Engaged Learning Project Draft Template
Calley, Cosgrove, Hanna, Suber, and McEvoy

Title of Project: *Water, Water Everywhere*
Subject(s): Science, Math, Social Studies, Art, Health and Physical Education
Grade Level(s): 3

Abstract:
Students will develop, create, and use water filters for various real-world problems. They will take on the role of environmental engineers charged with the task of developing effective water filters. Students will collaborate with experts in watershed management and waste water treatment to better understand the water challenges we face in our community. Students will also test their products on water samples from the Chattahoochee River

Learner Description/Context:
Brumby Elementary School has a student enrollment of approximately 1,000 students. Brumby has a diverse student population. 56% of students are African-American, 27% are Hispanic, 7% are white, and 4% of the students are multi-racial. 78% of students in the schools qualify for free or reduced- price lunch. The school's population is transient, although the transiency rate has declined in recent years. Brumby is STEM certified in Cobb County and received AdvancedED STEM Certification in 2017. *Water, Water, Everywhere* is designed for third-grade students and addresses third-grade standards.

Time Frame:
The students will be completing this learning experience during their specials rotation. The rotation lasts three week, during which the students attend two forty-minute classes a day. It might be necessary to extend the project into two rotations.

Standards Assessed:
Content Standards
Science:
S3L2. Obtain, evaluate, and communicate information about the effects of pollution (air, land, and water) and humans on the environment.
b. Explore, research, and communicate solutions, such as conservation of resources and recycling of materials, to protect plants and animals.

Math:
MGSE3.NBT.2
Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

MGSE3.OA.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Social Studies:
SS3E1. Describe the four types of productive resources:
a. Natural (land)
b. Human (labor)
c. Capital (capital goods)
d. Entrepreneurship (used to create goods and services)

Map and Globe Skills8. draw conclusions and make generalizations based on information from maps
7. use a map to explain impact of geography on historical and current events
8. draw conclusions and make generalizations based on information from maps
9. use latitude and longitude to determine location

Art:
VA3.CN.2 a. Apply art skills and knowledge to improve understanding in other disciplines.

VA3.CN.1 b. Compare ideas and universal themes from diverse cultures of the past and present.
c. Recognize ways that artists are involved in communities and careers (e.g. architects, painters, photographers, interior designers, educators, museum educators).

PE/Health:
HE3.8: Students will demonstrate the ability to advocate for personal, family, and community health
a. Share accurate information about a health issue.
Examples: Share with family members suggestions for conserving water in their daily practices.

Georgia PSC Instructional Technology Standards
1.1 Shared Vision
2.1 Content Standards & Student Technology Standards
2.3 Authentic Learning
2.4 Higher Order Thinking Skills
2.6 Instructional Design
3.1Classroom Management & Collaborative Learning
3.2 Managing Digital Tools and Resources
3.6 Selecting and Evaluating Digital Tools & Resources
3.7 Communication & Collaboration
4.1 Digital Equity
4.3 Diversity, Cultural Understanding & Global Awareness
6.1 Continuous Learning
6.2 Reflection
6.3 Field Experiences

ISTE NETS-S:
2. Teaching, learning, and assessments
a. Contribute to the development, communication, and implementation of a shared vision for the comprehensive use of technology to support a digital-age education for all students
d. Implement strategies for initiating and sustaining technology innovations and manage the change process in schools and classrooms
3. Digital age learning environment
a. Coach teachers in and model design and implementation of technology-enhanced learning experiences addressing content standards and student technology standards
c. Coach teachers in and model engagement of students in local and global interdisciplinary units in which technology helps students assume professional roles, research real-world problems, collaborate with others, and produce products that are meaningful and useful to a wide audience
d. Coach teachers in and model design and implementation of technology-enhanced learning experiences emphasizing creativity, higher-order thinking skills and processes, and mental habits of mind (e.g., critical thinking, metacognition, and self-regulation)
5. Digital citizenship
a. Model and promote strategies for achieving equitable access to digital tools and resources and technology-related best practices for all students and teachers
c. Model and promote diversity, cultural understanding, and global awareness by using digital age communication and collaboration tools to interact locally and globally with students, peers, parents, and the larger community
6. Content knowledge and professional growth
a. Engage in continual learning to deepen content and pedagogical knowledge in technology integration and current and emerging technologies necessary to effectively implement the Standards•S and Standards•T
b. Engage in continuous learning to deepen professional knowledge, skills, and dispositions in organizational change and leadership, project management, and adult learning to improve professional practice
c. Regularly evaluate and reflect on their professional practice and dispositions to improve and strengthen their ability to effectively model and facilitate technology-enhanced learning experiences

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Learner Objectives: Students will understand how to explore, research, and communicate solutions to a real-world problem by using various means of technology to design and create a water filter, as well as demonstrate their learning through documentation and presentation of the process and outcome.

The "hook" or Introduction:

We will introduce this project by sharing the storybook***, Saving Salila's Turtle*** which explores the problem of water pollution. The story is about a child in India, near the banks of the highly polluted Ganges River, who tackles the real-world problem of water pollution through engineering**.** ***Saving Salila's Turtle*** is a component of the Water, Water, Everywhere lesson in the EiE Curriculum (https://www.eie.org/eie-curriculum/curriculum-units/water-water-everywhere-designing-water-filters) we have implemented in our Core Expansion specials rotation. ***Saving Salila's Turtle*** helps students see the connection between STEM lessons and real life and helps students make connections with the experiences of children of other cultures. The storybook sets the stage for us to integrate literacy, math, art, health, and social, studies with our engineering and science lessons.

Process:

Core Expansion	**Project Overview**
Media Center	Read book and introduce vocabulary
Art	Testing textures and their responses to water and collect data
Career	What is an Environmental Engineer? Guest speaker from Cobb County Watershed Program
Counseling	How to cope with situations in your life that you cannot control
Health and PE	Students will talk about health issues and the ability to conserve water; students will discuss ideas to actively advocate for their community health
Theatre	Make a commercial marketing water filters (camping along the Chattahoochee)
Computer Lab	Online research and design of water filters including 3D printing
Music	Study the culture and music of India
Cultural Connections	Use instruments to produce the sounds of India
Social Studies	Locating New Delhi, India/Equator and other points on map/globe; discuss water pollution along the Ganges
Math	Predictions, estimations, calculating price, plan and begin creating
Science	Build and test filters, improve, retest and compare
Writing	Reflect upon the process of building a filter and create a brochure

Product:

Students will plan, construct, test, and improve their water filter. This project will be meaningful to students because many of our students have lived in or have family members in countries that do not enjoy the easy access to clean/healthy water that we do. Students will explore global problems related to water pollution. After creating water filters, students can further expand the product by using it on water samples from the Chattahoochee. We enlist mentoring help from partners at the Cobb County Watershed and Waste Water Treatment Consultants in this branch of the project. One way we will integrate technology into the project is by participating in the Pen Pals Schools online project through their project "Joining Forces for the Environment. Students will share ideas with students across the world about the impact of pollution in their countries. Students will also use. Excel to help in the planning/budgeting phase of the water filter project which they will work on the Math portion of the project. We will use a STEM project rubric to assess the water filter project. The rubric a self-assessment, team assessment, and assessment by the teacher portions. The evaluation criteria include teamwork, scientific thinking, task completion, and reflection.

Technology Use:

Students will be using IPADS to create videos documenting the water filter production. They will also use video functions to record their trial runs for critique and sharing with peers for assistance. Students will use Excel to create spreadsheets for

collecting, recording and analyzing data during their tests. This data can be used to compare their success against other student's designs. Using water test kits, students will be able to analyze what is in their water samples. Students will have access to two 3-D printers at our school to create parts and prototypes for their water filters.

References and Supporting Material:
List materials that you used to develop this learning experience. List supporting materials that the instructor would need to implement this learning experience. What would need to be made? (Rubrics? Videos? Samples? Books) Include links to existing Web resources that a teacher would use to understand and implement this learning experience. (For example, if students will be using the Little Kids Rock Website, include the URL somewhere in your template.) Use APA 6 Style.

Boston Museum of Science. Engineering is Elementary Team. (2005). *Saving Salila's turtle: An environmental engineering story.* Boston, MA: Boston Museum of Science.

Discovery Education. (2015). *India: Pollution in New Delhi* [Video clip]. United States: Discovery Education.

Engineering is Elementary. (2018). *Water, water, everywhere: Designingw water filters*. Retrieved from https://www.eie.org/eie-curriculum/curriculum-units/water-water-everywhere-designing-water-filters

PenPal Schools.. (2017). *Joining forces for the environment*. Retrieved from https://www.penpalschools.com

United States Environmental Protection Agency. (2018). Ground and drinking water. Retrieved from https://www.epa.gov/ground-water-and-drinking-water

More Than a Worksheet. (n.d.). *Stem rubric*. Retrieved from http://www.morethanaworksheet.com/wp-content/uploads/2015/07/STEM-Rubric.pdf

What modifications have you made since you submitted your "idea" for feedback?
We adjusted the abstract to focus on the student task and moved some of the details that were originally in the abstract to more appropriate sections. We increased technology integration in several ways, including having students use IPads to create videos of the water filter production. Students will also use video functions to record their trial runs for critique and sharing with peers for assistance. We also added in the use of Excel for data collection and analysis and the use of our school's two 3-D printers with which students can create prototypes for their water filters.

Which indicators of Engaged Learning will be high in this lesson and Why?
Multi-disciplinary-Students will work on the areas of science, writing, math, social studies, health, and art
Culturally Responsive-Students will focus on the Chattahoochee River which is located within 2 miles of their school and homes.
Student as Explorer-Students will explore ways to solve the problem of pollution in the Chattahoochee
Student as Producer-Students will be creating brochures and flyers to explain the pollution problem as well as creating a water filter
Teacher as Facilitator
Teacher as Guide
Teacher as Co-Investigator-Teacher will learn about the problems facing the river along with the students. The teacher will collaborate with the local experts to have information to help students with their project.
Performance-Based Assessments-Students assessment will be based on their created and final projects. Using the rubrics, teachers can determine how deeply students have gained knowledge of the problem and an understanding of its solutions.

Which indicators would you like to strengthen?
We would like to strengthen the generative assessments indicator. Perhaps we could find a way to have students reflect on their water filters and presentations and have them revise the criteria which describe exemplary performance.

What LoTI level do you think this lesson would be and Why?
Loti level 6-Students will use real world tools to measure pollution problems in the Chattahoochee River. Students will use higher order thinking skills to understand the problems with water pollution in our area and other world communities. Collaborating with local water authorities, students will work on how to solve the pollution problem. Students will work to

create their own version of materials to inform people of the problem and come up with their own water filter. Using video students will record and document their progress and plans. They will also use video to document their trials and to improve their filters. They will use spreadsheet and graphing software to document collect data for analyzing and comparing to other projects.

What help would you like to receive from us?
We would appreciate suggestions for presentation software and anything that would strengthen technology overall.