Grade 6 Learning Experiences: Biodiversity and its impact on our environment

Experience 2: Classification of Living Things

Long Range Plan: Grade 6 Model 1

Students will develop their knowledge of biodiversity and how to classify biodiversity using a classification system. In addition, they will engage in various scientific processes such as designing and building a bee box, coding an animal classification game, and investigating the impact of the lack of tree cover in cities.

Overview of learning experiences	Students will be engaged in active meaning-making and knowledge construction as they develop an understanding of biodiversity. They will learn about the contributions of Black and Indigenous scientists and how the loss of biodiversity often impacts marginalized communities disproportionately. The learning experiences outlined here can be found in: Long Range Plan: Grade 6 Model 1
Prior Knowledge / Prior Skill Set(s)	**Background Knowledge and Concepts (Teacher)** - Aware of culturally relevant responsive pedagogy (CRRP) - Understanding of the Learning For All Document - Understanding of the Supporting English Language Learners document - Understanding of how to engage in the Engineering Design and Research Process - Understanding of safety procedures - Understanding of block-based coding concepts and platforms like Scratch **Background Knowledge and Skills (Students)** - Aware of collaboration norms - Aware of various collaboration strategies - Use of technology and suites (e.g. Google Workspace) - Aware of using the internet for research purposes - Aware of safety procedures

	- Knowledge of habitats and interactions between species - Prior and knowledge of coding concepts (e.g. loops, conditional statements) - Prior knowledge and experience using basic block-coding and the use of Scratch
Strand A - STEM Investigation and Communication Skills	**STEM Investigation and Communication Skills:**  **A1.1** use a scientific research process and associated skills to conduct investigations  **A1.3** use an engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems  **A1.4** follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials  **A1.5** communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes  **A2.1** write and execute code in investigations and when modelling concepts, with a focus on producing different types of output for a variety of purposes
Overview / Big Ideas/Fundamental Concepts	**Overview** Students will learn about biodiversity through a series of activities that help them see the organization of life on earth. They will use observational and communication skills to identify and classify different living things. Using coding skills, they will create an animal classification game and learn about the importance of bees by designing and building their own bee box. Students will also think critically about how the loss of biodiversity can affect people differently based on their identities. **Big Ideas** Different natural systems need different species in order to reach biodiversity Biodiversity provides benefits to all living things.

	Not everyone experiences the loss of biodiversity equally. **Systems and Interactions:** A system is a collection of living and/or non-living things and processes that interact to perform some function. **Sustainability and Stewardship:** Sustainability is the concept of meeting the needs of the present without compromising the ability of future generations to meet their needs. Stewardship involves understanding that we need to use and care for the natural environment in a responsible way and making the effort to pass it on to future generations no less than what we have access to ourselves. **Structure and Function:** This concept focuses on the interrelationship between the function or use of a natural or human-made object and the form that the object takes.
Learning Goals / Success Criteria	**Learning Goal** We are learning about biodiversity and why it is important to all life on earth. **Success Criteria** ● I can describe the distinguishing characteristics of organisms ● I can identify, define, and explain all the characteristics of biodiversity (e.g. species, communities, habitat) ● I can use characteristics to classify organisms using a classification system ● I can code a program that can classify animals **Ministry of Education Key Points:** **STEM Skills and Connections:** Perspectives and approaches that provide opportunities for students to investigate and apply concepts and skills from all areas of learning. **Research and Experimentation Processes**: Provides students with the scientific literacy skills needed to approach scientific questions that are becoming a part of everyday life. **Engineering Design Process**: Provides students with support to plan and build solutions to problems or address needs that connect to the curriculum and the world around them.

	Hands-on, Experiential Learning: Includes hands-on, experiential learning opportunities to support classroom activities that encourage curiosity. **Coding**: Allows students to explore a wide variety of science and technology concepts and contexts through coding, while also learning valuable skills related to the automation and control of systems. **Skilled Trades**: Students consider the practical application of skills and concepts within the skilled trades and related occupations. **Contributions to Science and Technology**: Showcases the important contributions made to science and technology by people with diverse lived experiences. **Climate Change**: Students will develop the skills and knowledge needed to understand the causes and potential solutions and mitigation strategies related to climate change and other environmental issues, and how they can make the most environmentally responsible decisions possible, given the choices they have.
Learning Experiences **A1.1**	**Classification of Living Things** **Part 1: Creating a Classification System** Provide students with animal and plant cards containing species from ecosystems around Ontario. Define the word classification with students. Explain to students that classification is what scientists use to classify living things. Engage students in the following discussion questions using the stand-up-hands up-pair-up strategy (see Appendix A: Instructional Strategies). **Discussion Questions:** A. How do scientists determine the names of so many different living things? B. Why might it be important to have a system for identifying and naming organisms? C. What traits do you think would be useful for classifying organisms? D. What might make it difficult to classify an organism? E. How can we classify the people in our classroom? Please follow the instructions below for the next activity part (Adapted from

A1.5	OTTFEO Grade 6 Biodiversity Lesson). You can project cards of animals and plants on the screen or share the document with the students so they can see the pictures (see Appendix B: Classification Cards). Students can also use the internet to learn more about each organism listed on the cards. 1. Assign students random partners (see Appendix A: Instructional Strategies) to divide things into broader taxonomic categories such as plants, animals, bacteria, and fungi. 2. Then, tell the students they are to divide those categories into smaller categories using characteristics they can observe. For example, they could have three lists under plant kingdom: plants with flowers or fruit, plants with cones, and plants with spores. Students will continue to do this until they cannot think of any other divisions. 3. They can draw and list their classification chart on a large chart paper, or they can use Google Draw or similar software. They should be ready to justify their classification system. 4. Please remind students that as they work through the classification activity, they need to be sharing their thinking for their reasoning and take turns. 5. After students have completed their classification chart, they will meet with another group and share their chart. **Assessment for Learning Opportunity: (B 2.1)** Observe and listen to students to check for understanding of classification systems using a checklist (see Appendix A: Instructional Strategies). Re-teach and review concepts if you notice students do not understand the activity and classification systems.
A.2	**Part 2 (Coding a Classification Game)** For this activity, students will create a program that can guess what kind of organism something is based on the input provided by the user. **Prior Knowledge:** Before creating this program, students should understand the coding expectation (Coding C3.1- understanding of loops and conditional statements (if-then, if-then-else)). They also need to know how to collect user input and store variables. If you would like to review

	these concepts before beginning the task with your students, the introductory lessons can be found here on the Scratch. **No Tech Option:** 1. Tell students they will be creating a code for the program without a computer. (check out this YouTube video called 'Coding Without Computers for an explanation for teachers). Their program will guess the type of organism based on the classification details provided by the user. Click to see an example from Science North of a sample code without using a computer. 2. The students' code must use if-then and if-then-else conditional statements and loops. 3. The students can have as many different characteristics in their code as they want. 4. Give students chart paper to record their code. Students are to be explaining their thinking out loud when creating their code. 5. Students can then share their code with another group and engage in error-proofing. 6. Here is another version of pseudo coding on the Science North Site for a more detailed version of this activity. **Tech Option:** 1. Tell students they will be creating a program that will guess the type of organism something is based on the classification details provided by the user. Please show this Animal Classification sample program to the students from the Scratch website. **Opportunity for Differentiation:** For students who do not have much experience coding or need additional support, you can let them know the required coding blocks needed for the program. This can be written on the board or shared on a screen. Another option is to provide the Animal Classification sample program with the blocks rearranged for the students. 1. The students' code must make you use if-then and if-then-else conditional statements and loops. 2. Students can have as many different characteristics in their program as they would like. 3. Once students have completed their program, they can share or get

	help from another group for troubleshooting. **Assessment For Learning Opportunity (A2.1, B2.1, and C3.1)**: Observe and listen to students as they create their code. Check for an understanding of classification systems and their ability to write and execute code. Record your observations in a checklist (see Appendix C: Experience 2 Checklist). You can review certain concepts if you see students are having any difficulties.
	Consolidation Review with students other examples of classification systems scientists use and have students share as a whole class how they created their classification system. Check out this Let's Talk Science The Classification of Life: From Linnaeus to DNA Barcoding resource. **Assessment for/as Learning (B2.1)**: In their science journal, students can choose an ecosystem and then classify the plants and animals in this ecosystem using a classification system they created using observable characteristics. Students can also complete a checklist to show how much they understood today's learning goal (see Appendix D: Biodiversity Student Self-Assessment Checklist).
Science and Technology Expectations (Beyond Strand A)	**Strand B: Life Systems** **Overall Expectations** B1 assess the importance of biodiversity, and describe ways of protecting biodiversity B1.1 assess the benefits of biodiversity and the consequences of the diminishing of biodiversity B1.2 analyse a local issue related to biodiversity while considering different perspectives; plan a course of action in response to the issue; and act on their plan **Overall Expectations** B2. demonstrate an understanding of biodiversity, its contributions to the stability of natural systems, and its benefits to humans

	B2.1 describe the distinguishing characteristics of different groups of organisms, and use these characteristics to further classify these organisms using a classification system B2.2 demonstrate an understanding of biodiversity as the diversity of life on Earth, including the diversity of organisms within species, among species in a community, and among communities and the habitats that support them B2.4 describe ways in which biodiversity within and among communities is essential for maintaining the resilience of these communities B2.5 describe interrelationships within species, between species, and between species and their natural environment, and explain how these interrelationships sustain biodiversity
Science and Technology Vocabulary	Biodiversity Species Community Habitat Ecosystem Interrelationship Interaction Loops Conditional Statements Engineering Process Research Process Coastal Zone Intertidal Zone
Equipment and Materials	Laptops w/ internet access Household items (cardboard, glue, popsicle sticks, rubber bands, straws, scissors) Pool noodles iPad w/ Google Lens Large play area Pylons LCD Projector Scratch
Timeline and Preparation	**Minds On** 20 mins

	Action Part 1 40 mins Part 2 60 mins **Consolidation** 15 mins
Safety Considerations	Review with students the appropriate use of technology. Review safety procedures for using a glue gun and scissors for the Bee Box activity. Students should be wearing goggles when creating the Bee Box Students should be under adult supervision when hanging and observing their Bee Box Review with students the appropriate behaviour when going for a neighbourhood walk. Review with students appropriate play guidelines when students are playing the Foxes, Rabbits and Leaves Refer to these safety resources: ● Safety in Elementary Science and Technology (STAO) ● Safe Activity Foundations in Education Document (SAFEdoc) Science and Technology, Grades 1-8 (OCTE) ● Ontario Curriculum Program Planning – Health and Safety
Opportunities For Assessment	**Part 1** **Assessment for/as Learning (B2.1)**: In their science journal, students can choose an ecosystem and then classify the plants and animals in this ecosystem using a classification system they created using observable characteristics. Students can also complete a checklist to show how much they understood today's learning goal (see Appendix D: Biodiversity Student Self-Assessment Checklist). **Part 2** **Assessment For Learning Opportunity (A2.1, B2.1, and C3.1)**: Observe and listen to students as they create their code. Check for an

	understanding of classification systems and their ability to write and execute code. Record your observations in a checklist (see Appendix C: Experience 2 Checklist). You can review certain concepts if you see students are having any difficulties. According to the Ministry of Education, Growing Success Document (2010) assessment is about improving student learning! **Assessment FOR Learning:** Occurs frequently and in an ongoing manner during instruction, while students are still gaining knowledge and practicing skills and is used by teachers to monitor students' progress towards achieving the overall and specific expectations, so that teachers can provide timely and specific descriptive feedback to students, scaffold next steps, and differentiate instruction and assessment in response to student needs. **Assessment AS Learning:** Occurs frequently and in an ongoing manner during instruction, with support, modelling, and guidance from the teacher and is used by students to provide feedback to other students (peer assessment), monitor their own progress towards achieving their learning goals (self-assessment), make adjustments in their learning approaches, reflect on their learning, and set individual goals for learning. **Assessment OF Learning:** Occurs at or near the end of a period of learning, and may be used to inform further instruction and is used by the teacher to summarize learning at a given point in time. This summary is used to make judgments about the quality of student learning on the basis of established criteria, to assign a value to represent that quality, and to support the communication of information about achievement to students themselves, parents, teachers, and others **NOTE:** The assessment in the learning experiences are intentionally assessment for learning and assessment as learning. The assessment modality is intentionally conversations and observations. This is to help move away from only product based assessment. Throughout the learning experiences students will have many opportunities to demonstrate their understanding through doing, talking and engaging in self-assessment. By collecting assessment for/as learning data teachers can be responsive and provide meaningful feedback. Teachers have been provided with assessment tools to collect evidence of student learning. Assessment opportunities are embedded throughout the learning experiences.

Instructional Strategies and Adaptability	• Collaboration and communication are important skills for scientists and that is reflected throughout the learning experiences found in this resource • Teachers should aim to have a learning environment that is safe, respectful, and inclusive (community building should be ongoing). Please see the ETFO Inclusive Classrooms website • Students should have an understanding of collaboration norms • There are many collaboration strategies that are employed in the ETFO resource and teachers are encouraged to review them before starting this lesson • Teachers should adapt the lessons based on the needs of the students in their class (Please refer to the Learning for All document) • Movement is important to learning. Students should be given opportunities to get up and move through games and active learning strategies • Teachers should value the lived experiences and stories of their students in the materials they use in the classroom through the use Culturally Relevant and Responsive Pedagogy (CRRP)
Additional Supporting Resources	Ontario Science Centre Curriculum Resources Science North Grade 6 Resources Let's Talk Science Educational Resources
Cross-Curricular Opportunities	**Language** - Students can use various reading strategies to help them understand the articles that are provided in this resource. For example, students can use monitoring comprehension strategies to decode information. (Reading Overall 1) **Writing**- Students can write a letter using writing traits and conventions urging their local MPP to make a change. (Writing Overall & 2) **Math** - Students will be applying their knowledge of coding skills to write and execute code. (Coding Overall 1 & 2)
Future Opportunities / Next Steps	Students can code this Invasive Species Game from Science North if they finish the classification activity early.

	Students can explore STEM careers from Let's Talk Science.

Appendix A: Instructional Strategies

Instructional Strategies

Think-Walk-Random Pair-Share: Whenever a guiding question is asked all students need at least 20-30 seconds to think of the answer. This wait time helps all students process the response. Then using a visibly random pairing system, pair up the students. Consider randomizing the groups instead of asking students to pick their partners. Research from Peter Lijedenhal, *Building Thinking Classrooms* (2015) shows that randomizing groups/pairs leads to better student cohesion and improved cooperation over time. Instead of having students share with someone at their desk, have them physically get up and move to find their random partner. Movement helps the brain function better. Students should be sharing their ideas while standing up.

Two On A Crayon - Have students buddy up using a random pairing and pass out one crayon and one piece of paper for each pair. Tell everyone they both have to hold the crayon the entire time and color until the song is over and that there is no talking about what to draw. Once everyone is situated, turn on a song and begin coloring. When the song ends, get the students' attention, look at the art and talk about how there are leaders and followers and it's okay to be either. This activity is a chance to talk about fighting for dominance, being too passive, and ideally sharing power. It teaches and helps the students understand that we all need to work together to get the right picture. Sometimes we will be leaders, sometimes we should follow, and that is okay either way. (https://inside.ewu.edu/managementtoolbox/2-on-a-crayon-2/)

One Stray One Stay - One of the group members stays (expert) and explains what they have learned during the activity to others. The other pair joins another pair to see what they have learned. Halfway through the activity, the students switch roles. The student visiting the expert should be actively listening. Here is another version of this (English/French).

Gallery Walk - Gives students an opportunity to walk around the classroom and view what others have created.

Rally Coach - With Rally Coach, students fulfill two meaningful roles. Firstly, they are at no point in the learning process able to retreat from a situation. Whether they are the writer, speaker, or coach, that student is considered an essential member of the partner pair or small group. If that student is not writing down a response, he or she is expected to be "coaching" a peer; this coaching might involve searching for textual evidence from a text, revising an error, or simply offering positive encouragement. Palmer (1997) notes that the teacher in a classroom holds a pivotal position in fostering a "safe space and trusting relationship" (p. 20) with students and among students to promote these positive interactions. While this mutual trust may take time and effort to build, the potential academic yield is tremendous. I have found from personal experience in the classroom that my students not only enjoy Rally Coach, they prefer it to

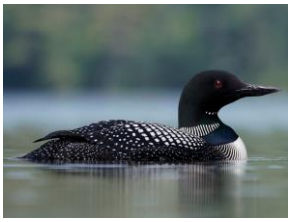
completing worksheets or writing assignments alone. It enables them to socialize with a partner, promoting their social skills, while also seeking help and a second set of eyes for review and support when needed. (Excerpt from https://ryanarciero.weebly.com/cooperative-teaching-strategies-blog/rally-coach-kagan-strategy)

Rally Robin- Partner A talks about what they have learned and they write it down. They pass it to Partner B, who checks over their work, provides them a compliment, and then adds to the question.

Stand up-hands up- pair up: Students stand up, put their hand up, and quickly find a partner with whom to share or discuss by giving them a high five. This structure is perfect for class building, processing and reviewing information, energizing the class, forming random pairs or teams, and lesson starts or wraps. (Review consent for this activity with students and follow covid protocols)

Appendix B: Classification Cards

White-Tailed Deer 	Black Bear 	Duckweeds 	Waterlily 
Eastern Red Cedar 	Black Rasberry 	Crabapples 	Cougar 
Moose 	Little Brown Bat 	White Oak 	Wolverine 

Hawthorn 	Trumpet Creeper 	Sunflower 	Muskrat 
Canadian Geese 	Bluejay 	Cardinal 	Loon 

Appendix C: Experience 2 Checklist

Experience 2 Checklist

Teachers are strongly encouraged to read this page on Assessment for Learning page and this page on Assessment and Evaluation before using the checklist below.

Assessment for Learning (Observations & Conversations)
The purpose of this checklist is to collect evidence of student learning over time. The assessment data can be used to provide feedback and be responsive to student needs. This data can also be used for the assessment of learning. During the activities, teachers can observe and converse with students and their ability to meet specific expectations. Teachers can include multiple assessment points for each column since there will be multiple opportunities throughout the activity for the students to show their understanding of each expectation. Teachers can use the assessment coding provided below or your own. A sample is provided.

Learning Experience: Biodiversity

Learning Goal (Overall Ex. B1): We are learning to assess the importance of biodiversity, and describe ways of protecting biodiversity

Learning Goal (Overall Ex. B2): We are learning to demonstrate an understanding of biodiversity, its contributions to the stability of natural systems, and its benefits to humans.

Specific Expectations Addressed:

B1.1 : assess the benefits of biodiversity and the consequences of the diminishing of biodiversity (Activity C)

B2.1 : describe the distinguishing characteristics of different groups of organisms, and use these characteristics to further classify these organisms using a classification system (Activity B)

B2.2 : demonstrate an understanding of biodiversity as the diversity of life on Earth, including the diversity of organisms within species, among species in a community, and among communities and the habitats that support them (Activity A)

A2.1 write and execute code in investigations and when modelling concepts, with a focus on obtaining input in different ways for a variety of purposes

Assessment Coding: N- Not Yet A - Almost G - Got It

Student Name	B2.2	B2.1	B1.1	A2.1	Anecdotal Notes
Matthews, Auston	G, G, A, N				Auston showed a very good understanding of being able to differentiate between species, habitats and communities. He showed this understanding by providing concrete examples of each.
Student Name	**B2.2**	**B2.1**	**B1.1**	**A2.1**	**Anecdotal Notes**

Appendix D: Biodiversity Student Self-Assessment Checklist

Biodiversity Student Self-Assessment Checklist

N- Not Yet **GT**- Getting There **A**-Almost **G**- Got It!

Success Criteria	**N**	**GT**	**A**	**G**
I can describe the benefits of biodiversity.				
I can explain the consequences of diminishing biodiversity.				
I can demonstrate an understanding of biodiversity.				
I can explain diversity within species, among communities and habitats that support them.				
I can use the characteristics of living things to create a classification system.				
I can use the engineering process to design and build a bee box.				
I can use the scientific research process to see how the loss of trees affects communities.				
I can write and execute code for a program that classifies animals based on user input.				