Inquiry Project Design Plan

Teacher/Designer Names: Oddo	
Name of Project: Assessment of Biodiversity of Meadow Sections Using Quadrats	**Grade Level: 6**
Est Launch Date: October/November	**Est Duration (in weeks): 3**
Disciplines Involved: Science, Math, ELA, Technology	
Problem Statement: As humans, we often ignore the needs of other living things around us. We negatively affect ecosystems around us without always knowing that we've done so.	

STAGE 1: DESIRED RESULTS

Big Idea: Biodiversity of a Local Ecosystem

Enduring Understandings:	**Essential Question(s):** (MEANT TO BE SHARED WITH STUDENTS)
● Why is the health of our ecosystem important? ● What living things are a part of our ecosystem? How will we know if it is healthy? ● What does our data say about the health of our ecosystem?	● Can one square meter predict the health of our ecosystem?

Established Goals (Standards, Performance Indicators, Learning Goals):
Students will gather data on the status/progress of the three future meadow zones at Untermeyer Garden Conservary by using quadrats on sample area(s) in each zone.

Science Standards:
LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

Social Studies Standards:

Mathematics Standards:
6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
6.RP.A.2 Understand the concept of a unit rate a/b associated with a ratio a:b with b not equal to zero, and use rate language in the context of a ratio relationship.
6.RP.A.3.C Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

ELA Standards:
W.6.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

Technology Standards:
- **NYS Computer Science and Digital Fluency:**

4-6.DL.2 Select appropriate digital tools to communicate and collaborate while learning with others.
4-6.DL.4 Use a variety of digital tools and resources to create and revise digital artifacts.
- **ISTE:**

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1.5b Students collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making
Social Justice Standards: DI.6-8.6 I interact with people who are similar to and different from me, and I show respect to all people.
Other (Art, SEL, etc):
Links to Standards/Reference Frameworks: **NGSS, NGSS by DCI Nat'l C3 SS Framework, NYS K-8 SS Standards, Common Core, ISTE, Learning for Justice Social Justice Standards, CASEL SEL Framework, NYS CS and Digital Fluency**

Students will know (SWK):	**Students will be able to do (SWBAT):**
• **A ratio is made up of two quantities** • **There is a relationship between the two quantities** • **Percent is a rate per 100** • **How to write an informative text**	• **Define/explain the terms: relationship and quantity** • **Write ratios in three ways: using the word "to", a colon, or as a fraction** • **Describe real-world ratio relationships** • **Find the percent of a quantity when given the part and the whole** • **Write informative text to examine topics, convey ideas, concepts and information** • **Analyze and interpret data**

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STAGE 2: EVIDENCE & ASSESSMENTS:

Performance Task Narrative:

Goal: *Provide a statement of the task. Establish the goal, problem, challenge, or obstacle in the task.*
Students mark out sample one square meter areas (quadrats) in the local ecosystem. They use collected data to calculate the abundance of different species in three different sections of the future meadow. They then analyze data using ratios, unit rate, and percentages to determine the health of the local ecosystem. They submit their findings to a class website.

Role: *Define the role of the students in the task. State the job of the students for the task.*
Students will work together in small groups to collect quantative data and take photographs of the invasive and other species within the space.

Audience: *Identify the target audience within the context of the scenario.*
Students will post their articles to the class website. This website link will be shared on social media and the school website. Student presentations will take place at Untermeyer Gardens with a panel including representatives from the school, district and garden.

Situation: *Set the context of the scenario. Define the narrative.*

- Entry event: Viewing of Clips from the Untermyer Gardens Virtual Symposium *"The Making of a Meadow: Considerations, Complications, Compositions"* pausing for discussion and questions.
- Observe & research the local ecosystem and use ratios and percents to analyze ecosystem data.
- Observe the data collection site a total of three times to gather organism population data.
- Use ratio, percents, and unit rates to analyze quadrant data, make comparisons, and draw conclusions about the health of the local ecosystem.

Product(s): *Clarify what the students will create and why they will create it.*

- Data tables showing calculations of the density and frequency of the collected data
- Science article to explain the results and what they mean about the health of the local ecosystem
- Documentation of quadrat change – weekly images, learning log

Standards (criteria for success): *Provide students with a clear picture of success. Identify specific standards for success.*

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Other Evidence/Assessments:

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STAGE 3: THE LEARNING PLAN:

Learning Activities

WEEK 1 - PROJECT LAUNCH & BEGIN TO OBSERVE, RESEARCH & LEARN

Learning Goals:

- Why is the health of our ecosystem important?
- What living things are part of our ecosystem?
- What is a meadow?
- What invasive species can we expect to see living in the future meadow?
- How will we know if it is healthy?

Learning Events:

PROJECT LAUNCH

- Viewing of Clips from the Untermyer Gardens Virtual Symposium *"The Making of a Meadow: Considerations, Complications, Compositions"* pausing for discussion and NTK questions
- Review rubric
- Form research teams

BEGIN TO OBSERVE, RESEARCH & LEARN

- Discuss relevant vocabulary: density, intermingling, weeds, weed pressure, weed suppression, native, non-native, invasive, diversity, desirable plants, undesirable plants, pollinator, biodiversity, soil, topography
- Research the three dominant invasives plaguing the meadow zones: mugwort, Japanese knotweed, and common reed grass
- Practice ratio and percentage language and concepts with sample data problems from classroom math texts
- Learn about and apply ratios to compare the local ecosystem's animal/plant population.

Student work:

- Define relevant vocabulary
- Notes on dominant invasive plants
- Ratio and percentage exit tickets

Notes/Resources:

Learning Log

- Mugwort (Artemisia vulgaris)
- Japanese Knotweed (Fallopia japonica); NY Fact Sheet on Japanese Knotweed
- Common Reed (Phragmities australis)
- NY Invasive Species Information sheets

WEEK 2 - PREPARE, OBSERVE, GATHER & ANALYZE DATA

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Learning Goals:

- What does our data say about the health of our ecosystem?

Learning Events:

PREPARE, OBSERVE, GATHER & ANALYZE DATA

- Visit the three quadrats for a short, set amount of time. Record sighted organisms in a learning log using a chart and tally marks to organize data.
- Take photographs of species within the quadrats
- Share and compare quadrat data among teams. Use ratios, unit rate, and percentages to analyze data.
- Compare analyzed team data and calculations to data and calculations that characterize a healthy ecosystem. Use the comparison to determine whether the team's analyzed data indicates a healthy or unhealthy local ecosystem.
- Use a persuasive writing map to organize observations/data, claims, and supporting evidence and draw conclusions about the health of the local ecosystem
- Write an article about whether or not quadrats are a reliable way to determine the health of the future meadow.

Student work:

- Learning Log
- Photographs/videos
- Writing maps

Notes/Resources:
Persuasion Graphic Organizer
Learning Log

WEEK 3 – PREPARE and PRESENT FINDINGS

Learning Goals:

- How do we effectively communicate our findings?
- How can we share our analyses with the community?

Learning Events:

- Analyze high-quality models (e.g., science news articles) and chart their common characteristics.
- Individually draft articles using the characteristics for high quality science news articles as guidance.
- Share drafts with team members then create a revised version that incorporates the best of each individual version.
- Use a gallery walk or other critique protocol to exchange peer feedback.
- Revise and finalize articles. Publish to Thinglink.
- Present article/website to community.

Notes/Resources:

Week 4

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Learning Goals:

Learning Events:

Formative Assessments: