Investigating Water Quality in Lynch Cove Park 5E Lesson Plan

6th Grade Science / World Cultures / Math

Dundalk Middle School

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**Lesson Type:** Performance-Based Assessment

**Lesson Duration:** 3-4 days

**Unit:** Chemistry Skills

**Content Standards:**

*Scientific inquiry*

* Access and process information from readings, investigations, and/or oral communications.
* Formulate and develop hypotheses that can be tested in well-designed investigations.
* Develop and evaluate a well-designed investigation.
* Identify and demonstrate safe procedures when conducting an investigation.
* Collect, organize, and accurately display data in ways others can verify using appropriate instruments.
* Communicate findings from hands-on investigations and text resources.

*Critical Thinking*

* Provide supporting evidence when forming conclusions, devising a plan or solving a practical problem.

*Applications of Science*

* Apply scientific concepts to defend a position relative to an issue.

**NGSS Practices**

- Planning and carrying out investigations

- Analyzing and interpreting data

- Engaging in argument from evidence

- Obtaining, evaluating, and communicating information

**Lesson Objective:**

 S.W.B.A.T. investigate variables of water quality in order to evaluate the overall health of the aquatic ecosystem at Lynch Cove Park.

**Materials:**

* Interactive Notebooks
* Revolve tablets
* Various water quality websites
* Pinch Cards
* Secchi disks
* pH indicator tests
* Electroconductivity gauges
* Dissolved oxygen tests
* Thermometers
* SAV / macroinvertabrate identification charts
* Distilled water

**Engagement**

* Students will use their interactive notebooks to respond to the questions “*What does a healthy aquatic ecosystem look like? “*and“ *Why is a healthy aquatic ecosystem important?”* Students will respond via sketch, written response, or a combination of both.
* Student volunteers will share responses while the other students compare and contrast their responses independently.
* Students will engage in a whole class discussion resulting in an agreed upon “master list” of characteristics inherent within a healthy aquatic ecosystem and their importance.
* Instructor will informally assess student prior knowledge of several variables influencing water quality. (GROUP 1: *pH, temperature, dissolved oxygen, turbidity, conductivity.* GROUP 2*: biodiversity, submerged aquatic vegetation or* SAV)

**Exploration**

* Students will use their tablets to research the aforementioned variables. Each student will be assigned one term from GROUP 1 and will choose of one the terms in GROUP 2
* Students will construct a chart in their interactive notebooks identifying what their variable measures, what constitutes a healthy range, what impact the variable has, and the contributing factors associated with that variable.
* Students will be provided the following websites to assist in their research:

*Water Quality (pH, temperature, dissolved oxygen, turbidity, conductivity)*

<http://water.usgs.gov/edu/waterquality.html>

<http://education.nationalgeographic.com/media/file/freshwater_chapter4_v2.pdf>

<http://www.dnr.state.md.us/cin/explorerestoreschoolshed/pdfs/StudentDataSheet.pdf>

<http://www.grc.nasa.gov/WWW/k-12/fenlewis/test.htm>

<http://water.epa.gov/type/rsl/monitoring/vms50.cfm>

*Biodiversity*

<http://www.nwf.org/Wildlife/Wildlife-Conservation/Biodiversity.aspx>

<http://www.ecokids.ca/PUB/eco_info/topics/biodiversity/index.cfm>

<http://www.globalissues.org/article/170/why-is-biodiversity-important-who-cares>

*SAV*

<http://web.vims.edu/bio/sav/AboutSAV.html>

<http://www.earthgauge.net/2012/submerged-aquatic-vegetation-in-chesapeake-bay>

<http://www.fws.gov/chesapeakebay/savpage.htm>

<http://www.dnr.state.mn.us/shorelandmgmt/apg/value.html>

**Explanation**

* Students will share their research in a whole class discussion with supporting information provided via PowerPoint by the instructor.
* Students will work in small groups to develop a problem question for the Lynch Cove water quality investigation (*ex. How healthy is the Lynch Cove aquatic ecosystem?)*
* Students will share problem questions in a whole class discussion in order to develop a universal problem question for the investigation.
* Students will work in small groups to develop a hypothesis for the agreed upon problem question using *if …then …because* format.
* Students will discuss in small groups the importance of biodiversity and SAV as indicators of health in an aquatic ecosystem.
* Instructor will model the various instruments and techniques used to evaluate water quality on the off site location.
* Students will conduct tests using samples of distilled water to establish control values and practice techniques.

**Extension (off site)**

* Students will briefly review expectations of conduct and experimental procedures.
* Students will note prevalence of biodiversity and SAV in the surrounding ecosystem in their interactive notebooks.
* Students will work in small groups to conduct investigations and record data regarding pH, temperature, dissolved oxygen, turbidity, and conductivity of samples from water at Lynch Cove Park.

**Evaluation**

* Students will engage in argument from evidence by constructing a Claim 🡪 Evidence🡪 Reasoning flowchart.
* Students will use their flowcharts to construct a conclusion for their investigation.
* Students will modify their hypotheses as necessary

***HOMEWORK:***  Students will develop a rebuttal BCR describing alternate explanations for evidence which refuted their initial hypothesis **OR** develop practical strategies which could be implemented to improve the overall health of the Lynch Cove aquatic ecosystem. *Extra credit will be provided for addressing both options.*