Future Ready Project - Butterfly Migration

Teacher Name:		Duration (in minutes): 4 x 45 minute session Actual: 6 x 45 minute sessions
Grade Level(s): 3	Subject/Course: Science	Unit: Generations of Butterflies
Resources needed: (On-site people, facilities, tools, technology, materials, community connections)	Student devices BOCES4 Science "Generations of Butterflies" 12 Coding Devices (Partners?, Groups of 3?) Edison Robots Back up plan: Sphero Robots	
Learning Standards: (content + CS & DF) Computer Science Digital Fluency	**NYS P-12 Science Learning Standards** 3-LS1-1. Develop models to describe organisms have unique and diverse life cycles but all have in common birth, growth, reproduction and death. 3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment. 3-LS2.C. Ecosystem Dynamics, Functioning and Resilience - when the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment and some die. (secondary to 3-LS4-4) 3-LS4-D Biodiversity and Humans- populations live in a variety of habitats and change in those habitats affects the organisms living there (3-LS4-4) **Crosscutting Concepts** 3-PS2-2. Patterns of change can be used to make predictions. 3-LS4-1. Observable phenomena exist from very short to very long time periods. **Connections to Nature of Science: Scientific knowledge assumes an order of consistency in natural systems.** 3-LS4-1. Science assumes consistent patterns in natural systems **Connections to Nature of Science is a Human Endeavor** 3-ESS3-1. Science affects everyday life. **Science and Engineering Practices** Developing and using models - develop models to describe phenomena (3-LS1-1) Analyzing and Interpreting Data to make sense of phenomena using logical reasoning (3-LS3-1) Constructing Explanations and Designing Solutions - use evidence to support and construct an explanation (3-LS3-2, 3-LS4-2) **Computer Science/ Digital Fluency** **Computational Thinking** 2-3 CT1 Create a model of an object or computational process in order to identify patterns and essential elements of the object or process.	

	2-3 CT3 Present the same data in multiple visual formats in order to tell a story about the data 2-3 CT4 Identify multiple ways that the same problem could be decomposed into smaller steps. 2-3 CT5 Identify the essential details needed to perform a general task in different settings or situations. 2-3 CT6 Create 2 or more algorithms for the same task. 2-3 CT7 Name/Label key pieces of information in a set of instructions noting whether each name/label refers to a fixed or changing value. 2-3 CT8 Identify steps within a task that should only be carried out under certain precise conditions. 2-3 CT9 Identify and debug errors within an algorithm or program that includes sequencing or repetition. 2-3 CT10 Develop and document a plan that outlines specific steps taken to complete a project. **Network and system design** NSD.1 Describe and demonstrate several ways a computer program can receive data and instructions (input) and can present results (output). NSD.3Describe and attempt troubleshooting steps to solve a simple technology problem. **Cybersecurity** CY.3 Identify why someone might choose to share an account, app access, or devices. **Digital Literacy** DL.1 Locate and use the main keys on a keyboard to enter text independently. DL.2 Communicate and work with others using digital tools to share knowledge and convey ideas. DL.4 Use a variety of digital tools and resources to create digital artifacts. DL.7 Understand what it means to be part of a digital community and describe ways to keep it a safe, respectful space.
Big Idea:	Students will explain the migration path of the Monarch Butterfly by coding a device that will recreate the path, explain the timeline and reason for this migration pattern as well as the impact on the species with regard to its life cycle.
Authentic Purpose: (Why does this matter to your students?)	Students need to understand the environmental impact and importance of the monarch migration. Although not a threatened species, data indicates the number of monarchs arriving in Mexico has decreased greatly. Monarchs are essential for many ecosystems to survive and are **pollinators**. There are many factors increasing their survival including temperature change, drought, impacts of climate change, etc.

Future-Ready Competencies: _X_Collaboration _X_Communication _X_Critical Thinking & Problem Solving _X_Creativity & Innovation ___Other:	Objectives: Students will work together in teams of 2 to "Explain and Describe the Monarch Butterfly migration using a coding device." Students will problem solve and collaborate to determine the best way to showcase their learning. Students will discuss one potential environmental factor that could impact the Monarch Butterfly Migration.
Project Statement: (Include: issue, problem or challenge; student role, purpose, beneficiary, and desired outcomes)	Monarch Butterfly Migration As a culminating activity to the BOCES4 Science "Generations of Butterflies" unit, students will create an interactive presentation with a partner/team to show their understanding of the importance of the monarch migration and how environmental factors can impact/change the success of the monarch migration.
Empathy Anchor: (How will students develop empathy and care about this problem)	Students will be learning how environmental changes within an ecosystem can impact the life cycle and continuation of a species. The students will learn the important role a Monarch has within an ecosystem and how a decline in the population can directly impact other species within the ecosystem.
Public Audience & Reveal: (Experts, audiences, or product users students will engage with during and at the end of project)	Students will share their learning with other students, faculty and or parent night/invite parents during school day.

Knowledge Construction: (How are students going to construct content knowledge and practice it) 1. Students will learn what happens to butterflies to include a. Life cycles (birth to death) b. The body c. Traits and variation d. Environmental factors that impact a species ability to survive/adapt. (Not fully discussed in BOCES4Science - will need to build background) e. Why a species migrates. 2. Students will learn and practice how to code a device. 3. Studies will apply knowledge of coding to show their understanding of the monarch butterfly migration.	Student Assessment: ● Student assessment will be based on the final partner/team presentation of the Monarch Butterfly Migration (Rubric) ○ Collaboration ○ Successful coding of the device ○ Following steps in a process ○ Creativity ○ Accurate explanation of migration pattern. ○ Discussion of 1 environmental impact on migration (Flood, drought, weather phenomenon, climate, deforestation)

Design Process: 1. Discover 2. Research & Empathize 3. Brainstorm 4. Choose 5. Build 6. Test 7. Communicate 8. Redesign	Describe what (& how) students are going to do in each step: 1. After learning about the Monarch Butterfly migration pattern design and build a model using a coding platform to model the migration pattern. 2. Students will research migration patterns and be able to communicate/ share these patterns (ie: distance a monarch can fly in a given day) using coding, the robotics tools provided and maps available. 3. As a learning team (Partners/small group), students will collaborate to determine the direction and path of the Butterfly flight. Students will need to determine if their butterfly experiences a challenge

	(weather, geography). While coding, students may need to brainstorm solutions when faced with a problem. 4. Students will sketch the path they want their butterfly to take to include stopping points and challenges along the way. Students will determine how they will complete the coding (whose device? Taking turns, etc.) and a plan for when a team gets frustrated (take a breath, take a walk, see what other groups are doing) 5. Students will code the robot to follow the intended path using the coding platform. 6. Students will test their plan. 7. Students will work together and self/peer evaluate to determine if they met their goal and solved the problem. 8. Students will reflect on the project and note where they could make changes and why. (Ongoing)