# Grade 4 Learning Experiences: Pollinators and Creating Sustainable Spaces

## Experience 3: Redesigning a Local Garden

Long Range Plan Model 2

Students will develop their knowledge of pollinators, specifically bees, and their role in our ecosystem. Through interactive activities, students will investigate the impacts humans have on pollinators and brainstorm realistic solutions to create sustainable spaces for such species.

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| Overview of learning experiences – why these activities | In these activities, students will explore the life of pollinators and how to create a sustainable ecosystem in which they can thrive. The learning experiences will allow students to engage in research to learn the importance of pollinators and complete hands-on action-based solutions to ensure we reverse the negative factors that are hindering their survival.<br><br>LRP Grade 4 Model B - Page 3 and 4 |
| Prior Knowledge / Prior Skill Set(s) | Background Knowledge and Concepts (Teacher) -<br><br>● Aware of health & safety procedures<br>● Aware of Global Competencies & Transferable Skills<br>● Aware of Culturally Relevant & Responsive Pedagogy<br>● Understand how to implement the UDL framework<br>● Understand how to engage in an Engineering Design Process<br>● Aware of strategies to help new language learners ELL/MLLs<br>● Understand basic block-based coding concepts, platforms, functions and algorithms for software such as Scratch and Micro:bit Make Code<br><br>Background Knowledge and Skills (Students) |

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| | • Understand ways in which plants are beneficial to society and the environment (Gr 3)<br>• Understand ways in which human activities have an impact on plants and plant habitats (Gr 3)<br>• Understanding of the composition of soils, of different types of soils, and of processes and practices that can affect the health of soil (Gr 3)<br>  • All about Bees<br>  • Simplified Text for researching about Bees<br>  • Video about Climate Change Action - World's Largest Lesson<br>  • Block-based coding concepts, platforms, functions and algorithms for software such as Scratch and Micro:bit Make Code and Do Your :bit |
| Strand A - STEM Investigation and Communication Skills | **The following expectations from the A strand will be covered in the activities.**<br><br>  **A.1.2 Scientific Experimentation:** use a scientific experimentation process and associated skills to conduct investigations (bee pollination process).<br><br>  **A.1.3.Engineering Design Process:** use an engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems **(**design/build a pollinator garden to attract pollinators)<br><br>  **A.1.5. Communication:** communicate findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes (creating a poster, justification of the pollinator garden design)<br><br>  **A.2 Coding and Emerging Technologies**: use coding in investigations and to model concepts, and assess the impact of coding and of emerging technologies on everyday life and in STEM-related fields (Bee Pollination process, My Garden App)<br><br>  **A3 Applications, Connections and Contributions:** demonstrate an understanding of the practical applications of |

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| | science and technology, and of contributions to science and technology from people with diverse lived experiences (Bee Keepers and their importance, creating a poster to bring awareness) |
| Overview / Big Ideas/Fundamental Concepts | **Overview**: In these learning experiences, students will first research the role of pollinators such as bees and factors affecting their habitats. They will then participate in a hands-on activity to learn about the pollination process and how this affects humans' access to food. For the Career Spotlight, the class can connect with a local beekeeper or watch a video to learn more about the importance of their role in supporting bees and the pollination process. To take action, students will identify factors affecting pollination in a local community garden and will redesign it to maximize its effect. Using various media tools and options, students will communicate the critical need for pollinators in our life, and how we can reduce negative human activity toward them.<br><br>**Big Ideas:**<br>The activity of both humans and pollinators interact together and affect life on earth.<br>The engineering process can help us find solutions to problems resulting from animals and human activity.<br><br>**Systems and Interactions**<br>A system is a collection of living and/or non-living things and processes that interact to perform some function. Through these activities, students will learn the interaction between humans and pollinators and the system by which they both rely on one another.<br><br>**Sustainability and Stewardship**<br>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 on to future generations no less than what we have access to ourselves. Students will redesign a garden to encourage the sustainability of pollination along with creating posters to encourage people to change their attitudes and actions towards pollinators and their importance.<br><br>**Change and Continuity** |

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| | Continuity represents consistency and connectedness within and among systems over time. Students will build an action and communicate it through their posters which will encourage the public to change the way they interact with our environment. |
| Learning Goals / Success Criteria | **Learning Goals**<br>We are studying the role of local pollinators and the human impacts on their habitats/ecosystems.<br><br>We are exploring the process of pollination and the important role of beekeepers.<br><br>We are investigating the long term impacts of human activity on pollinators and identifying ways to reduce this impact through sustainable solutions that involve promoting stewardship.<br><br>**Success Criteria**<br>The following success criteria are examples of what can be co-created with the class.<br><br>**Experience 3: Redesigning a Local Garden**<br><br>I will apply my knowledge of the issues that exist for pollinators to redesign a local garden.<br>I will create a model of the design that shows how pollination will increase.<br>I will explain how my garden meets the needs of pollinators and other living species that live in this habitat.<br>I will identify steps that need to be taken to the current local garden to transform it.<br><br>**Ministry of Education Key Points**<br><br>● **STEM Skills and Connections**: Perspectives and approaches that provide opportunities for students to investigate and apply concepts and skills from all areas of learning.<br><br>● **Research and Experimentation Processes**: Provides students with the scientific literacy skills needed to approach scientific questions that are becoming a part of everyday life.<br><br>● **Hands-on, Experiential Learning**: Includes hands-on, |

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| | experiential learning opportunities to support classroom activities that encourage curiosity<br><br>● **Contributions to Science and Technology**: Showcases the important contributions made to science and technology by people with diverse lived experiences. Students also explore real-world issues by connecting scientific and technological knowledge systems and perspectives from various cultures, including connecting Indigenous sciences and technologies and Western science and technology.<br><br>● **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 Experience(s)<br><br>  <br>**A1.2, A1.3, A1.5, A3.** | **Experience 3: Redesigning a Local Garden (Approx 5 x 40 min)**<br><br>Show students the following 2 videos with a focus on the UN Goals for Sustainability:<br>World's Largest Lesson Part 3 - Global Goals.<br>World's Largest Lesson - Call to Climate Learning<br><br>(optional: Changemakers in action (French)<br><br>Students will design or redesign an existing community garden to increase the population of pollinators and the pollination process. Before the building process, students can explore the current trend of pollination and plants in their local garden. To do this, students can:<br><br>**Option 1:** Use the Garden App activity by Actua to record current plants in the community garden and rate how good they are for pollination.<br><br>**Option 2:** Use the iNaturalist.ca website to identify native plants around the school community. This website can also be used to learn about other native plants which can be grown in the regions. |

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| | **Option 3:** Track the activity of pollinators in a local community garden that students will redesign. Use the instructions from the micorbit.org Animal Tracker (French) activity.<br><br>Here is a video and information on how to get started with the Microbit (microbit.org/get-started).<br><br>**Option 4:** Go outside and observe a local garden space for 30 minutes or so. Tally the number of pollinators that go to this garden space and record or take a picture of the plants for further research.<br><br>Once students have identified some of the problems of the local community garden, they will work through the design process to create a garden that will improve pollination. They can create a prototype model or depending on the season, students can grow appropriate plants and track the progress of pollinators using the micorbit.org Animal Tracker again.<br><br>**Variation**: Students can work in small groups or pairs to complete this activity.<br><br>**Communication**: Students can share their ideas by creating 3-D models in shoe boxes with craft materials, making a digital prototype using Minecraft for Education, or a drawing of the plan. Students can record their explanation which would include the changes they would make and justify how the improvements will make the space more sustainable for all animals in the habitat. |
| Science and Technology Expectations | **Strand B. Life Systems: Habitats and Communities**<br><br>**B.1 Relating Science and Technology to Our Changing World**<br><br>B1.1 assess positive and negative impacts of human activities on habitats and communities while taking different perspectives into account<br><br>B1.2 analyse the impact of the depletion or extinction of a species on its habitat and community, and describe possible actions to prevent such depletions or extinctions |

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| | **B.2 Exploring and Understanding Concepts**<br><br>B2.6 describe structural adaptations of a variety of plants and animals and how these adaptations allow the organisms to survive in specific habitats<br><br>B2.7 explain why all habitats have limits to the number of plants and animals they can support<br><br>**E. Earth and Space Systems**<br><br>E1.1 analyse ways in which geological processes impact society and the environment |
| Science and Technology Vocabulary | ● habitat<br>● organisms<br>● species<br>● structural adaptations<br>● pollinators<br>● pollination<br>● stewardship<br>● sustainability |
| Equipment and Materials | Option 1<br>● My Garden App<br><br>Option 2<br>● iNaturalist<br><br>Option 3<br>● Microbit<br>● Animal Tracker<br><br>Design Process<br>● Native plant Seeds (For growing a local garden)<br>● Soil (depending on the area of gardening space) (for growing a local garden)<br>● Shoeboxes and art materials (for 3D Model)<br>● Minecraft for Education (creating an online prototype) |

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| Timeline and Preparation | These are approximate times that can be shortened or extended based on student engagement, interest and additional inquiry.<br><br>**Experience 3** Redesign a Local Garden 200 minutes |
| Safety Considerations | Depending on the building/testing projects that are chosen, review safety guidelines before using tools (saws, scissors, glue gun, etc.).<br><br>Refer to these safety resources:<br><br>● Safety in Elementary Science and Technology (STAO)<br>● Safe Activity Foundations in Education Document (SAFEdoc) Science and Technology, Grades 1-8 (OCTE)<br>● Ontario Curriculum Program Planning – Health and Safety<br><br>During testing and use of micro:bits or Sphero, ensure they are used away from liquids, heat and food. Students should wash their hands after exploring natural habitats and community gardens.<br><br>Students may require assistance when using specific building materials (cutting materials, and gardening materials (e.g.shovels)<br><br>Students may need to be reminded of safety considerations (e.g., never point elastic launchers at others).<br><br>Review of netiquette when browsing the internet for research and producing final projects on the computer. |
| Opportunities For Assessment | **Assessment FOR Learning:** Occurs throughout the learning experiences as students are still gaining knowledge and practicing skills. It 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. This can be in the form of conversations with students and observations during hands-on activities. Exit tickets can also be completed as a quick check-in for understanding. Assessment FOR learning will take place through every activity listed in the above learning experiences. |

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| | **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. In the above learning experiences, this can take place when students are researching pollinators, the coding processes with Scratch, Microbit, and Sphero, and creating questions for the interviewee. As a teacher, use the success criteria listed above to create checklists for peer and self-assessment. Ensure criteria that are co-created is student-friendly.<br><br>**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 provides information on the quality of student learning on the basis of established criteria and supports the communication of information about achievement to students themselves, parents, teachers, and others. In the above learning experiences, this will take place during<br><br>The teacher can use a checklist for the engineering design process (see Appendix A: Assessment Checklist and Rubric Suggestions). |
| Instructional Strategies and Adaptability | ● Giving student voice and choice (options for communicating their learning and tools for learning)<br>● Pulling from students' lived experience (e.g., what gardening, farming looks like in other countries or in their homes)<br>● Building vocabulary collaboratively (e.g. use of images and creating an interactive word wall)<br>● Offering visuals to support language learning<br>● Using assistive technology to access texts (E.g., Google Read&Write)<br>● Offering multiple ways of showing understanding<br>● Using the triangulation of data (e.g., observations, conversations, and products). |

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| | • Prompt students as required. Simplify resources and support as required. Enhance learning opportunities with extension activities where required.<br>• Offering different learning environments/spaces around the school (e.g., library, outdoor classroom) |
| Additional Supporting Resources | • Pollination (Indigenous Perspectives Activity 1.4 & 2.2)<br>• Pollinators are Important - Let's Talk Science<br>• World Bee Day - UN<br>• Goal 15 of UN Goals for Sustainability<br>• WWF Endangerment of Butterflies<br>• Pollinator Infographic<br>• Canadian Wildlife Foundation<br>• All about Bees<br>• Simplified Text for researching about Bees<br>• Video about Climate Change Action - World's Largest Lesson<br>• Scratch<br>• Micro:bit Make Code and Do Your :bit<br><br>Other additional resources:<br>Ecoschools Canada |
| Cross-Curricular Opportunities | **Language**<br>Oral and written communication (recording research, listening to information from videos, presentation of the design), Media (Communicating their learning)<br><br>**Math**<br>Elapsed Time: Track time when tracking animals using the Micro:Bit.<br>Coding: Create code onto the Micro:Bit to track animals<br>Data: Reading data from Micro:bit results, data from research of pollinator populations, or native plants in communities<br><br>**Social Studies**<br>Discuss land use and the different landforms and features (e.g., St. Lawrence Lowlands include fertile soil for farming and crops).<br><br>**Physical Education** |

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| | Go for a walk to observe local garden spaces and physically build a pollinator garden.<br><br>**Health**<br>Discussing the importance of healthy eating, where our food comes from, and growing locally |
| Future Opportunities / Next Steps | Visit an outdoor education centre or conservation centre if possible (e.g., butterfly conservatory)<br><br>Students can create and organize a schoolwide EcoClub that focuses on maintaining school garden spaces. |

## Appendix A: Assessment Checklist and Rubric Suggestions

**Assessment Checklist and Rubric Suggestions**

These are samples of rubrics that could be co-created with students.

Information to fill these rubrics can be collected through verbal conversations with the students, student presentations (synchronous/asynchronous), observation of the students, journals, notes, design-book, and sometimes in the final product.

Science experiment

| **Next steps**<br><br>***Prochaines étapes*** | **Meeting Expectation**<br>**(Level 3)**<br><br>***Répond aux attentes***<br>***(Niveau 3)*** | **Exceeds expectation**<br>**(Level 4)**<br><br>***Surpasse les attentes***<br>***(Niveau 4)*** |
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| | The hypothesis is a full sentence that includes a prediction and a justification.<br><br>*L'hypothèse est une phrase complète qui comprend une prédiction et une justification.* | |
| | The student identifies the related QUALITATIVE (words) observations.<br><br>*L'élève identifie les observations QUALITATIVES (mots).* | |
| | The student identifies the related QUANTITATIVE (numbers) observations.<br><br>*L'élève identifie les observations QUANTITATIVES (nombres)* | |
| | The student uses the vocabulary appropriately<br><br>*L'élève utilise le vocabulaire de manière appropriée* | |
| | The conclusion states whether the hypothesis was correct, and uses observations to justify it.<br><br>*La conclusion indique si l'hypothèse était correcte et utilise des observations pour la justifier.* | |

Design with test and review

| **Next steps**<br><br>***Prochaines étapes*** | **Meeting Expectation (Level 3)**<br><br>***Répond aux attentes (Niveau 3)*** | **Exceeds expectation (Level 4)**<br><br>***Surpasse les attentes (Niveau 4)*** |
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| | The student identifies the desired outcome for their design<br><br>*L'étudiant identifie le résultat souhaité pour sa conception/design* | |
| | The student uses the vocabulary appropriately<br><br>*L'élève utilise le vocabulaire de manière appropriée* | |
| | The technological-design process shows signs that new knowledge was used to improve on the design<br><br>*Le processus de conception technologique montre des signes que de nouvelles connaissances ont été utilisées pour améliorer le design* | |
| | The student communicates their design for different audiences (e.g., peers, experts, community members) and in a variety of ways (oral, visual, and/or written forms) with considerable effectiveness.<br><br>*L'étudiant communique sa conception pour différents publics (par exemple, pairs, experts, membres de la communauté) et de diverses manières (formes orales, visuelles et / ou écrites) avec une efficacité considérable.* | |

Coding

| **Next steps**<br><br>***Prochaines étapes*** | **Meeting Expectation (Level 3)**<br><br>***Répond aux attentes (Niveau 3)*** | **Exceeds expectation (Level 4)**<br><br>***Surpasse les attentes (Niveau 4)*** |
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| | I can design a plan before starting to code<br>I can write, read and alter existing code<br>I can modify my code when the outcome is not what I expected (troubleshooting)<br>I can use the related vocabulary appropriately<br>Grade 4. I can write code that produces different outputs | |
| | *Je peux concevoir un plan avant de commencer à coder*<br>*Je peux écrire, lire et modifier le code existant*<br>*Je peux modifier mon code lorsque le résultat n'est pas celui que j'attendais (troubleshooting/dépannage)*<br>*Je peux utiliser le vocabulaire associé de manière appropriée*<br><br>*4e année. Je peux écrire du code qui produit différentes sorties* | |

**Self-evaluation for design and re-design**

| **Self-evaluation for design and re-design**<br><br>(4= My best effort, 1 = Little effort) | |
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| Were my sketches clear enough for others to understand? | 4 3 2 1 |
| Did I include written suggestions on my rough sketch? | 4 3 2 1 |
| Did my product do what I designed it to do? | 4 3 2 1 |
| If I worked with others, how well did I cooperate? | 4 3 2 1 |
| If I worked with others, how would I rate my contribution to the product? | 4 3 2 1 |