

**CODE/MOE/UOIT Makerspaces Project**

**Lesson Plan: Grade 5 Science, Mathematics & Social Studies: Drinking Water, Part 3**

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| **Lesson 3**  **BIG IDEAS:**  Chemical change implies the formation of a new substance. ***(Overall expectations 2 and 3)***  The properties of materials determine their use and may have an effect on society and the environment. ***(Overall expectation 1)***  Human activity and the environment have an impact on each other.  Human activities should balance environmental stewardship with human needs/ wants.  When studying interrelationships between groups of people, it is important to be aware that each group has its own perspective on those interrelationships.  **Science and Technology Overall Curriculum Expectations:**  **1.** evaluate the social and environmental impacts of processes used to make everyday products;  **2.** conduct investigations that explore the properties of matter and changes in matter;  **3.** demonstrate an understanding of the properties of matter, changes of state, and physical and chemical change.  **Mathematics**  1. describe, through investigation, how a set of data is collected (e.g., by survey, measurement, observation) and explain whether the collection method is appropriate.  **Social Studies**  A1.3 explain some of the ways in which interactions between and among First Nations and Europeans in New France are connected to issues in present-day Canada *(e.g., land claims, treaty rights, environmental stewardship, resource ownership and use)* | |
| **Learning Goals:**  “We are learning to and about:  How the lack of clean drinking water infrastructure impacts on First Nations communities in Canada.  The importance of clean water for human health.  How water is treated in order to make it potable.  How to create, test, evaluate and improve upon a portable water filtering device of our own design.  How to use data collection to inform our assessment of our filters, and to guide us on how to improve our designs. | **Success Criteria:**  “We will be successful when…”  We can tell you about the various factors that have led to many First Nations not having access to clean drinking water.  We can identify many of the different reasons why the water in not potable. (Bacteria, metal contamination, etc.)  We can tell you about the processes in the human body that rely on water, and describe the ill effects of water deprivation.  We can tell you about the health effects that can occur from drinking non-potable water.  We use research skills to research ways to treat water in order to make it potable.  We design, build and test a portable water treatment unit out of found materials.  We use our data analysis to see if we have successfully cleaned water.  We use what we have learned to improve upon our initial design. |
| **Lesson Overview:**  **Filter Testing, data collection and analysis** | |
| **Materials and Technology:**  **Our water filters, a total dissolved solids testing meter, bacteria contamination test kits, data collection table, various buckets and flasks** | |
| **Student Accommodations/Modifications:**  **EA for students on the Autism Spectrum.** | **Lesson will be differentiated by:**   * **Content, specifically: None** * **Process, specifically: Hands on help with the testing** * **Product, specifically:** * **Environment, specifically: An EA to watch the students in class who are on the Autism Spectrum when we are down at the river doing our testing.** |
| **MINDS ON: Getting Started** | |
| During this phase, the teacher may:  • activate students’ prior knowledge;  • engage students by posing thought-provoking questions;  • gather diagnostic and/or formative assessment data through observation and questioning;  • discuss and clarify the task(s). | During this phase, students may:  • participate in discussions;  • propose strategies;  • question the teacher and their classmates;  • make connections to and reflect on prior learning. |
| Describe how you will introduce the learning activity to your students. What key questions will you ask? How will you gather diagnostic or formative data about the students’ current levels of understanding? How will students be grouped? How will materials be distributed?  We will walk down to the Otonabee river (10 minute walk), carrying our filters and our testing equipment. During the walk we will discuss what we have learned in our unit of study thus far.  We will gather data by collecting data about water turbidity, total dissolved solids and bacteria count.  Student groups will be based on the type of filtration method the created (chemical, membrane, charcoal). | |
| **ACTION: Working on it** | |
| During this phase, the teacher may:  • ask probing questions;  • clarify misconceptions, as needed, by redirecting students through questioning;  • answer students’ questions (but avoid providing a solution to the problem);  • observe and assess;  • encourage students to represent their thinking concretely and/or pictorially;  • encourage students to clarify ideas and to pose questions to other students. | During this phase, students may:  • represent their thinking (using numbers, pictures, words, manipulatives, actions, etc.);  • participate actively in whole group, small group, or independent settings;  • explain their thinking to the teacher and their classmates;  • explore and develop strategies and concepts. |
| Describe the task(s) in which your students will be engaged. What misconceptions or difficulties do you think they might experience? How will they demonstrate their understanding of the concept? How will you gather your assessment data (e.g., checklist, anecdotal records)? What extension activities will you provide?  The task will to be test each filter and their samples and compare our results against two control standards (the water from the taps at school, and the raw water before testing).  **Clarify misconceptions- we will talk about the idea of having controls, and what a fair test means in science.**  **The data will be assessed against our control data. We will see how much (if any) we can improve turbidity, TDS and bacteria count vs the untreated water and how close we can get to the treated water from the school’s values.**  **Extensions: Use our 3-d printer to create an updated water filter.** | |
| **CONSOLIDATION: Reflecting and Connecting** | |
| During this phase, the teacher may:  • bring students back together to share and analyse strategies;  • encourage students to explain a variety of learning strategies;  • ask students to defend their procedures and justify their answers;  • clarify misunderstandings;  • relate strategies and solutions to similar types of problems in order to help students generalize concepts;  • summarize the discussion and emphasize key points or concepts. | During this phase, students may:  • share their findings;  • use a variety of concrete, pictorial, and numerical representations to demonstrate their understandings;  • justify and explain their thinking;  • reflect on their learning. |
| How will you select the individual students or groups of students who are to share their work with the class (i.e., to demonstrate a variety of strategies, to show different types of representations, to illustrate a key concept)? What key questions will you ask during the debriefing?  All students will write up their findings and present them to the class. Key questions will be:  Where you successful? How do you know? Would you want to drink this water? Why?  What research do you need to do? What do you need to find out? In order to improve upon your prototype?  Assessment may be done using a checklist or rubric. | |