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| **Fellow Name: Neah Gray** | **Contact Info: 614-483-3899** | **Date: January 23, 2017** |
| **Teacher Name: Amy Parker** | **School Name: Finneytown Secondary School** | **Grade and Class: Mixed Grade Level (High School) Environmental Science** |

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| **Activity Title:** |  |
| **Estimated Activity Duration:** | **2 Days of Lessons (week-long activity)** |

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| **Setting:** |  |

Classroom

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| **Activity Objectives:** |

The student will be able to:

1. Identify some big issues regarding water in today’s society.
2. Define clean water.
3. Compare and contrast the different purposes of water.
4. Identify the steps in water purification.
5. Design a solar still that utilizes the steps in water purification.

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| **Activity Guiding Questions:** |

1. What are some issues regarding water in today’s society?
2. What is clean water? How do we know?
3. What are the different uses of water and how does the quality vary from purpose to purpose?
4. What are the steps in the water purification?
5. How do you create a solar still that utilizes the steps in water purification?

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| **Next Generation Science Standards (NGSS)**  |
| **Science and Engineering Practices (Check all that apply)**  | **Crosscutting Concepts (Check all that apply)** |
| **X** Asking questions (for science) and defining problems (for engineering) | ☐ Patterns |
| **X** Developing and using models | **X** Cause and effect |
| ☐ Planning and carrying out investigations | ☐ Scale, proportion, and quantity |
| **X** Analyzing and interpreting data | **X** Systems and system models |
| ☐ Using mathematics and computational thinking | ☐ Energy and matter: Flows, cycles, and conservation |
| ☐ Constructing explanations (for science) and designing solutions (for engineering) | **X** Structure and function.  |
| ☐ Engaging in argument from evidence | ☐ Stability and change.  |
| **X** Obtaining, evaluating, and communicating information  |  |

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| **Ohio’s New Learning Standards for Science (ONLS)** |
| **Expectations for Learning - Cognitive Demands (Check all that apply)** |
| **X** Designing Technological/Engineering Solutions Using Science concepts **(T)** |
| **X** Demonstrating Science Knowledge **(D)** |
| **X** Interpreting and Communicating Science Concepts **(C)** |
| **X** Recalling Accurate Science **(R)** |

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| **Common Core State Standards -- Mathematics (CCSS)** |
| **Standards for Mathematical Practice (Check all that apply)** |
| ☐ Make sense of problems and persevere in solving them | ☐ Useappropriate tools strategically |
| ☐ Reason abstractly and quantitatively | ☐ Attendto precision |
| ☐ Construct viable arguments and critique the reasoning of others | ☐ Look for and make use of structure |
| ☐ Model with mathematics | ☐ Look for and express regularity in repeated reasoning |

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| **Unit Academic Standards (NGSS, ONLS and/or CCSS): Ohio Science Standards- EVS** |

**Earth Resources (Water Pollution)**

**Global Environmental Problems and Issues (Potable water quality, use and availability) (Food Production and availability)**

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| **Materials**: (Link Handouts, Power Points, Resources, Websites, Supplies) |

Prezi: http://prezi.com/41lmudrrksll/?utm\_campaign=share&utm\_medium=copy

2 design ideas to offer students with materials:

large ziplock bags

wine cups

medium size rocks

Seran wrap

Record sheet for students – should contain checkpoints for design of solar still, construction of solar still, a data table for collecting observations, and identification of the steps in the water purification process on the diagram.

Video on Flint or California – YouTube website: <https://www.youtube.com/watch?time_continue=3&v=NUSiLOwkrIw>

<https://www.youtube.com/watch?time_continue=2&v=aRBfag-hQk>8

PollEverywhere Info to give students

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| **Teacher Advance Preparation:** |

Clean Water Act Lesson and Pre-Test

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| **Activity Procedures:** |

Friday before (January 20th): **Pre-Test**

**Day 1** (January 23rd)

1. Students are presented with the QOD: - Question of the Day: What are some issues regarding water in today’s society? Use PollEverywhere to compile answers
2. Teachers lead discussion on QOD.

**Day 2** (January 24th)

1. Video on Flint and California drought is shown.
	1. Have students brainstorm a list of how clean water can be supplied to Flint and California.
	2. What are the problems that are specific to each place?
2. Water purification chart review chart and definition recall
3. Discussion on cleaning water. Use the CWW website.
4. PollEverywhere: vocabulary recall (Sedimentation, Solar Stills, Clean Water)
5. Introduce the concept of solar stills. Recall California example. Show them the models and provide the instructions.
	1. Work in groups.
	2. Group member responsibilities
	3. Introduce the record sheet and explain the checkpoints.
	4. Review the data tables
	5. Diagram will also contain the identification of the steps in the water purification process

**Day 3** (January 25th)

1. Each person picks which design they prefer and why they think they will work best OR create your own version
2. Students chose best design in group and start to plan materials to be checked off by teacher

Student work on construction of still after diagrams are approved.

**Day 4** (January 26th)

1. Student work on construction of still after diagrams are approved.

**Day 5** (January 27th)

1. Final touches and peer critiques of solar stills to be given to groups

**Day 6** (January 30th)

1. -Midway: record water levels and observations, reflect on potential modifications to be done NOW (final opportunity to make changes!)

**Day 7** (February 1st)

1)Final Data analysis

2)Observation of results

3)Vote of top 3 design groups based on results and creativity

**Day 8** (February 3rd)

 1)Announcement of Winners

2)Discussion and Lesson Review

**Post Quiz**

 Distribution of Prizes

**Formative Assessments:** Link the items in the Activities that will be used as formative assessments.

**Check Points:**

**-**Design

-Model Creation

-Observation Table

-Midway checkpoint (Friday January 27th)-

record water levels and observations, reflect on potential modifications in the future (peer feedback)

 -Monday February 1st: Final Measurement-

 record water levels and observations, complete analysis for lab

**Summative Assessments:** Prepare a Pre-Test and Post-Test with the input of the RET Teacher. This should be a simple 10-12 question assessment tool. These questions will cover the content related to the Standards. The Pre and Post Test will be identical. There may be several summative assessments at the end of this Activity. Besides the Pre and Post Tests, the students might create a product for which this is a rubric developed. The rubric is also a summative assessment tool. Link the assessment tools.





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| **Differentiation:** Describe how you modified parts of the Lesson to support the needs of different learners. Refer to Activity Template for details. |

This lesson plan was changed a lot sue to the pace of comprehension. I originally had myself completing this lesson plan in about a week, to give the solar stills time to condensate, but because many concepts had to be taught multiple times and the execution of building was more time consuming, the lesson plan took about two weeks of class. The concepts of clean water and the vocabulary associated were not picked up as easy and the understanding of how a solar still worked had to be explained several times.

Results of Pre and Post Tests:

Percentage on Assessment (value X 100)

The results of the Post-test, in most cases significantly showed improvement from the Pre-test. However, some showed that, no matter how many times one may go over a topic; in this case four times, the person may not have the motivation to try to complete the assignment or pay attention in the first place. Some people would fill in the multiple choice correctly, or at random, and leave the extended response blank because they did not want to put for the effort to read the question. There was a total of three students who had a lower Post-Test score compared to Pre-Test and, overall, there was a 36% increase in scores as a class. The original class average was 39% and the final was 75%. I believe having the short answer question within the test was helpful to gauge the attentiveness of the test taker as the actual question was not difficult.

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| **Reflection:** Reflect upon the successes and shortcomings of the Activity. This is done after the Activity is implemented. |

This Activity was an, overall, success. The students enjoyed the interactive portion of the lesson that involved being creative and making the solar still. They also did well with the comprehension of the concepts of drought and unclean drinking water in relation to Flint, Michigan and California. I do believe that next time, I will not utilize the PollEverywhere app because students do not like to use their phones in that manner and the down time makes them complacent and lose focus.