

Lesson Design

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| Subject Area: Chemistry & Biology | Grade Level: 9-12 | |
| Names Sissy Scallings Jonathan Hypolite Vanessa Cao Melissa Haynes | Duration of Lesson: 40-45 minutes | |
| Standard(s): Biology—Ecology 6b, Physiology 9b Investigation & Experimentation—1a, 1d, 1m Chemistry—Acids and bases, gases, ionic bonding, solutions, chemical reactions, chemical bonds | | |
| Big Ideas involved in the lesson: Aquatic life is dependent on the quality of water, which students will analyze. | | |
| As a result of this lesson students will: | | |
| Know: Living organisms are dependent on certain limits in their environment. | | |
| Understand: The importance of water conservation and human beings play a part in ecological responsibility. | | |
| Be Able To Do: Perform water tests with probes, analyze a freshwater system for contaminants. | | |
| Assessments: What will be evidence of student knowledge, understanding & ability? | Formative: Check for understanding with questions, monitor student understanding throughout lesson as using probes Summative: Analyze a water sample, explain how a pH probe works | Fieldtrip possibility: Aquarium of the pacific... Water treatment Plant... |
| Lesson Plan | | |
| Anticipatory Set: a. T. focuses students b. T. states objectives c. T. establishes purpose of the lesson d. T. activates prior knowledge | Jigsaw articles/Think pair share—Magazine articles, textbooks, newspaper Thought provoking question to engage students Question: What environmental conditions are required for fish to thrive in a freshwater aquarium? Additional Questions: 1. What elements/contaminates are contained in freshwater? 2. What are some biological filters that exist in freshwater? What are some ways nature keeps itself balanced. Objectives on the board (copied down with bell ringer) Introduce new vocabulary terms to ensure understanding | |
| Instruction: a. Provide information ▪ Explain concepts ▪ State definitions ▪ Provide exs. ▪ Model b. Check for Understanding ▪ Pose key questions | Introduce key vocabulary terms (review old terms) to ensure understanding Provide the students with aquarium testing manual. (Inform students of optimum levels) Do a water test for pH so the students can visually see what they need to do Have the students use vocab words and re write them in their own words Have the student explain how the different probes and tests work | |

Lesson Design

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| <ul style="list-style-type: none"> ▪ Ask students to explain concepts, definitions, attributes in their own words ▪ Have students discriminate between examples and non-examples ▪ Encourage students generate their own examples ▪ Use participation | <p>Based on findings, what are the ideal conditions needed for fish to thrive in freshwater?</p> <p>Make a tree map to discuss what was learned while reading (skeleton on board—classifying types of contaminants)</p> |
| <p>Guided Practice:</p> <ol style="list-style-type: none"> a. Initiate practice activities under direct teacher supervision – T. works problem step-by-step along w/students at the same time b. Elicit overt responses from students that demonstrate behavior in objectives c. T. slowly releases student to do more work on their own (semi-independent) d. Check for understanding that students were <i>correct at each step</i> e. Provide specific knowledge of results f. Provide close monitoring | <p>Based on findings, we are going to analyze the freshwater in an aquarium. Explain how to use the different types of probes (protocol)</p> <p>Students will conduct tests (pH, nitrates, dissolved oxygen)</p> <p>Groups can verify results with color tester and document camera (project on screen)</p> <p>Students can do a gallery walk of the tests performed since they will only be performing one test</p> |
| <p>What opportunities will students have to read, write, listen & speak about science?</p> | <p>Read: Students will participate in a jigsaw at the beginning of the lesson to read about chemical contaminants that can be harmful to freshwater systems.</p> <p>Write: Students will write ideas from jigsaw articles on the board for the tree map and will write data while making observations during the gallery walk.</p> <p>Listen: Students will listen as other pairs share out after the jigsaw activity, as the teacher models how to use different probes to test aquarium water, and while working with others using science terminology.</p> <p>Speak: Students will speak to one another throughout the testing process and after reading their jigsaw article to collaborate with their partner.</p> |
| <p>Closure:</p> <ol style="list-style-type: none"> a. Students prove that they know how to do the work b. T. verifies that students can describe the what and why of the work | <p>Ask students why was each test performed important for freshwater aquarium life?</p> <p>Students will write a reflection regarding their experiment and the ideal environmental conditions required for a freshwater aquarium.</p> <p>Discuss the possibility of using instrumentation to test for chemicals in water. Using the Atomic Force Microscope, students can analyze the chemical</p> |

Lesson Design

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| <p>c. Have each student perform behavior</p> | <p>composition of water on the atomic level (nanoscale). AFM careers can be associated with the medical field, detecting contaminants, imaging chemicals on the nanoscale.</p> |
| <p>Independent Practice: a. Have students continue to practice on their own b. Students do work by themselves with 80% accuracy c. Provide effective, timely feedback</p> | <p>Students will find and current events article related to the lesson that they will read for homework and share with the class in the morning.</p> |
| <p>Resources: materials needed to complete the lesson</p> | <p>Aquarium testing kit, pH probe, aquarium with fish, nitrates probe, readings (content related articles for jigsaw), oxygen and CO2 gas probe, dissolved oxygen probe, ammonium probe</p> |