sweet, sour, bitter, or salty.
- Use appropriate safety procedures to smell and describe the odour of provided materials as aromatic, musky, or pungent.
- Explore materials at the curiosity centre and describe their textures using the terms hard, soft, smooth, rough, and sticky.

Consolidation

Students may

- Describe the attributes of their favourite food or drink using descriptive, sensory terminology.
- Observe materials (e.g., aluminum foil, carrot coins, celery, cinnamon sticks, seeds, sponge, tissue paper, wool) using appropriate senses and describe their attributes using sensory terminology.
- Play “I Spy” using materials found at the curiosity centre.

Extension

Students may

- Create a restaurant menu describing food and beverage items using descriptive, sensory terminology.

Resources and Notes

Authorized

Let’s Do Science (TR)

- *Materials and Our Senses*
 - pp.17-24, 25-30
- Science Cards 3-5
- Teachers Website
 - IWB Activities 3 & 4
- Read Aloud
 - *The Hockey Tree*

Supplementary

Science Library

- *Leaves! Leaves! Leaves!*
- *Rough and Smooth*
- *Seeds! Seeds! Seeds!*
- *Soft and Hard*
- *You Can’t Taste a Pickle With Your Ears*

Cultural Connections Resource Acquisition Program (RAP)

- *On Poppy’s Beach*
- *What Colour is the Ocean?*

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/senses.html

- Explorations or Investigations
- Skill - Using Appropriate Vocabulary

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *Rain*

Sequencing and Grouping Materials

Outcomes

Students will be expected to

9.0 *sequence or group materials and objects*
[GCO 2]

18.0 *communicate procedures and results*
[GCO 2]

Focus for Learning

Students are expected to use their senses to sequence or group collections of materials according to one or more recognizable attributes. For example, sequencing crayons of varying shades of red from lightest to darkest colour.

Address this outcome through directed exploration centres. At each centre, provide a simple procedure for students to follow. Procedures can be presented orally, pictorially, in written format, or as digital audio or video recordings. Procedures should direct students to sequence or group a collection of materials according to an attribute they can recognize with their senses.

Cross curricular connections may be made to English Language Arts 1 outcomes related to sequencing and Mathematics 1 outcomes related to sorting and ordering.

Scientists communicate about their investigations by publishing articles in peer-reviewed science journals and making presentations at science conferences. Communicating procedures and results enables other members of the science community to replicate investigations to confirm or extend the results and conclusions.

Students should communicate the procedures and results of their explorations and investigations. Communicating what is learned is the final step in the science inquiry process.

Students should communicate what they did (i.e., procedure) and what they found out (i.e., results) at the exploration centres. This may take the form of a physical demonstration, oral presentation, digital photographs, or drawings and a written description recorded in their science learning journal.

Cross curricular connections may be made to English Language Arts 1 outcomes related to presenting orally and communicating information.

Sample Performance Indicators

Sequence samples of Purity Syrup™, diluted to varying concentrations, according to sweetness and communicate the procedure followed and results obtained.

Group a collection Lego™ blocks by colour and shape and communicate the procedure followed and results obtained.

Sequencing and Grouping Materials

Sample Teaching and Assessment Strategies

Connection

Teachers may

- Model sequencing materials by removing the bars from a xylophone and having students replace them according to pitch.
- Model grouping materials by sorting books according to the texture of the cover (i.e., hard cover or soft cover).

Consolidation

Students may

- Sequence, at directed exploration centres,
 - paint swatches from lightest to darkest colour
 - tuning forks or glasses of water in a water glass xylophone from lowest to highest pitch
 - salt water solutions, diluted to varying concentrations, from most to least salty by taste
 - small, sealable, plastic containers containing a cotton ball and vanilla extract, diluted with varying amounts of water, from weakest to strongest odour
 - squares of sandpaper from roughest to smoothest (i.e., the higher the grit scale number the smoother the sandpaper)

Communicate the procedure followed and the results obtained. Answer keys may be provided to verify results.

- Group, at directed exploration centres,
 - crayons from a single colour family as tints (i.e., lighter colours) or shades (i.e., darker colours)
 - leaves by colour and shape
 - a seed collection by appearance and record results as a digital photograph
 - materials according to whether or not they make a detectable sound when dropped on a desk
 - water samples as fresh, salty, or sweet by taste
 - images by odour (i.e., aromatic, musky, pungent, or putrid)
 - fabric swatches according to a personal sorting rule

Communicate the procedure followed and the results obtained. Answer keys may be provided to verify results.

Extension

Teachers may

- Add one or more new materials to an exploration centre and have students adjust their sequence or groupings accordingly.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Materials and Our Senses*
 - pp. 31-34
- Science Card 6
- Teachers Website
 - IWB Activities 5 & 6

Supplementary

Science Library

- *Seeds! Seeds! Seeds!*

What is the Inquiry Process? (poster)

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/senses.html

- Skill - Classifying and Organizing
- Sequence Organizer

Altering Smell and Taste

Outcomes

Students will be expected to

19.0 investigate ways that materials can be changed to alter their smell and taste [GCO 1/3]

20.0 follow a simple procedure [GCO 2]

Focus for Learning

Engage students in initial experiences where they smell and/or taste materials before and after they have been changed in some way. Changes may include heating or cooling, hydrating or dehydrating, diluting or concentrating, changing state, dissolving, chopping, grating, grinding, or adding new materials. These experiences exemplify how materials can be changed to alter their attributes. While this outcome focuses on the attributes of smell and taste, some investigated changes may alter other attributes as well. Altering appearance, texture, and the sound materials make is the focus of subsequent outcomes.

Further engage students in directed inquiry investigations where they follow recipes to make simple foods or beverages (e.g., Jell-o™, lemonade). Making foods and beverages provides a context to investigate ways that materials can be changed. Students should observe and describe the taste and smell of materials (i.e., ingredients) prior to their use and compare these initial observations with observations of the final product.

Students are expected to follow simple procedures where instructions are given one step at a time.

Procedures are the detailed, sequential steps that scientists follow when conducting science inquiry investigations. Procedures can be presented orally, pictorially, in written format, or as digital audio or video recordings. The ability to follow procedures can be assessed in a variety of curricular and non-curricular settings.

In the context of these directed inquiry investigations, students are expected to follow a simple procedure (i.e., recipe) to make a food or beverage.

Cross curricular connections may be made to English Language Arts 1 outcomes related to following directions.

Attitude

Encourage students to work with others in exploring and investigating. [GCO 4]

Sample Performance Indicator

Make ice cream by following the procedure within the text *Making Ice Cream*. Observe and describe the smell and taste of the initial ingredients and the ice cream produced.

Altering Smell and Taste

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Model silly situations where they change materials in unusual ways (e.g., add ketchup to milk).
- Provide samples of grapes and raisins to exemplify how changing materials (i.e., dehydration) may alter their smell and taste.
- Read aloud *Seeing Red* to introduce the inquiry process and the skill of following procedures.

Connection

Students may

- Observe how materials smell and/or taste before and after they are changed in some way.
 - apple slices before and after adding cinnamon
 - carbonated beverages before and after going flat
 - juice before and after being warmed or diluted with water
 - pepper corns before and after grinding
 - garlic bulb before and after pressing
 - bread before and after toasting to varying levels of darkness
 - ginger root before and after grating
 - onions before and after chopping

Consolidation

Students may

- Collaborate in small groups to make simple foods or beverages following teacher provided procedures. Compare the smell and/or taste of initial ingredients to the final product.
 - juice from frozen concentrate
 - Kool-Aid™ from drink crystals
 - coffee brewed from ground coffee beans
 - pancakes or cookies from scratch ingredients
 - croutons from day old bread
 - instant oatmeal

Procedures may require direct adult supervision or assistance.

- Collaborate in small groups to develop a recipe (i.e., procedure) for making lemonade from lemons, sugar, and water. Students may refine their recipe through taste testing.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Materials and Our Senses*
 - pp. 35-41
- Science Card 7
- Teachers Website
 - IWB Activity 7
- Read Aloud
 - *Seeing Red*

Supplementary

Science Library

- *Scientists Ask Questions*
- *Stone Soup*

What Is the Inquiry Process? (poster)

Suggested

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *Making Ice Cream*

Altering Appearance and Texture

Outcomes

Students will be expected to

21.0 investigate ways that materials can be changed to alter their appearance and texture
[GCO 1/3]

1.0 *pose questions that lead to exploration and investigation*
[GCO 2]

22.0 use appropriate tools
[GCO 2]

13.0 *propose an answer to an initial question or problem and draw a simple conclusion*
[GCO 2]

Focus for Learning

Engage students in initial experiences where they observe the appearance and texture of materials before and after a change (e.g., popcorn kernels and popped popcorn). These experiences reinforce that materials can be changed in ways that alter their attributes.

Further engage students in investigations where they actively change a material in some way and determine if the change altered the material's appearance and texture. Structuring these investigations as guided inquiry expands the focus to include the development and assessment of skill outcomes.

Present students with a material and have them pose "I Wonder" questions related to ways they can change the material to alter its appearance and/or texture. If provided with a piece of wood, for example, students may wonder if sanding, waxing, painting, soaking it overnight in water, or drying it in an oven will alter its appearance and texture.

Empower students to choose an "I Wonder" question to investigate, devise procedures, select and use tools, make predictions, and carry out their own investigations.

Cross curricular connections may be made to English Language Arts 1 outcomes related to formulating questions that lead to inquiry.

In carrying out investigations of their "I Wonder" questions, students may require the use of tools to manipulate and observe materials. Provide a collection of familiar and science-related tools for student use or use under adult supervision (e.g., magnifying glasses, scissors, sand paper, tweezers, tongs, utility knives, stir sticks, plastic cutlery, eye droppers, paint brushes, graduated cylinders, thermometers, pan balance). Students should be expected to explain their choice of tool and evaluate its' appropriateness.

Students should propose an answer to their "I Wonder" question; communicating if the change they investigated altered the appearance and/or texture of their material.

Attitude

Encourage students to consider their own observations and ideas when drawing a conclusion. [GCO 4]

Altering Appearance and Texture

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Read aloud *The Hockey Tree* and have students explore the appearance and texture of tree rounds (i.e., dry, wet, frozen).

Students may

- Brainstorm different ways to change a piece of paper to alter its attributes (e.g., burning, colouring, cutting, crumpling, folding, shredding, tearing, staining with tea, leaving in the sun, wetting).

Connection

Students may

- Collaborate in small groups to observe and describe the appearance and texture of materials before and after a change.
 - bread before and after toasting, soaking in water, squashing under a book, or leaving overnight on the counter
 - artificial nails before and after filing, cutting, or painting
 - skin before and after applying lotion or finger painting
 - aluminum foil before and after folding, crumpling, smoothing out, or squashing under a book
 - candle before and after burning, melting, or breaking
 - popsicle sticks before and after breaking or soaking in water
 - instant noodles before and after adding hot water
 - chocolate before and after placing in the sun
 - steel wool before and after placing in water

Magnifying tools may be used to observe materials in detail.

Consolidation

Teachers may

- Distribute a material to small, collaborative groups (e.g., construction paper, marshmallow, bar of soap, soda cracker, modelling clay). Students should generate “I Wonder” questions related to ways they could change their material, select one, and collaboratively devise a procedure and carry out their investigation. This guided inquiry investigation provides an opportunity to assess many skill outcomes. Having completed their investigations, students should propose an answer to their initial question, communicate their procedures and results, and generate new questions to investigate from what was learned.

Students may

- Create a science card representing materials before and after changes that alter their appearance and texture.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Materials and Our Senses*
 - pp. 42-48
- Science Card 8
- Teachers Website
 - IWB Activity 8
- Read Alouds
 - *The Hockey Tree*
 - *Seeing Red*

Teaching and Learning Strategies

- www.k12pl.nl.ca/curr/k-6/sci/sci-1/teaching-and-learning-strategies.html
 - Inquiry Continuum

Supplementary

Science Library

- *Mmm, Cookies!*
- *Scientists Ask Questions*

What Is the Inquiry Process? (poster)

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/senses.html

- Explorations or Investigations
- Skill - Questioning

Altering Sound

Outcomes

Students will be expected to

23.0 investigate ways that materials can be changed to alter the sound they make
[GCO 1/3]

24.0 select and use materials to carry out their own explorations and investigations
[GCO 2]

8.0 *communicate while exploring and investigating*
[GCO 2]

Focus for Learning

Engage students in guided inquiry investigations where they select a material and investigate how they can change it to alter the sound it makes.

Materials may include plastic bottles or containers with covers, metal cans, aluminum foil plates, elastic bands, or paper towel rolls. To investigate plastic containers with covers, for example, students may

- tap the container in different locations or with different tools
- tap the container when placed on different surfaces or when wrapped in different materials
- tap the container when filled with varying amounts of a material or different materials
- shake the container when filled with varying amounts of a material or different materials

Empower students to pose their own “I Wonder” questions and carry out their own investigations to determine if changes made alter the sound the material makes.

Selecting materials is an important aspect of designing science inquiry investigations. Facilitate the development of this skill by providing students with a variety of materials to choose from. If investigating aluminum foil plates, for example, students should have access to foil plates of different shapes and sizes and a variety of tools and other materials with which to change them. Students should be expected to explain the thinking behind their choices.

Students are expected to communicate aloud while investigating their “I Wonder” questions. Encourage communication through the use of small, collaborative groups and pose questions to students such as

- What material did you select?
- How can you use the material to make sound?
- What ways could you change the material?
- Do you think the change will alter the sound it makes?
- What way did you choose to change the material?
- What tools or materials did you use to change it?
- Did the sound change?
- What new “I Wonder” questions do you have about your material and the sound it makes?

Attitude

Encourage students to willingly observe, question, and explore.
[GCO 4]

Altering Sound

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Model ways to use materials to make sounds (e.g., blowing across the neck of a bottle or against a blade of grass held between the fingers, plucking a stretched elastic band, running a finger tip around the wet rim of a partially filled water glass).
- Create a “curiosity centre” of materials that can be used to make sounds (e.g., aluminum foil, waxed paper, paper bag, paper towel roll, plastic pipes, elastic band, ribbon, straw, metal washers). Have students select materials and explore ways to use it to make sounds. While exploring, students should be encouraged to communicate aloud their questions, ideas, and intentions.

Connection

Teachers may

- Demonstrate a screaming balloon. Place a small hex nut inside the balloon, blow it up, and tie it off. Holding it palm down, swirl the balloon in a circular motion to make the hex nut spin. Have students suggest ways the materials can be changed and carry out investigations to determine if the change alters the sound made (e.g., changing inflation of the balloon, balloon size, hex nut size, partially filling the balloon with water).

Consolidation

Students may

- Collaborate in small groups to investigate ways a chosen material can be changed to alter the sound it makes (e.g., elastic bands, aluminum foil plates, metal cans or washers, plastic wrap, bottles, straws, rulers, or containers with covers, construction paper, paper towel rolls. Students should select materials needed to carry out their own investigations. Encourage students to communicate aloud their questions, ideas, and intentions while investigating. Digital recordings of group communication may be used for assessment.
- Collaborate in small groups to construct hand crafted noise makers.

Extension

Students may

- Use materials to create sound effects for a book or video.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Materials and Our Senses*
 - pp. 49-52
- Science Cards 9 & 10
- Teachers Website
 - IWB Activity 9

Supplementary

What Is the Inquiry Process?
(poster)

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/senses.html

- Skill - Working Collaboratively
- Skill - Using Appropriate Vocabulary



Section Three:

Specific Curriculum Outcomes

Unit 3: Properties of Objects and Materials

Focus

The materials and objects around us have a wide variety of properties, representing the rich and diverse environments in which we live. Making sense of this diversity requires the ability to make distinctions, including distinctions that are largely perceptual, such as “which material is softest?” and some that have a conceptual element, such as “what materials are used to make this object?” Initially, young children may not make a clear distinction between objects and materials. Through guided activities, students can discover that objects may be made of several materials, each with its own properties. Students can also discover that the selection of materials is related to the purpose of the object.

This unit has both a scientific inquiry and problem solving focus. Students will explore familiar objects to identify the materials they are made from, investigate the properties of different materials, and select the most appropriate material to use for an identified task. Students will investigate different methods of joining materials and apply these understandings to create a personally constructed object that solves an identified problem. Through this problem solving experience, students will be introduced to the design process used by inventors and engineers. Problem solving experiences support the development of skills related to identifying problems, selecting and using materials, using appropriate tools, and comparing and evaluating personally created objects.

Outcomes Framework

GCO 1 (STSE): Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology.

GCO 3 (Knowledge): Students will construct knowledge and understandings of concepts in life science, physical science, and Earth and space science, and apply these understandings to interpret, integrate, and extend their knowledge.

- 25.0 identify objects, how they are used, and for what purpose they are used
- 26.0 observe objects and describe their similarities and differences
- 27.0 compare and describe properties of objects and materials
- 28.0 describe and demonstrate ways to use materials appropriately and efficiently
- 29.0 explore ways to join materials
- 30.0 create a product by safely selecting, joining, and modifying materials

GCO 2 (Skills): Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions.

- 7.0 make and record observations and measurements
- 8.0 communicate while exploring and investigating
- 10.0 predict based on an observed pattern
- 13.0 propose an answer to an initial question or problem and draw a simple conclusion
- 18.0 communicate procedures and results
- 20.0 follow a simple procedure
- 22.0 use appropriate tools
- 24.0 select and use materials to carry out their own explorations and investigations
- 31.0 identify problems to be solved
- 32.0 compare and evaluate personally constructed objects

GCO 4 (Attitudes): Students will be encouraged to develop attitudes that support the responsible acquisition and application of scientific and technological knowledge to the mutual benefit of self, society, and the environment.

- show interest in and curiosity about objects and events within the immediate environment
- willingly observe, question, and explore
- appreciate the importance of accuracy
- be open-minded in their explorations and investigations
- work with others in exploring and investigating
- be sensitive to the needs of other people, other living things, and the local environment
- show concern for their safety and that of others while exploring and investigating

SCO Continuum

GCO 1 (STSE): Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology.

GCO 3 (Knowledge): Students will construct knowledge and understandings of concepts in life science, physical science, and Earth and space science, and apply these understandings to interpret, integrate, and extend their knowledge.

| Science K | Science 1 | Science 3 |
|---|--|---|
| <i>Exploring the World with Our Senses</i> | <i>Properties of Objects and Materials</i> | <i>Materials and Structures</i> |
| <ul style="list-style-type: none"> • identify and explore ways to use tools to help carry out useful tasks • choose materials to build a variety of real and imaginary settings | <ul style="list-style-type: none"> • identify objects, how they are used, and for what purpose they are used • observe objects and describe their similarities and differences • compare and describe properties of objects and materials • describe and demonstrate ways to use materials appropriately and effectively • explore ways to join materials • create a product by safely selecting, joining, and modifying materials | <ul style="list-style-type: none"> • describe properties of materials and evaluate their suitability for use in building structures • use appropriate tools in safely cutting, shaping, making holes through, and assembling materials • investigate and identify the most appropriate way to join materials |

GCO 2 (Skills): Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions.

| Science K | Science 1 | Science 2 |
|---|--|--|
| <ul style="list-style-type: none"> select and use materials to carry out their own explorations and investigations follow a simple procedure communicate while exploring and investigating | <ul style="list-style-type: none"> identify problems to be solved predict based on an observed pattern select and use materials to carry out their own explorations and investigations follow a simple procedure use appropriate tools make and record observations and measurements propose an answer to an initial question or problem and draw a simple conclusion compare and evaluate personally constructed objects communicate while exploring and investigating communicate procedures and results | <ul style="list-style-type: none"> identify problems to be solved predict based on an observed pattern select and use materials to carry out their own explorations and investigations follow a simple procedure use appropriate tools make and record observations and measurements propose an answer to an initial question or problem and draw a simple conclusion compare and evaluate personally constructed objects communicate while exploring and investigating communicate procedures and results |

Suggested Unit Plan

The Properties of Objects and Materials unit flows naturally from the preceding Materials and Our Senses unit. The unit culminates with the personal construction of a useful object to solve a problem. To achieve success, students will need to apply their understanding of materials, developed through inquiry experiences in both units, to design and construct an object that solves the problem identified.

| September | October | November | December | January | February | March | April | May | June |
|-----------|---------|----------|----------|---------|----------|-------|-------|-----|------|
| | | | | | | | | | |

Properties of Objects and Materials

What are Objects?

Outcomes

Students will be expected to

25.0 identify objects, how they are used, and for what purpose they are used [GCO 1/3]

Focus for Learning

Items humans use for a purpose are called objects. Objects are made from one or more materials and can be natural or human-made. Specialized objects, designed by humans to make work easier, may be referred to as tools.

Students are expected to:

- identify familiar objects found within their immediate environment
- communicate the purpose for which the objects are used
- demonstrate how the objects are used

If presented with a toothbrush, for example, students should identify the object as a toothbrush, communicate that it is used to help clean your teeth, and demonstrate how you manipulate it with your hand to create a brushing motion.

Attitude

Encourage students to show interest in and curiosity about objects and events within their immediate environment. [GCO 4]

Sample Performance Indicator

Select an object from a collection (e.g., clothes hanger, clothespin, eraser, pencil sharpener, rolling pin, screw driver, spoon) and answer the following:

- What is the name of the object or tool?
- How do we use it?
- What do we use it for?

What are Objects?

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Create a “curiosity centre” of familiar and unfamiliar objects, observe students as they explore the objects, and ask What object is that? What is it used for? How do you use it?

Connection

Teachers may

- Read aloud *The Subway Mouse* and have students identify the objects collected by Nib in the illustration on pages 8-9.
- Have students create their own collection of small objects. Objects can be stored in a plastic zipper bag. Collections may be incorporated into classroom activities or used to create a collage.
- Label classroom objects for use in Daily 5 work on words.
- Use charades and “Who am I?” riddles to have students identify familiar objects and tools.

Students may

- Identify objects found within *I Spy* books.
- Draw and identify
 - objects found in a specific room at home or at school
 - tools found in a carpenter’s tool box
- Play object memory games (i.e., briefly view a collection of objects then attempt to recall them).

Consolidation

Students may

- Play “I Wonder What I Am?”, asking questions of peers until they can identify the object or tool taped to their back.
- Participate in a classroom scavenger hunt to find objects or tools used for a specific purpose (e.g., to join paper, to write with).
- Brainstorm objects and tools that are needed to go camping, hiking, skating, swimming, to a sleep over or a picnic.
- Explore kitchen-related objects and tools, communicate their purpose, and demonstrate how they are used.

Extension

Students may

- Predict the purpose of unfamiliar objects or tools.
- Brainstorm alternate uses for a familiar object or tool.

Resources and Notes

Authorized

Let’s Do Science (Teachers Resource [TR])

- *Properties of Objects and Materials*
 - pp. 10-14, 56-61
- Science Cards 1, 9 & 10
- Teachers Website
 - Anchor Video
 - IWB Activities 1, 2 & 8
 - Image Bank
- Read Aloud
 - *The Subway Mouse*

Teaching and Learning Strategies

- www.k12pl.nl.ca/curr/k-6/sci/sci-1/teaching-and-learning-strategies.html
 - Science Daily 5

Supplementary

Science Library

- *I Spy: A Book of Picture Riddles*

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/objects.html

- Explorations or Investigations

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *Making Things*

Exploring Objects and Materials

Outcomes

Students will be expected to

26.0 observe objects and describe their similarities and differences
[GCO 1/3]

7.0 *make and record observations and measurements*
[GCO 2]

Focus for Learning

Students should describe how two objects are the same and how they are different.

Provide first-hand opportunities for students to explore, manipulate, and observe diverse objects made from different materials.

Detailed observing is the key to describing objects. Descriptions should include how objects feel, look, smell, and sound. Objects should also be described by their purpose, where they are found, how they are used, and what materials they are made from (e.g., cardboard, clay, fabrics, fur, glass, leather, metals, paper, plastic, rubber, stone, wood, wool). Some objects are made from one material; other objects are made from two or more materials.

Students may be confused about whether certain items are classified as objects or materials. Generally, if it is used to create an object, then it must be a material. Some items can be both an object and a material. For example, when string is used to tie up a parcel it is an object. String is a material when it is used to make a bracelet.

Students should also be expected to apply their observations of similarities and differences to group collections of objects according to one or more attributes (e.g., group objects according to the material they are made from).

Students should make accurate, detailed observations of objects using all appropriate senses. Detailed observations enable detection of similarities and differences that may not be obvious at first glance. The use of technology (e.g., magnifying lens, illuminated magnifier, placing the object on a viewing mirror) may enhance and extend observations. Observations may be recorded using written language or drawings in T-Charts, tables, and Venn diagrams. Physical groupings using sorting mats, hoops, or bowls are also considered records. Digital images of groupings enable observations to be revisited.

Attitude

Encourage students to appreciate the importance of accuracy.
[GCO 4]

Sample Performance Indicator

Select two different beverage containers from a collection (e.g., aluminum can, coloured plastic bottle, glass bottle, juice box, milk carton) and compare them using a Venn diagram.

Exploring Objects and Materials

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Introduce a daily “Mystery Object”; having students ask questions and make observations, using senses other than sight, to identify it. Students may be asked to bring mystery objects to use.

Connection

Teachers may

- Provide various objects and materials featured in *The Subway Mouse* (e.g., button, coin, pencil, pine cone). Have students select two items, observe them using magnification technology, and describe how they are the same and how they are different.

Students may

- Explore at centres, objects made from different materials (e.g., fabrics, glass, metals, paper, plastic, wood, and wool).
- Participate in a materials walk to identify objects made from a specific material. Students may be organized into teams (e.g., team plastic) and physically collect, label, represent in a chart, or digitally capture images of identified objects.
- Identify objects within *I Spy* books made from different materials.
- Compare and contrast two different materials in a Venn diagram.

Consolidation

Teachers may

- Provide a bag of cleaned, household recyclables for students to collaboratively sort (i.e., paper, cardboard, plastic, metal). Follow local or regional rules for sorting recycled materials.

Students may

- Group collections of objects at guided exploration centres:
 - coins (e.g., colour, material, size, shape, year of issue)
 - spoons (e.g., material, size, function)
 - buttons (e.g., material, size, colour, number of holes)
 - diverse objects made from different materials
- Create a photo album of objects made from different materials.

Extension

Students may

- Interview community elders to identify what materials objects from their childhood were made from.
- Identify differences in *Hocus Focus* cartoons.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Properties of Objects and Materials*
 - pp. 15-21, 22-28
- Science Cards 2, 3 & 4
- Teachers Website
 - IWB Activities 3 & 4
 - Image Bank
- Read Aloud
 - The Subway Mouse

Teaching and Learning Strategies

- www.k12pl.nl.ca/curr/k-6/sci/sci-1/teaching-and-learning-strategies.html
 - Science Daily 5

Supplementary

Science Library

- *I Spy: A Book of Picture Riddles*

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/objects.html

- Explorations or Investigations
- *Hocus Focus* (cartoons)

Other Curriculum Resources

- *Nelson Literacy Cross-Curricular Kit: What Is It Made Of?* (ELA Kindergarten)

Describing Properties of Objects and Materials

Outcomes

Students will be expected to

27.0 compare and describe properties of objects and materials
[GCO 1/3]

Focus for Learning

Materials have unique properties that can be observed with the senses (e.g., metals are shiny). Materials, and the objects made from them, are compared and described based on their properties:

- colour
- lustre - shiny or dull (i.e., how it looks when light shines on it)
- shape - round, square, triangular, rectangular
- size - big or small, long or short, wide or narrow
- texture - hard, soft, rough, smooth (i.e., how it feels)
- weight - heavy or light
- other useful properties - absorbency, buoyancy, insulating ability, magnetism, strength (i.e., resistance to failure when placed under stress), transparency, water resistance

Students should explore objects and materials at hands-on centres and describe their properties using descriptive terminology.

Knowledge of materials' unique properties allows scientists and engineers to select the most appropriate material to suit various jobs and applications. Later in the unit, students will be expected to select the best material, based on its properties, to use for a task. Students may select, for example, plastic as the best material from which to make drinking glasses because it is waterproof, lightweight, and strong (i.e., it will not break if dropped).

Attitude

Encourage students to willingly observe, question, explore and explain. [GCO 4]

Sample Performance Indicator

Compare three different balls selected from a collection (e.g., ball bearing, basketball, baseball, beach ball, bowling ball, foam ball, football, golf ball, high bouncer, marble, ping pong ball, pool ball, street hockey ball, Styrofoam ball, tennis ball) and describe their properties.

Describing Properties of Objects and Materials

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Observe students exploring objects and materials at the curiosity centre and ask them how they would describe an item of interest.
- Read aloud *Goldilocks and the Three Bears* and highlight how properties of the porridge, chair, and bed are compared and described.

Connection

Students may

- Collaboratively test and observe the properties of objects and materials at hands-on, directed exploration centres:
 - test and group items as hard or soft and rough or smooth. Record observations in T-charts.
 - sequence crayons or Legos™ from shortest to longest
 - test and group items as shiny or dull (i.e., lustre)
 - weigh similar sized items in a pan balance and sequence them from lightest to heaviest

Consolidation

Teachers may

- Read Aloud *The Hockey Tree*. Have students compare and describe the properties of pucks made from different materials (e.g., foam, plastic, rubber, Styrofoam, tree rounds).
- Play “I Spy” using riddles that describe multiple properties of a classroom item (e.g., I spy an object that is shiny, red, and rough). After sufficient modelling, students can create their own riddles.

Students may

- Compare and describe the properties of materials used in *The Three Little Pigs* (i.e., brick, sticks, straw).
- Sort articles of clothing according to the material they are made from and compare and describe the properties of different fabrics. Clothing tags may be used to aid sorting.
- Replay “I Wonder What I Am?”, asking property related questions of peers until they can identify the object taped to their back.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Properties of Objects and Materials*
 - pp. 22-28, 29-35
- Science Card 5
- Teachers Website
 - IWB Activity 5
- Read Aloud
 - The Hockey Tree

Teaching and Learning Strategies

- www.k12pl.nl.ca/curr/k-6/sci/sci-1/teaching-and-learning-strategies.html
 - Science Inquiry

Supplementary

Science Library

- *Rough and Smooth*
- *Soft and Hard*

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/objects.html

- Explorations or Investigations

Children's Literature

- *Goldilocks and the Three Bears*
- *The Three Little Pigs*

Other Curriculum Resources

- *Nelson Literacy Cross-Curricular Kit: What Is It Made Of?* (ELA Kindergarten)

Investigating Properties of Objects and Materials

Outcomes

Students will be expected to
24.0 select and use materials to carry out their own explorations and investigations
 [GCO 2]

10.0 predict based on an observed pattern
 [GCO 2]

20.0 follow a simple procedure
 [GCO 2]

13.0 propose an answer to an initial question or problem and draw a simple conclusion
 [GCO 2]

Focus for Learning

This series of skill outcomes should be addressed through guided inquiry investigations related to properties of objects and materials. Students should investigate:

- Which material is best for wiping up spills?
- Which material is most resistant to absorbing water?
- Which material is attracted most to a magnet?
- Which material is best to insulate an ice cube from melting?
- Which material lets light pass through it?

In guided inquiry, students assume control over aspects of the investigation. Students may pose or select the questions to investigate, collaboratively devise procedures, and determine how to measure and record their observations.

Students should select the materials they wish to test and explain the reasoning behind their selections. To facilitate development of this skill, provide students with a variety of materials to choose from that yield different results when tested.

Prior to performing each inquiry investigation, students should make predictions about which material will be most effective and record their prediction. Expect students to be able to explain the reasoning behind their predictions. Predictions should be based on prior knowledge or observed patterns.

Students are expected to follow the collaboratively devised, or teacher provided procedures, to carry out their inquiry investigations and test their chosen materials.

Once students have performed the investigations and analyzed and interpreted their results, they should answer their initial question and support their answer with recorded evidence. Students should also communicate the accuracy of their predictions.

Attitude

Encourage students to work with others in exploring and investigating.
 [GCO 4]

Sample Performance Indicator

Investigate which writing material is most visible on black paper. Select materials to test (e.g., chalk, crayons, highlighters, markers, pens, pencils) and follow a simple, provided procedure to propose an answer to the initial question.

Investigating Properties of Objects and Materials

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Model the science inquiry process by carrying out an investigation as a teacher demonstration (e.g., Which objects and materials can float?). Pose a question to investigate and devise aloud a procedure to follow. Select objects and materials to test and collaboratively discuss ways to measure and record your observations. Perform the investigation, record observations, and draw a conclusion that answers the initial question.

Consolidation

Teachers may

- Provide a collection of pucks made from different materials and tree rounds (i.e., dry, wet, wet and frozen) as described in *The Hockey Tree*. Have students select and use pucks to carry out their own investigation (e.g., Which puck slides the farthest?).

Students may

- Collaborate in small groups to investigate:
 - Which material absorbs the most water? Place small samples of selected materials (e.g., aluminum foil, cotton ball, fabrics, plastic bag, sponge, old towel, types of paper) in water, remove them, and observe how much they absorbed.
 - Which materials keep water off? Place a drop of water on selected materials (e.g., aluminum foil, fabrics, glass, Styrofoam™, types of paper, waxed and unwaxed cardboard) with an eyedropper and observe using a magnifying lens.
 - Is it magnetic? Place a magnet near selected materials (e.g., fabric, glass, metals, paper, plastic, wood) and observe.
 - Does it insulate? Place ice cubes in small containers and surround them with selected materials (e.g., aluminum foil, cotton balls, fabrics, plastic wrap, sawdust, Styrofoam™, types of paper, wool). Unwrap periodically and observe.
 - Is it transparent? Shine a flashlight on selected materials (e.g., acetate, aluminum foil, cardboard, fabrics, plastic wrap, types of paper, wood) and observe if light passes through.

Organize investigations as centres. Students may rotate through all centres or select centres based on interest. Selecting and using materials, making predictions, following procedures, and drawing conclusions should be the focus of assessment.

Extension

Students may

- Independently devise and carry out an inquiry investigation to determine which material is best to use for sliding on a snow hill.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Properties of Objects and Materials*
 - pp. 41-50
- Read Aloud
 - *The Hockey Tree*

Teaching and Learning Strategies

- www.k12pl.nl.ca/curr/k-6/sci/sci-1/teaching-and-learning-strategies.html
 - Science Daily 5
 - Science Inquiry
 - Inquiry Impact

Supplementary

Science Library

- *Scientists Ask Questions*

What is the Inquiry Process? (poster)

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/objects.html

- Skill - Predicting

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *What Can Float?*

Using Objects and Materials

Outcomes

Students will be expected to

28.0 describe and demonstrate ways to use materials appropriately and efficiently [GCO 1/3]

Focus for Learning

Materials have unique properties. Understanding their unique properties enables scientists and engineers to select the most appropriate material to suit various tasks and applications.

Students are expected to

- describe the properties of a material that make it appropriate for use in making specific objects. What properties of wool, for example, make it appropriate to use to make mittens or scarves?
- predict the effectiveness of objects if made from different materials. How effective would a frying pan be, for example, if made from fabric, glass, metal, paper, plastic, rubber, or wood?
- select and use the most appropriate material for a specific task and explain the reasoning behind their selection. Selections should consider the properties of materials.
- demonstrate efficient use of materials (e.g., using as little of a material as possible, using recycled or re-purposed materials)

Upcoming explorations, inquiry investigations, and problem-solving design challenges will provide opportunities for students to make choices and predictions as to which materials are best suited for a task and to use those materials wisely, responsibly, and resourcefully.

Describing and demonstrating ways to use materials appropriately and efficiently can be addressed and assessed in other curriculum areas (e.g., Art) and non-curricular routines (e.g., washing hands, cleaning up classroom spills).

Attitude

Encourage students to be sensitive to the needs of other people, other living things, and the local environment. [GCO 4]

Sample Performance Indicator

Describe and demonstrate appropriate and efficient use of glue in joining materials together.

Using Objects and Materials

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Model silly situations where they:
 - choose an inappropriate material (e.g., using elastic bands, plastic bags, or Styrofoam to clean up spilt water)
 - inefficiently use too much of a material (e.g., toothpaste, paper towels to clean a spill, or glue in making a craft)
- Read Aloud *Muncha! Muncha! Muncha!* and discuss the materials Mr. McGreely decided to use to build his fence and why he might have chosen those materials.
- Read Aloud *My Grandfather's Coat* and discuss how the Grandfather uses materials efficiently; taking old objects apart and reusing the material to create new objects.

Connection

Students may

- Collaboratively describe the properties of
 - glass that make it appropriate to use to make a window
 - wood that make it appropriate to use to make a chair
 - paper that make it appropriate to use to make a book
- Predict the effectiveness of using different materials to make objects (e.g., What if your umbrella was made of glass?, What if your book was made of stone?). Questions may be used as prompts for writing activities.
- Create Frayer Models of how familiar materials are used (e.g., cardboard, fabric, glass, metal, paper, plastic, rubber, stone, wood). Models should include
 - picture of or definition for the material
 - properties of the material
 - objects the material is used for
 - objects the material is not used for

Consolidation

Students may

- Describe and demonstrate appropriate and efficient use of
 - hand soap and paper towels for hand washing and drying
 - paint or glitter for art activities
 - toothpaste for brushing teeth
- Investigate and select the most appropriate way to store a sandwich in their lunch bag (i.e., hard plastic container, plastic sandwich bag, or wrapped in aluminum foil, paper, plastic wrap, or wax paper). Students should consider if the material can be reused or recycled.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Properties of Objects and Materials*
 - pp. 41-50
- Teachers Website
 - IWB Activity 6

Teaching and Learning Strategies

- www.k12pl.nl.ca/curr/k-6/sci/sci-1/teaching-and-learning-strategies.html
 - Science Daily 5

Supplementary

Science Library

- *My Grandfather's Coat*

Cultural Connections resource Acquisition Program (RAP)

- *Pop's Rubber Boots: The Busy Life of a Newfoundland and Labrador Fisherman*

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/objects.html

- Science Games

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *Muncha! Muncha! Muncha!*
- *Nelson Literacy Cross-Curricular Kit: What Is It Made Of?* (ELA Kindergarten)

Joining Objects and Materials

Outcomes

Students will be expected to

29.0 explore ways to join materials
[GCO 1/3]

8.0 *communicate while exploring and investigating*
[GCO 2]

18.0 *communicate procedures and results*
[GCO 2]

Focus for Learning

Some objects have parts that are joined together in different ways using fasteners and joining materials.

Students are expected to explore a variety of fasteners and joining materials:

- types of glue and tape, sticky tack
- ribbon, rope, shoe laces, string, wool
- clamps, clothespins, paper clips, paper fasteners, staples
- barrettes, buckles, buttons, hook and eyes, nails, nuts and bolts, stick pins, safety pins, screws, snaps, thread, Velcro™, zippers
- pipe cleaners, plastic ties, twist ties, wire

Following exploration, students should investigate methods used to join materials. Students may investigate:

- different ways to join two pieces of paper and communicate the benefits and drawbacks of each method
- different ways to join two different materials together (e.g., paper and wooden craft sticks)

Students should select the joining method (e.g., gluing, taping, stapling) and the fastener or joining material (e.g., all purpose glue, construction glue, plastic tape, masking tape) they wish to test and compare the results.

Facilitate communication during explorations and investigations by organizing students into small, collaborative groups. Encourage students to think aloud; verbalizing to classmates their questions, ideas, and intentions. Ask students:

- What do you see that could join materials? What materials can they join? How can they join them?
- Which materials are you trying to join? How are you trying to join them? Why are you trying this method? How well did your method work? What other ways could you join the same materials? How could you conduct a test to see which way is best?

When students have finished exploring and investigating, they should communicate to their classmates what their group did (i.e., procedure) and what they found out (i.e., results).

Attitude

Encourage students to be open-minded in their explorations and investigations. [GCO 4]

Joining Objects and Materials

Sample Teaching and Assessment Strategies

Connection

Students may

- Brainstorm different types of fasteners and joining materials.
- Explore a variety of objects that have parts joined together in some way (e.g., clothes, toys, shoes, furniture, books, back packs, supply cases, food storage containers). Describe how they are joined and the type of fastener or joining material used.
- Explore different fasteners at centres (e.g., barrettes, clamps, nails, nuts and bolts, plastic ties, safety pins, screws, staples, twist ties, Velcro™). Discuss and record what materials they could join.
- Identify the number of different fasteners and joining materials they are wearing.

Consolidation

Teachers may

- Provide different types of tape (e.g., duct, electrical, hockey, masking, packing, painter's, plastic) and glue (e.g., all purpose, carpenter's, craft, spray, glue stick). In groups, have students explore and compare how well they join different materials.

Students may

- Collaborate in small groups, to investigate the best way to join different objects and materials. Students may investigate the best way to join:
 - buttons to paper, plastic container lids, or craft sticks
 - wool to aluminum foil, Styrofoam plates, or paper towel rolls
 - felt to craft sticks, construction paper, or tin cans
 - googly eyes to felt, pie plates, plastic container lids, or stones
 - pompoms to felt, foam, plastic containers lids, or paper plates
 - straws, tooth picks, craft sticks, or pipe cleaners end to end

A variety of fasteners and joining materials should be provided. Students should record observations for each joining method they choose to test and communicate to classmates which methods they tried and what they found out.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Properties of Objects and Materials*
 - pp. 51-55
- Science Card 7
- Teachers Website
 - IWB Activity 7

Supplementary

Science Library

- *Scientists Ask Questions*

What is the Inquiry Process? (poster)

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/objects.html

- Skill - Working Collaboratively

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *Let's Make Cards*
- *Nelson Literacy Cross-Curricular Kit: What Is It Made Of?* (ELA Kindergarten)

Technological Problem Solving

Outcomes

Students will be expected to

30.0 create a product by safely selecting, joining, and modifying materials
[GCO 1/3]

31.0 identify problems to be solved
[GCO 2]

22.0 use appropriate tools
[GCO 2]

32.0 compare and evaluate personally constructed objects
[GCO 2]

Focus for Learning

Engineers and inventors follow a design process (i.e., a sequence of steps) to develop solutions to problems. There is no single design process that all engineers follow, however, most include:

1. identifying and describing the problem
2. brainstorming possible solutions and choosing the best one
3. making a plan and gathering materials
4. constructing the prototype
5. testing, evaluating, and redesigning the prototype
6. communicating the solution

Provide opportunities for students to be engineers; to follow a design process to create useful objects. These experiences should be open problem solving experiences where students, individually or in small collaborative groups, devise their own solution, select their own materials, and build their own prototype. Students should apply their understanding of joining methods and the properties of objects and materials in the construction of their objects.

Students should be able to identify and describe problems they encounter in their immediate environment. For example,

- misplacing their school materials (e.g., pencil, eraser, crayons)
- difficulty reaching a sink or a classroom shelf
- difficulty getting toothpaste out of the tube

Identifying problems, such as those above, should initiate a design process to construct useful objects that solve the problem (e.g., pencil box, stepping stool, toothpaste squeezer).

To construct their useful object, students may require the use of tools to modify and join selected materials (e.g., glue gun, hammer, hole punch, ruler, screwdriver, scissors, stapler, utility knife). Use of some tools may require adult supervision or assistance.

Following construction of their prototype, students should test their object against previously established design criteria. First attempts to solve problems are rarely successful. Student constructed objects may need to be redesigned, modified, or repaired.

Once completed, students should present their solution to their classmates for comparison and evaluation. Objects may be evaluated based on their design, material choice, joining method, and whether it meets the design criteria.

Attitude

Encourage students to show concern for their safety and that of others while exploring and investigating. [GCO 4]

Technological Problem Solving

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Read aloud *The Magnificent Tree*, to introduce students to the problem-solving design process. While reading the story, pause frequently and refer students to the What is the Design Process? poster. Compare the process and steps Bonny and Pop follow with the process and steps on the poster.
- Read *Art for the Birds* and connect the action in the story with the steps in the design process.

Connection

Students may

- Explore familiar objects and tools at centres and discuss:
 - What problem was it designed to solve?
 - What materials is it made of?
 - Why were these materials chosen?
 - Does it have any parts that are joined?
 - How are they joined?
 - What fasteners or joining materials were used?

Teachers may

- Model the design process as students individually construct paper bag puppets. Students should test their puppets by placing their hand inside and shaking them to see if anything falls off, and redesign, modify, or repair their puppet based on testing.

Consolidation

Students may

- Collaborate, in small groups, to design a useful object that solves an identified problem:
 - create handles for a paper bag
 - make a toy car to play with that moves
 - create a back scratcher
 - construct a pencil box or holder
 - construct a birdhouse or feeder

Groups should present their constructed objects to classmates for comparison and evaluation.

- Participate in a gallery walk to compare and evaluate the students' constructed objects. Students should evaluate objects against design criteria and compliment or make suggestions for improvement based on design, material choice, and joining method.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Properties of Objects and Materials*
 - pp. 36-40, 51-55, 56-61, 62-66, & 67-74
- Science Cards 6 & 8,
- Teachers Website
 - IWB Activity 9
- Read Aloud
 - *The Magnificent Tree*

Teaching and Learning Strategies

- www.k12pl.nl.ca/curr/k-6/sci/sci-1/teaching-and-learning-strategies.html
 - Technological Problem Solving

Supplementary

What is the Design Process? (poster)

Cultural Connections Resource Acquisition Program (RAP)

- *Emma's New Game*

Suggested

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *Art for the Birds*
- *Nelson Literacy Cross-Curricular Kit: What Is It Made Of?* (ELA Kindergarten)

Section Three:

Specific Curriculum Outcomes

Unit 4: Needs and Characteristics of
Living Things

Focus

Students at this level are interested in a wide variety of living things, including those found in their local environments and ones from afar. The unit focus should be on local living things, including aquatic (i.e., freshwater and marine) and terrestrial plants and animals. A study of living things provides an opportunity for students to discover the many different forms of life. Students can observe similarities and differences and develop an understanding of the general characteristics of living things. Through this study, students also become aware that all living things, including themselves, have needs. They discover that some of the needs of organisms are similar, while others may be unique.

This Needs and Characteristics of Living Things unit has both a scientific inquiry and problem solving focus. Students will pose questions about living things that lead to explorations and investigations. Related inquiry experiences will introduce new skills (i.e., using a variety of sources of science information, responding to the ideas and actions of others) and further develop the skills of predicting, making and recording observations, sequencing and grouping, and communicating using scientific terminology. Problem solving experiences will focus on following the design process to construct accurate models of selected animals. Students will further develop the skill of comparing and evaluating personally constructed objects by comparing their finished models with a photograph of their selected animal and evaluating the accuracy of their model.

Outcomes Framework

GCO 1 (STSE): Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology.

GCO 3 (Knowledge): Students will construct knowledge and understandings of concepts in life science, physical science, and Earth and space science, and apply these understandings to interpret, integrate, and extend their knowledge.

- 35.0 identify and describe common characteristics of humans and other animals, and identify variations that make each person and animal unique
- 36.0 observe and identify similarities and differences in the needs of living things
- 37.0 describe different ways plants and animals meet their needs
- 38.0 describe the different ways that humans and other living things move to meet their needs
- 39.0 describe ways humans use their knowledge of living things in meeting their own needs and the needs of plants and animals
- 40.0 recognize that living things depend on their environment, and identify personal actions that contribute to a healthy environment

GCO 2 (Skills): Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions.

- 1.0 pose questions that lead to exploration and investigation
- 2.0 pose new questions that arise from what is learned
- 3.0 communicate using scientific terminology
- 7.0 make and record observations and measurements
- 9.0 sequence or group materials and objects
- 10.0 predict based on an observed pattern
- 32.0 compare and evaluate personally constructed objects
- 33.0 use a variety of sources of science information
- 34.0 respond to the ideas and actions of others in constructing their own understanding

GCO 4 (Attitude): Students will be encouraged to develop attitudes that support the responsible acquisition and application of scientific and technological knowledge to the mutual benefit of self, society, and the environment.

- recognize the role and contribution of science in their understanding of the world
- show interest in and curiosity about objects and events within the immediate environment
- willingly observe, question, and explore
- consider their observations and their own ideas when drawing a conclusion
- appreciate the importance of accuracy
- be open-minded while exploring and investigating
- work with others in exploring and investigating
- be sensitive to the needs of other people, other living things, and the local environment

SCO Continuum

GCO 1 (STSE): Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology.

GCO 3 (Knowledge): Students will construct knowledge and understandings of concepts in life science, physical science, and Earth and space science, and apply these understandings to interpret, integrate, and extend their knowledge.

| Science K | Science 1 | Science 2 |
|--|--|---|
| <i>Exploring the World with Our Senses</i> | <i>Needs and Characteristics of Living Things</i> | <i>Animal Growth and Changes</i> |
| | <ul style="list-style-type: none"> • identify and describe common characteristics of humans and other animals, and identify variations making each person and animal unique • observe and identify similarities and differences in the needs of living things • describe ways plants and animals meet their needs • describe ways animals move to meet their needs • describe ways humans use their knowledge of living things in meeting their own needs and the needs of plants and animals • recognize living things depend on their environment • identify personal actions contributing to a healthy environment | <ul style="list-style-type: none"> • compare life cycles of animals • contrast human growth to that of other animals • observe and describe changes in animals it goes through its life cycle • identify constant and changing traits in animals as they grow and develop • describe features of environments that support animal health and growth |
| | | <p style="text-align: center;">Science 3</p> <p style="text-align: center;"><i>Plant Growth and Changes</i></p> <ul style="list-style-type: none"> • investigate life needs of plants • describe how plants are affected by conditions in which they grow • describe changes occurring in the life cycle of a flowering plant • describe ways plants are important to living things and their environment |

GCO 2 (Skills): Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions.

| Science K | Science 1 | Science 2 |
|--|---|---|
| <ul style="list-style-type: none"> pose questions that lead to exploration and investigation sequence or group materials and objects communicate using scientific terminology respond to the ideas and actions of others in constructing their own understanding | <ul style="list-style-type: none"> pose questions that lead to exploration and investigation predict based on an observed pattern make and record observations and measurements use a variety of sources of science information sequence or group materials and objects compare and evaluate personally constructed objects pose new questions that arise from what is learned communicate using scientific terminology respond to the ideas and actions of others in constructing their own understanding | <ul style="list-style-type: none"> pose questions that lead to exploration and investigation predict based on an observed pattern make and record observations and measurements use a variety of sources of science information sequence or group materials and objects compare and evaluate personally constructed objects pose new questions that arise from what is learned communicate using scientific terminology respond to the ideas and actions of others in constructing their own understanding |

Suggested Unit Plan

Needs and Characteristics of Living Things is the life science unit of the Science 1 curriculum. The unit is positioned at the end of Science 1 to capitalize on opportunities for outdoor learning; observing plants and animals in their local environments.

| September | October | November | December | January | February | March | April | May | June |
|-----------|---------|----------|----------|---------|----------|-------|-------|-----|------|
| | | | | | | | | | |

**Needs and Characteristics
of Living Things**

What Are Living Things?

Outcomes

Students will be expected to

1.0 *pose questions that lead to exploration and investigation*
[GCO 2]

33.0 *use a variety of sources of science information*
[GCO 2]

Focus for Learning

Ensure students have a clear understanding of the difference between living and non-living things. Living things are alive; they move, reproduce and grow, respond to stimuli, and respire. All things that are not classified as living things are non-living things.

Primary students are interested in and curious about a wide variety of living things. Focus their attention on local living things, including terrestrial, freshwater, and marine plants and animals (e.g., arctic hare, dragon fly, eel grass, river otter, robin, seal, sea star, water lily).

In the context of this unit, students are expected to generate and record questions about local living things. Selecting a pine marten, for example, students should pose “I Wonder” questions:

- I wonder where it lives? I wonder what type of home it lives in?
- I wonder what it eats? Does it eat plants or animals?
- I wonder how big it is? What other animals is it similar to?
- I wonder how it moves? Can it fly, swim, climb trees, or burrow underground?
- I wonder if it is nocturnal? Does it migrate or hibernate?

Provide opportunities for students to find answers to their inquiry questions through research and investigation.

To begin to find answers to their inquiry questions, students should explore a variety of sources of science information. Sources include

- personal observations of living things;
- libraries and learning resource centres (e.g., non-fiction texts, field guides, encyclopedias);
- the Internet;
- videos and images;
- people (i.e., knowledgeable community members); and
- museums and interpretation centres.

Cross curricular connections may be made to English Language Arts 1 outcomes related to interpreting, selecting, and combining information using a variety of resources and technologies.

Attitude

Encourage students to show interest in and curiosity about objects and events within the immediate environment. [GCO 4]

Sample Performance Indicator

View an image of a local living thing (e.g., polar bear) and pose “I Wonder” questions. Identify several possible sources of science information you could explore to help find your answers.

What Are Living Things?

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Read aloud *What's Alive?* and *Is it Alive?* to introduce living and non-living things.

Students may

- Take a walk around the school grounds and identify the living and non-living things they observe, as well as evidence of living things (e.g., spider's web, animal feces). Observations may be recorded on a checklist or as digital images.
- Group living and non-living things identified on their walk in a t-chart.
- Collaboratively brainstorm lists of local terrestrial and aquatic plants and animals.

Connection

Teachers may

- Model aloud the posing of "I Wonder" questions related to a specific living thing. Ask students how they might find answers to these questions and collaboratively brainstorm various sources of science information.

Students may

- Collaborate in small groups to select a local animal and communicate what they already know about it. Generate questions about the animal and record them on the "I Wonder" Wall, in a group KWHL chart, or their science learning journals.

Consolidation

Students may

- Explore a variety of sources of science information to begin to find answers to their inquiry questions
 - where possible, directly observe their living thing
 - explore informational texts and websites
 - view images, field guides, nature videos, and live web cams
 - virtually interview knowledgeable community elders
 - visit farms, museums, and nature interpretation centres

Resources and Notes

Authorized

Let's Do Science (Teachers Resource [TR])

- *Needs and Characteristics of Living Things*
 - pp. 10-15
- Science Card 1
- Teachers Website
 - Anchor Video
 - IWB Activity 1
 - Image Bank

Supplementary

Science Library

- *What's Alive?*

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/living.html

- Living Things resources

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *Is it Alive?*
- *Nelson Literacy Cross-Curricular Kit: Living Things in the Environment* (ELA Kindergarten)
- *Visual Field Guides for The Environment of Newfoundland and Labrador* (Science 4 & Science 7)

Exploring Living Things

Outcomes

Students will be expected to

34.0 respond to the ideas and actions of others in constructing their own understanding
[GCO 2]

2.0 *pose new questions that arise from what was learned*
[GCO 2]

Focus for Learning

Students should collaborate in small groups to explore sources of science information to find answers to their inquiry questions about local living things. What is learned should be shared and communicated with their peers.

As new ideas, information, and scientific terminology are introduced by others, students should integrate these into their own understanding of living things.

Cross curricular connections may be made to English Language Arts 1 outcomes related to speaking and listening to explore, extend, clarify, and reflect on thoughts, ideas, and experiences.

As initial questions are explored and answered, new questions will arise from what is learned. These new questions should be recorded and explored as the unit progresses.

Attitude

Encourage students to be open-minded while exploring and investigating. [GCO 4]

Sample Performance Indicator

Present to classmates what was learned about their local living thing. Communication should include:

- the name of the local living thing,
- “I Wonder” question(s) explored,
- what was learned, and
- the source of the science information.

Classmates should personally respond to the presentation and pose new “I Wonder” questions that arise from what was learned.

Exploring Living Things

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Read aloud *True or False? Finding Out About Newfoundland Dogs*, pausing after each question to allow students to record their answer. Repeat the activity a second time allowing students to rerecord their answers. Ask if anyone changed one of their answers. Discuss how this activity models how we construct knowledge and understanding in science.

Connection

Teachers may

- Model selecting an “I Wonder” question and exploring sources of science information to find and communicate an answer.
- Encourage students to communicate aloud while exploring sources of science information.

Students may

- Select, in small collaborative groups, an inquiry question about a local living thing to explore and discuss ways to find an answer to their question. Inquiry questions may be selected from the student posed questions recorded on the “I Wonder” Wall or in KWHL charts.

Consolidation

Students may

- Explore, in small collaborative groups, sources of science information to answer the selected inquiry question. Communicate what is learned to peers and cite the source of the learning. What is learned may be added to KWHL charts.
- Record new questions that arise from explorations or information sharing.
- Annotate images of living things with what has been learned and add images of a class book of learning.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Needs and Characteristics of Living Things*
 - pp. 10-15
- Teachers Website
 - Image Bank

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/living.html

- Living Things resources

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *True or False? Finding Out About Newfoundland Dogs*
- *Nelson Literacy Cross-Curricular Kit: Living Things in the Environment* (ELA Kindergarten)
- *Visual Field Guides for The Environment of Newfoundland and Labrador* (Science 4 & Science 7)

Describing Living Things

Outcomes

Students will be expected to

7.0 *make and record observations and measurements*
[GCO 2]

3.0 *communicate using scientific terminology*
[GCO 2]

Focus for Learning

Living things are sorted into groups, or classified, on the basis of similar physical characteristics. Observing and measuring these physical characteristics are essential skills in life science.

Students should observe a variety of different living things and record their observations, focusing on physical characteristics. For example

- size, shape, colour;
- animal body coverings (e.g., fur, feathers, scales, shell, skin);
- animal parts (e.g., beak, fin, leg, mouth, tail, teeth, wing); and
- plant parts (e.g., bark, branch, bud, cone, flower, leaf, needle, root, seed, stem, trunk).

Students may have difficulty distinguishing between physical characteristics they observe (e.g., this animal has wings) and inferences they make based on their prior knowledge or observations (e.g., this animal is a bird; this animal can fly). To help distinguish observations from inferences, highlight that inferences are not necessarily correct. A little brown bat, for example, has wings. Students may infer that it is a bird, but it is not; it is a mammal. Similarly, a chicken has wings. Students may infer that it flies like other birds, however, it cannot. It can only fly short distances.

Students should germinate and grow seedlings, making and recording repeated observations and measurements over time. These seedlings will be used throughout the unit.

Cross curricular connections exist with Mathematics 1 outcomes related to measurement as a process of comparing. Where applicable, students should make and record measurements using non-standard units.

When communicating about the physical characteristics of different plants and animals, students should use appropriate scientific terminology. Students should, for example, use the terms

- flower, leaf, petal, root, and stem when describing a pitcher plant;
- bark, branch, cone, and needle when describing a spruce tree;
- beak, eye, feathers, wing, and leg when describing a crow; and
- eye, fins, gills, mouth, skin, and tail when describing a salmon.

Attitude

Encourage students to willingly observe, question, and explore.
[GCO 4]

Sample Performance Indicator

Orally describe the physical characteristics of a dandelion plant, or another local living thing, using appropriate scientific terminology.

Describing Living Things

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Describe a student using observable physical characteristics and have students guess which student you are describing.
- Use observable physical characteristics (e.g., size, body covering, colour, type and number of limbs) to describe a familiar animal, and have students guess which animal you are describing.

Connection

Teachers may

- Read aloud *Is This a Moose?* and suggested Science Library titles to expose students to a variety of different living things and their identifying features. Add new terminology to the Word Wall.
- Display images of local plants and animals and ask questions to prompt students to describe their observations (e.g., what kind of body covering does it have?). Encourage students to use the appropriate scientific terminology.

Students may

- Observe at open exploration centres
 - plant parts (e.g., bark, cones, leaves, needles, flowers, buds)
 - animal body coverings (e.g., fur, feathers, skins, shells)
 - live plants and animals (e.g., African violets, cactus, ivy, pothos, spider plant, aquarium fish, carpenter crickets, earthworms, hermit crabs, meal worms, tadpoles/frogs)

Consolidation

Students may

- Germinate and grow seeds (e.g., beans). Repeated observations and measurements should be taken over a series of days and recorded. Seedling height may be measured using unit cubes.
- Play “I Wonder What I Am?”, asking questions of peers until they can identify the plant or animal taped to their back.
- Select an index card marked with the name of a familiar, local living thing and describe its observable physical characteristics in such a way that other students can guess what it is.
- Record narration for a digital image or video clip of a living thing describing its physical characteristics.

Extension

Students may

- Create a claymation movie of their repeated observations of a developing seedling.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Needs and Characteristics of Living Things*
 - pp. 16-23
- Science Cards 2 & 3
- Teachers Website
 - IWB Activities 2 & 3

Supplementary

Science Library

- *Are Trees Alive?*
- *Dandelions: Stars in the Grass*
- *Groundhog Weather School*
- *Hop! Spring! Leap!: Animals That Jump*
- *How Do Polar Bears Stay Warm?*
- *Leaves! Leaves! Leaves!*
- *Seeds! Seeds! Seeds!*
- *What If You Had Animal Feet!?*
- *What If You Had Animal Teeth!?*
- *Who Has These Feet?*

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/living.html

- Explorations or Investigations
- Classroom gardening (program)

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *Is This a Moose?*
 - *Plant a Seed*

Sequencing and Grouping Living Things

Outcomes

Students will be expected to

9.0 *sequence or group materials and objects*
[GCO 2]

Focus for Learning

Students should further develop this skill outcome by grouping and sequencing living things according to one or more observable physical characteristics.

Grouping is appropriate for characteristics with a finite number of defined attributes (e.g., body coverings - fur, feathers, scales, skin). Sequencing is appropriate for measurable characteristics with a range of possible values that can be placed in a logical order (e.g., size, length, height).

Grouping opportunities include, for example

- students according to eye or hair colour;
- plants vs. animals;
- animals according to body covering (e.g., skin, fur, feathers, scales, shell), number of legs (e.g., 0, 2, 4), or the presence or absence of a feature (e.g., beak, fins, tail);
- trees with leaves vs. trees with needles; and
- leaves or seeds according to colour and/or shape.

Where possible, stimulate critical thinking by introducing examples that do not fit neatly into designated groups (e.g., a fallen leaf in living vs. non-living thing?).

Sequencing opportunities include, for example

- self-sorting according to height, foot size, or hair length;
- animals according to size, tail length, beak size, or track size; and
- plants according to height, number of flower petals, or leaf size.

Where appropriate, students should make and record measurements using non-standard units.

Cross curricular connections may be made to Mathematics 1 outcomes related to sorting and ordering, and measurement for comparison.

Attitude

Encourage students to consider their observations and their own ideas when drawing a conclusion. [GCO 4]

Sample Performance Indicator

Independently sequence or group images of local terrestrial, aquatic, and marine plants and animals according to a personally communicated rule.

Sequencing and Grouping Living Things

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Invite a group of students to the front of the classroom and group or sequence them according to an observable physical characteristic. Have students attempt to identify the rule.

Connection

Teachers may

- Distribute images of local terrestrial, aquatic, and marine plants and animals; one to each student. Communicate aloud various grouping or sequencing rules and have students group or sequence themselves according to the physical characteristics of their living thing.

Students may

- Collaborate in groups to come up with self-grouping and self-sequencing rules based on observable physical characteristics. Once they have completed a self-grouping or self-sequencing, have them call you over to infer the rule they have used.

Consolidation

Students may

- Use the grouping rule found on p. 31 of *What's Alive?* to group images of living things found in the image bank on the Teachers Website.
- Group, at exploration centres,
 - animal figurines according to body covering, number of legs, or the presence or absence of a specific feature
 - a seed collection like Buddy Bear in *Seeds! Seeds! Seeds!*
 - sunflower seeds according to the number of stripes
 - images of plants and animals according to whether they live on land or live in water. Communicate which living things were difficult to place in a group (e.g., gull).
- Sequence, at exploration centres,
 - cut-outs of student's feet from different grade levels, according to length measured with unit cubes
 - seedlings according to measured height
 - stages of seed germination using cards or images like Buddy Bear in *Seeds! Seeds! Seeds!*
 - animal tracks according to size

Resources and Notes

Authorized

Let's Do Science (TR)

- *Needs and Characteristics of Living Things*
 - pp. 24-29
- Teachers Website
 - IWB Activities 4 & 5
 - Image Bank

Supplementary

Science Library

- *What's Alive?*
- *Seeds! Seeds! Seeds!*

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/living.html

- Skill - Classifying & Organizing

Other curriculum resources

- *Visual Field Guides for The Environment of Newfoundland and Labrador* (Science 4 & Science 7)

Identifying and Describing Shared and Unique Characteristics

Outcomes

Students will be expected to

35.0 identify and describe common characteristics of humans and other animals, and identify variations that make each person and animal unique
[GCO 1/3]

Focus for Learning

Students should identify and describe characteristics shared by all humans and variations that make individuals unique. Students could identify eyes, fingers, hair, legs, skin, and a nose as shared characteristics. Freckles, blue eyes, curly hair, dimples, and left handedness may be identified as variations that make an individual unique.

In biology, groups of living things with shared physical characteristics, that naturally interbreed, are referred to as a species. House cats, for example, all belong to the same species. All cats look similar due to common shared characteristics (e.g., four legs, two eyes, two ears, claws, fur, teeth). Variation in characteristics, however, makes each individual cat unique.

Students should compare animals of the same species and identify and describe characteristics shared by all and variations unique to individuals.

Attitude

Encourage students to recognize the role and contribution of science in their understanding of the world. [GCO 4]

Sample Performance Indicator

Compare images of dogs. Identify and describe characteristics shared by all the dogs and variations unique to individual dogs.

Identifying and Describing Shared and Unique Characteristics

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Read Aloud *Same and Different?* comparing the observable physical characteristics of a girl and her puppy. Have students select another animal and describe how they are the same as and different from that animal.

Students may

- Choose two animals and describe how they are the same and how they are different using a Venn diagram.

Connection

Teachers may

- Play “Stand Up If...”. Have students sit down and call out physical characteristics. Students who exhibit those characteristics should stand up. Include characteristics shared by everyone (e.g., stand up if you have two eyes) and those that are unique to individuals (e.g., stand up if you have red hair).
- Read aloud suggested titles from the Science Library and have students identify shared characteristics of different species.

Students may

- Collaborate in small groups at centres to compare two images of different individuals of the same animal species. A Venn diagram may aid comparison.

Consolidation

Teachers may

- Create profile silhouettes of student heads on black construction paper using white crayon or chalk. Have students attempt to identify classmates based on their unique physical characteristics.

Students may

- Independently view a collection of images of individual animals of the same familiar species (e.g., cats, cows, dogs, goldfish, horses) and identify shared and unique characteristics.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Needs and Characteristics of Living Things*
 - pp. 29-36
- Science Card 4
- Teachers Website
 - IWB Activity 6
 - Image Bank

Supplementary

Science Library

- *Are Trees Alive?*
- *Fish is Fish*
- *What Do You Do With a Tail Like This?*
- *What If You Had Animal Feet!?*
- *What If You Had Animal Teeth!?*
- *Who Has These Feet?*

Suggested

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *Same and Different?*

Constructing Models of Living Things

Outcomes

Students will be expected to
32.0 compare and evaluate
personally constructed
objects
[GCO 2]

Focus for Learning

Scientists and engineers use models (i.e., visual, physical, or mathematical representations) to help them visualize, explore, and explain the objects and events they observe in the world around them.

Any physical representation of an animal or plant can be considered a model (e.g., duck decoy, piggy bank, teddy bear, rocking horse). However, many of these objects are produced for purposes other than accurately representing the living thing for scientific study. As a result, many physical representations of plants and animals are not accurate (i.e., unrealistic).

Students should individually select a local plant or animal (e.g., black capped chickadee, birch tree, green frog, lynx, orca whale, pitcher plant, puffin, squid, squirrel, trout) and follow a design process, to design and construct a model of their living thing. Models should be as accurate as students can make them.

Students should compare their finished model with digital images of the plant or animal they are modelling and evaluate the accuracy of their model with respect to depiction of physical characteristics, material use, colour, and other features that contribute to accuracy.

Following a design process provides another opportunity to readdress and assess skill outcomes (e.g., identifying problems, selecting and using materials, using materials appropriately and efficiently, using appropriate tools).

Attitude

Encourage students to appreciate the importance of accuracy.
[GCO 4]

Sample Performance Indicator

Participate in a gallery walk to compare models personally constructed by classmates with digital images of the living things they were modeling. Evaluate the accuracy of each model, and provide constructive feedback on how to make it more realistic.

Constructing Models of Living Things

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Have students view representations of plants and animals, classify them as realistic or unrealistic, and discuss the attributes of specific models that contribute to accuracy.
- Have students view Science Card 6 from the Materials and Our Senses unit and select the most realistic model of each animal.

Students may

- Bring models of living things from home and group them as realistic and unrealistic.

Connection

Teachers may

- Read aloud *Fish is Fish* and have students evaluate the accuracy of Minnow's mental representations of familiar animals.

Students may

- Select a digital image of a plant or animal to model. Follow a design process to construct a model of the chosen living thing that is as realistic as they can make it. Models can be constructed from modelling clay, paper mâché, or other construction materials (e.g., craft, found, or recycled materials).

Consolidation

Students may

- Self evaluate their personally constructed model for accuracy.
- Participate in a gallery walk to compare and evaluate the models of classmates and provide constructive feedback on how to make their models more realistic.
- Act on the feedback received from classmates to make improvements to their model.

Extension

Students may

- Construct a model of an imaginary pet that combines the physical characteristics of two different animals similar to those represented in *The Best Pet*.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Needs and Characteristics of Living Things*
 - pp. 37-43
- Science Card 5
- Teachers Website
 - Image Bank

Supplementary

Science Library

- *Fish is Fish*

What is the Design Process?
(poster)

Suggested

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *The Best Pet*
- *Visual Field Guides for The Environment of Newfoundland and Labrador* (Science 4 & Science 7)

Needs of Living Things

Outcomes

Students will be expected to

36.0 observe and identify similarities and differences in the needs of living things [GCO 1/3]

Focus for Learning

The basic needs that all living things share are food, water, air, and shelter. A comparison of living things, however, will identify differences in those needs. For example

- wolves eat other animals for food, moose eat plants, and plants make their own food;
- dogs drink water, trout live in water, and plants absorb water to make their own food;
- arctic hare breathe air and remove oxygen, cod use their gills to remove dissolved oxygen from water, and plants absorb air through their leaves and remove carbon dioxide; and
- polar bears dig shelters in the snow, beavers construct lodges in ponds, and snails carry their shelter with them (i.e., their shell).

Students should, through direct experience, observe different plants and animals to identify similarities and differences in their needs (e.g., aquarium fish, cacti, carpenters, crabs, crickets, crows, dandelions, ducks, earthworms, eel grass, farm animals, feeder birds, flowering bulbs, gulls, house plants, mealworms, moss, sea stars, slugs, snails, spiders, tadpoles, tree seedlings).

Seedlings germinated earlier in the unit should be used to investigate the needs of plants.

Cross curricular connections may be made to Social Studies 1 outcomes related to human needs and wants.

Attitude

Encourage students to work with others in exploring and investigating. [GCO 4]

Sample Performance Indicator

Use a Venn diagram to compare the needs of a house pet and a house plant.

Needs of Living Things

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Read aloud *Ordinary Amos and the Amazing Fish* pausing to discuss Amos’s needs. Have students draw their own “person bowl” and include their needs and wants.
- Label two walls as the “needs” and “wants” walls. Ask questions about whether something is a human need or want (e.g., water to drink, a game to play with) and have students move to a wall to indicate their choice.

Connection

Teachers may

- Post an image of four different, familiar living things (e.g., chipmunk, dandelion, puffin, lobster) on chart paper. Have students circulate to each poster and record what they think it needs to survive. Compare annotated posters to initiate a discussion about similarities and differences in needs.

Students may

- Generate needs-related questions and record them on the “I Wonder” Wall, KWHL chart, or in their science learning journals.
- Investigate the needs of plants. In pairs, students should select an inquiry question, devise and carry out a plan, and record their observations over several days. Investigations may include what happens if we:
 - don’t water our plant
 - give our plant plant food
 - place our plant in a sealed, clear, plastic bag
 - submerge our plant in a container of water
 - plant our plant in gravel or sand
 - place our plant in the dark or only give it artificial light

Plans should ensure that only one condition is changed (e.g., seedlings placed in the dark should still be watered). Some seedlings should be properly maintained for comparison purposes.

Consolidation

Students may

- Research and use Venn diagrams to compare the needs of a(n):
 - black bear and a robin
 - orca whale and a moose
 - cod and a dandelion

Resources and Notes

Authorized

Let’s Do Science (TR)

- *Needs and Characteristics of Living Things*
 - pp.44-52
- Science Card 6
- Teachers Website
 - IWB Activity 7
- Read Aloud
 - *Ordinary Amos and The Amazing Fish*

Supplementary

Science Library

- *Animal Snackers*
- *Are trees Alive?*
- *Dandelions: Starts in the Grass*
- *Leaves!, Leaves!, Leaves!*
- *Scientists Ask Questions*
- *What If You Had Animal Feet!?*
- *What If You Had Animal Teeth!?*
- *What’s Alive?*

What is the Inquiry Process? (poster)

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/living.html

- Classroom gardening (program)

Other curriculum resources

- *Discovery Links 1* (Social Studies 1)
 - *What We Really Need*

How Living Things Meet Their Needs

Outcomes

Students will be expected to

37.0 describe different ways plants and animals meet their needs
[GCO 1/3]

10.0 *predict based on an observed pattern*
[GCO 2]

Focus for Learning

Students should explore a variety of local plants and animals, and the environments in which they live, to describe how they meet their basic needs for food, water, air, and shelter:

- Beavers live in deep, still bodies of water they create by felling trees and constructing a dam across a river. They also construct their own shelter (i.e., a lodge) in the pond. Beavers eat aquatic plants and the leaves and bark of deciduous trees. Beavers need air to breathe. Their lodge has a hole in the roof for ventilation.
- Puffins live at sea but return to shore in the spring and dig nest burrows which they line with feathers, grass, and twigs. Puffins swim underwater to catch fish for food. They breathe air and drink salt water.
- Pitcher plants live in wet environments. They absorb water through their roots and carbon dioxide through their leaves to make their own food. However, pitcher plants can also digest insects that drown in rainwater collected inside their leaves.

The physical characteristics of living things help them meet their needs in their environment. For example

- the strong front teeth of a beaver enables it to gnaw through trees for food and building materials,
- the beak of a puffin enables it to catch and hold fish, and
- the pitcher shaped leaf of a pitcher plant enables it to collect rainwater and capture insects.

Physical characteristics provide clues to where an animal may live and how it may meet its needs. Students should predict how unfamiliar animals may meet their needs based on their observed physical characteristics. Dinosaurs may provide an engaging initial focus.

Attitude

Encourage students to be open-minded in their explorations.
[GCO 4]

Sample Performance Indicator

Describe how a puffin, or another local living thing that was explored, meets its need for food, water, air, and shelter.

How Living Things Meet Their Needs

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Revisit or read aloud *What's Alive?* to highlight different ways living things meet their needs.
- Read aloud *Animal Snackers* to highlight differences in the foods animals eat.

Connection

Teachers may

- Read aloud *Atlantic Puffin: Little Brother of the North*, *Dandelions: Stars in the Grass*, and *Wonderful Worms*. During reading, record references to food, water, air, and shelter in a chart describing how each living thing meets its needs.
- Read aloud *What Do You Do With a Tail Like This?* pausing at each question for students to predict what animal each part belongs to and how it is used.

Students may

- Brainstorm animals that live in different types of shelters (e.g., burrow/hole, cave, den, hive, nest).
- Discuss differences in how different plants and animals obtain and use air (e.g., black bear, blue whale, dandelion, earthworm, eel grass, maple tree, blue jay).

Consolidation

Teachers may

- Read aloud *Whose Teeth Are These?* and have students predict how each animal's teeth helps it to meet its needs.
- Provide images of dinosaurs and have students make predictions about their needs based on their physical characteristics.
- Provide images of unfamiliar animals (e.g., wolverines, lemmings, osprey, narwhal) and have students observe their physical characteristics. Based on these characteristics, have students predict where they may live and how they may meet their needs. Question students to explain their thinking.

Students may

- View nature videos of specific animals. After viewing, describe how the animal meets its needs for food, water, air, and shelter.
- Represent a fictitious living thing and describe how it meets its needs in its environment.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Needs and Characteristics of Living Things*
 - pp. 53-58
- Science Card 7

Supplementary

Science Library

- *Animal Snackers*
- *Are Trees Alive?*
- *Dandelions: Stars in the Grass*
- *Leaves! Leaves! Leaves!*
- *What Do You Do With a Tail Like This?*
- *What's Alive?*
- *What If You Had Animal Teeth!?*
- *Wonderful Worms*

Cultural Connections Resource Acquisition Program (RAP)

- *Atlantic Puffin: Little Brother of the North*
- *Over by the Harbour*

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/living.html

- Living Things resources

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *Whose Teeth Are These?*

How Living Things Move To Meet Their Needs

Outcomes

Students will be expected to

38.0 describe the different ways that humans and other living things move to meet their needs
[GCO 1/3]

Focus for Learning

Outcome 38.0 may be addressed separately or in conjunction with outcomes on the preceding spread (i.e., 37.0 and 10.0).

Students should explore and describe how humans, other animals, and plants, move to meet their needs, and predict the movement of living things based on their observable physical characteristics.

Humans and other animals move in different ways to find or capture food, escape from danger, and build shelters:

- Humans walk on two legs, climb, crawl, jump, run, and swim. They use their opposable thumb to grasp items and use tools.
- Black bears walk on four legs and can climb trees, swim, and run.
- River otters walk, run, slide, swim. They use their tail to propel themselves forward in water, and have webbed feet.
- Mallard ducks fly, walk on land, paddle across ponds, and upend themselves to feed underwater. They usually migrate.
- Earthworms eat their way through the soil alternating movements; stretching out to become long and thin, then squeezing in to become short and fat.
- Grasshoppers walk using three pairs of legs and jump using powerful hind legs. Adult grasshoppers can fly.
- Sea stars have hundreds of tube feet on the underside of their arms. The tube feet attach to surfaces by suction; grabbing and releasing in order to move and catch prey.

Albeit very slowly, plants move in response to external stimuli. If a plant is placed such that it is only getting sunlight from one direction, for example, it will grow toward the light, as cells on the unlit side lengthen causing the plant to bend. Some plants (e.g., mimosa, Venus fly trap) exhibit faster movement in response to touch.

In addition to where an animal may live and how it may meet its needs, observable physical characteristics provide clues as to how a living thing moves. Students should predict how unfamiliar animals may move based on their characteristics. Having observed living things with wings flying, for example, students should predict that an unfamiliar bird with wings can also fly.

Attitude

Encourage students to be open-minded in their explorations.
[GCO 4]

Sample Performance Indicator

Describe how an earthworm, or another local living thing that was explored, moves to meet its needs.

How Living Things Move To Meet Their Needs

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Lead students in a game of “Simon Says” focused on ways humans move.
- Have students role-play various animal movements.

Connection

Teacher may

- Read aloud *Hop! Spring! Leap!: Animals That Jump* and have students brainstorm a list of other animals that jump.
- Facilitate a nature walk or field trip to directly observe living things and the different ways they move.

Students may

- Explore, through direct classroom observations, ways different small animals move (e.g., aquarium fish, carpenters, earthworms, grasshoppers, meal worms, sea stars, slugs, snails).
- Explore, through direct classroom observations, plant movements
 - place seedlings near a bright window. After the seedling has noticeably bent toward the window, turn the seedling 180° and observe again.
 - tip a seedling container on its side and observe

Consolidation

Teachers may

- Show students images of unfamiliar living things. Have students predict how they will move, based on their observable physical characteristics. Viewing video excerpts of the living thing can confirm or refute their predictions.
- Read aloud *Who Has These Feet?*. Have students predict the animal to which the feet belong and discuss how these feet help it to meet its needs.

Students may

- Play animal movement charades. After each animal is guessed, discuss how it’s movement helps it meet its needs.

Extension

Students may

- Explore how the orientation of whale and fish tails affect how these animals move and describe how it helps them meet their unique needs.

Resources and Notes

Authorized

Let’s Do Science (TR)

- *Needs and Characteristics of Living Things*
 - pp. 53-58

Supplementary

Science Library

- *Fish is Fish*
- *Hop! Spring! Leap!: Animals That Jump*
- *What’s Alive?*
- *What If You Had Animal Feet!?*
- *Who Has These Feet?*
- *Wonderful Worms*

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/living.html

- Classroom gardening (program)

Other curriculum resources

- *Nelson Literacy Cross-Curricular Kit: How Do Things Move* (ELA Kindergarten)

Using And Caring For Living Things

Outcomes

Students will be expected to

39.0 describe ways humans use their knowledge of living things in meeting their own needs and the needs of plants and animals [GCO 1/3]

Focus for Learning

Students should identify various ways we use plants and animals to meet our needs. We use, for example

- animals and plants for food;
- animals for fur, leather, and wool;
- plants for clothing (e.g., cotton); and
- trees (i.e., wood) for constructing shelters.

For centuries, local indigenous people have relied on the terrestrial, aquatic, and marine plants and animals of Newfoundland and Labrador to meet their needs. Similarly, early settlers fished, hunted, gathered, and subsistence farmed (i.e., raised animals and grew plants for family use) to meet their needs. Some people still do these things to help meet their needs (e.g., salmon fishing, moose hunting, picking berries, raising hens, growing vegetables). Most of the living things we use today, however, come from large-scale farms.

Living things farmed in Newfoundland and Labrador include

- crops such as vegetables (e.g., turnip, potato, carrot, cabbage, beet, onions), berries (e.g., strawberries, cranberries, blueberries), and trees;
- livestock (e.g., cattle, sheep, pigs, goats);
- poultry (e.g., chicken, turkey, eggs);
- fish and seafood (e.g., mussels, salmon, steel head trout); and
- fur bearing animals (e.g., fox, mink).

To be successful, farmers must meet the basic needs of the living things they farm.

Students should describe how we use our knowledge of living things to care for the plants and animals we use.

Attitude

Encourage students to recognize the role and contribution of science in their understanding of the world. [GCO 4]

Sample Performance Indicator

Identify different ways we use plants and animals to meet our needs for food, clothing, and shelter.

Develop a set of rules to care for a class aquarium, house plant, or wormery.

Using And Caring For Living Things

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Create a curiosity centre of items made from natural materials for students to explore. Ask them to infer the source of the items and suggest or bring in new items to add to the centre.
- Display images of foods and objects made from natural materials and have students identify the source (i.e., plant or animal used to make it).
- Facilitate a field trip to a local grocery store to explore the variety of plants and animals used for food.
- Provide checklists of local plants and animals used for food and have students indicate the ones they have eaten. Include wild, farmed, terrestrial, and aquatic plants and animals.

Connection

Teachers may

- Facilitate a field trip to a local farm. Have students identify the living things being farmed, their needs, and how they are being cared for.
- Invite community elders, hunters, farmers, and fishers to class. Have students ask:
 - What living things do you farm, fish, gather, or hunt?
 - What do you use these living things for?
 - What knowledge about the living do you use to farm, fish, hunt, or gather it?
- Discuss how local indigenous people traditionally used living things to meet their needs.

Consolidation

Teachers may

- Read aloud *Caring For Speedy* as an example of a “how to” guide for caring for a classroom pet. Have students collaborate in small groups to create a “how to” guide for caring for aquarium fish or another classroom pet.

Students may

- Collaborate in small groups to describe ways farmers meet the needs of the living things in their care (e.g., crop, livestock, poultry, fish and seafood, fur) and what knowledge of living things is required to care for them.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Needs and Characteristics of Living Things*
 - pp. 59-64
- Science Cards 8 & 9
- Teachers Website
 - IWB Activity 8

Supplementary

Science Library

- *Are Trees Alive?*
- *Seeds! Seeds! Seeds!*

Cultural Connections Resource Acquisition Program (RAP)

- *Jack Likes Salt Fish and Scrunchions, Do You?*
- *Pop's Rubber Boots: The busy life of a Newfoundland and Labrador Fisherman*

Suggested

Resource Links: www.k12pl.nl.ca/curr/k-6/sci/sci-1/links/living.html

- Classroom gardening (programs)

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *School Days (Caring For Speedy pp. 14-16)*
- *Nelson Literacy Cross-Curricular Kit: Living Things in the Environment* (ELA Kindergarten)

Maintaining A Healthy Environment

Outcomes

Students will be expected to

40.0 recognize that living things depend on their environment, and identify personal actions that contribute to a healthy environment
[GCO 1/3]

Focus for Learning

Students should recognize that living things depend on their environment to fulfill their needs. If the environment does not meet their needs, they will have to move to a new area in order to survive. Sea birds, for example, may abandon traditional nesting sites if the environment does not provide enough food for survival.

Students should appreciate that it is important to maintain a healthy environment for ourselves and other living things. Human actions can negatively affect the environment (e.g., pollution of soil, air and water), but humans can also help the environment.

Students should identify simple actions they can take to help maintain a healthy environment:

- reduce, reuse, and recycle
- conserve energy and water
- compost kitchen and yard waste
- walk or cycle to school instead of being driven
- be careful about what gets poured down the drain at home
- clean up school grounds, community areas, and beaches
- plant native trees and wildflowers
- reduce noise and light pollution
- show care and concern for all living things

Attitude

Encourage students to be sensitive to the needs of other people, other living things, and the local environment. [GCO 4]

Sample Performance Indicator

Communicate three actions you can take to help maintain a healthy environment for living things.

Maintaining A Healthy Environment

Sample Teaching and Assessment Strategies

Activation

Teachers may

- Read aloud suggested titles from the science library to ensure students recognize that living things depend on their environment to meet their needs.
- Present media stories about animals found in unexpected places (e.g., black bears, caribou, coyotes, moose, polar bears or wolves wandering into urban and suburban areas). Ask students to discuss why they think the animal left its home and whether the new environment can meet its needs.

Connection

Teachers may

- Read aloud *The Very Hungry Bear* and discuss why the polar bear may be looking for a new home and what kind of home he needs.
- Read aloud *The Bug Hotel* and discuss the different ways the backyard provides a habitat for different insects.
- Invite representatives of local environmental and conservation groups to present ways we can help our local environment.

Students may

- Discuss reasons why animals might leave their home and why it is a problem when animals lose their homes.

Consolidation

Teachers may

- Facilitate a walk in and around the school to look for ways harm is being done to the environment. Have students collaboratively create a “to do” list for a more environmentally friendly classroom.
- Read aloud *How to be an Eco Class* and discuss the list of tips for reducing, reusing, and recycling in the classroom.

Students may

- Communicate the needs of a specific animal and what might happen if either of these needs were not met by the environment.
- Create posters or digital collages to show actions they and their family take to help maintain a healthy environment.

Resources and Notes

Authorized

Let's Do Science (TR)

- *Needs and Characteristics of Living Things*
 - pp. 65-70
- Science Card 10
- Teachers Website
 - IWB Activity 9
- Read Aloud
 - *The Very Hungry Bear*

Supplementary

Science Library

- *Fish is Fish*
- *Wonderful Worms*
- *Dandelions: Starts in the Grass*
- *Fish is Fish*
- *Groundhog Weather School*
- *Leaves! Leaves! Leaves!*
- *What's Alive?*
- *Wonderful Worms*

Suggested

Other curriculum resources

- *Literacy Place for the Early Years Grade 1* (ELA 1)
 - *The Bug Hotel*
 - *How to be an Eco Class*
- Discovery Links 1 (Social Studies 1)
 - *We Look After Our World*

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