STEAM: Grand River Water Quality Lab (Grades 4-8)

Program Description:

Students will work through stations to complete chemical and physical tests on water samples from the Grand River. This laboratory-based program will allow students to collect and analyze data, resulting in a graphical display of their dataset to share with the class. Ultimately, they will use their water quality results to decide whether or not the Grand River watershed could support various aquatic species.

What content standards align with this program?

NGSS Performance Expectations: PS1. Matter and its Interactions; LS2. Ecosystems: Interactions, Energy, and Dynamics; ESS3: Earth and Human Activity
NGSS Science and Engineering Practices: Planning and Carrying out Investigations; Analyzing and Interpreting Data; Obtaining, Evaluating, and Communicating information
Michigan K-12 Social Studies Standards: G2 Places and Regions, G3 Physical Systems, P1 Reading and Communication, P2 Inquiry Research and Analysis

Museum Program Strand:

Empower individuals to use observations and inquiry to understand arguments and design creative solutions.

This program is aligned with the following Museum Learner Outcomes:

Holders of Foundational Knowledge	Masters of Fundamental Literacies	Creative Thinkers and Doers	Generous Collaborators for Tough Problems	Learners For Life
X	X		X	X

What will students know and be able to do after completing this program?

- Students will be able to explain how chemical and physical indicators provide information about water quality.
- Students will be able to use water quality data to predict whether or not the river could support various aquatic organisms.
- Students will be able to safely perform scientific laboratory procedures such as using a pipette, filling test tubes to a specific volume, following chemical testing procedures, and interpreting results.

What questions will students answer?

- What is a watershed?
- How can I assess the health of a watershed?
- How do chemical and physical properties of water impact organisms that live in a river?

Key Vocabulary

Water Quality
pH
Chemistry
Watershed

Indicator
Phosphate
Nitrate
Turbidity

Materials List and Setup:

Laminated fish tolerance sheets
Water sampling materials (pH, nitrates, phosphates, D.O., turbidity)
Water sample from Grand River
Computer monitor
Protective goggles
Waste containers

Program Activities: 90 minutes

1. Engage:
    a. Introductions and expectations
    b. What's a watershed? Draw out prior conceptions
    c. Cover laboratory safety expectations
    d. Introduce goal for the lab: We will use water quality data to predict whether or not the river could support various species of Michigan fish
        i. Assign specific species to each group: Sturgeon, Northern Pike, Yellow Perch, Bluegill, Trout, Carp.
2. Explore:
    a. Students rotate through data-collection stations and record results in their own data collection sheets.
        i. Stations cover: dissolved oxygen, pH and temperature, nutrients (nitrogen and phosphorus), topography, and mapping.
3. Explain:
    a. Instructor pools class data and calculates averages
    b. In their groups, students will determine whether their assigned organism could live in the Grand River, based on the levels of chemical and physical indicators they have measured.
4. Elaborate:
    a. Communicate their results out with the group and discuss trends.