Marine Science Truncated Portfolio

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Endeavor STEM Teaching Certificate

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Marine and life science is a content area that students in Virginia are expected to learn and have multiple environmental experiences that reinforce the essential components of the scientific field. Through our school's STEAM Lab, students are afforded various learning opportunities that engage them in environmental education, stewardship and human impact on our oceans and freshwater sources. This portfolio aims to exemplify how I have met the course objectives through the instruction and academic support of lessons and activities that immerse our students in marine and life science concepts.

Course Objectives

Objective One

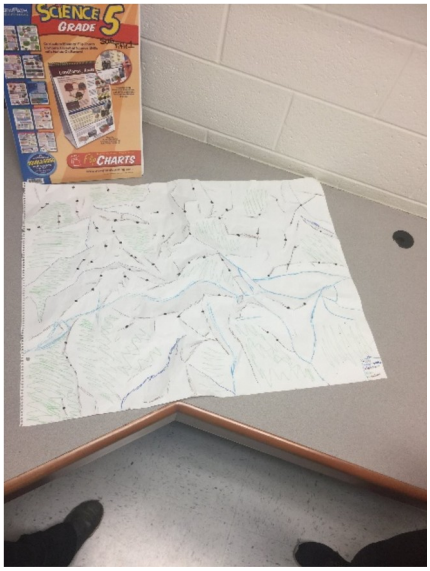
Students that display successful implementation of the program must demonstrate related content knowledge and themes (change over time—short term, seasonal, and geologic time; conservation; ocean processes; photosynthesis and food availability, and the interconnectedness of Earth's spheres) through activities and presentations[CITATION USS19 \l 1033].

The photograph below represents a project-based learning lesson that I conducted with our Kindergarten students. They were studying shadows in science and beginning time concepts in math. I worked with the students to create these sundials so that they could see the passing of time with the movement of the shadow across the face of the sundial. Students also could apply number sense skills when they added the numerals to the sundial to represent hours. This project helped students to see a correlation between the movement of the sun and the principles of shadows as nature of science concept.

This next photograph is of a presentation that was provided by a local meteorologist in our area. The program is StormWatch 7 Lunchbox Weather and the station's meteorologist, Bryan van de Graaf, came out to discuss concepts related to weather and atmospheric science to our fourth-grade students. Students had the opportunity to see the current technologies utilized by the weather team and the application of meteorological science to make weather predictions. They also learned that the oceans on Earth play a large role in weather and climate.

This photograph is of a paper watershed model created by students in small group teams. In fourth and fifth grades, students study watershed systems of Virginia and how human activity

affects the quality and health of the Chesapeake Bay watershed system. To extend this activity, students created a shower curtain-sized watershed map that included the natural and industrial resources that are prevalent in Virginia. Students analyzed the health of our watershed by pouring clear and "polluted" water on their curtain to estimate how certain pollutants are traveling into the Chesapeake Bay throughout various parts of the watershed.



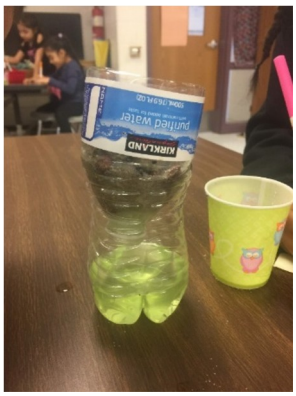
Objective Two

Students that display successful implementation of the program must illustrate the impacts of humans on the ocean and the ocean on humans[CITATION USS19 \l 1033].

In fifth-grade, students get introduced to the characteristics of the ocean floor. To support students' acquisition of the terms for each of the features, students work with a partner to develop a 3-D model of the ocean floor. They are provided a 2-D graphic organizer as a reference to assist them in creating their three-dimensional model. This activity occurs towards the beginning of the unit, so eventually, students will apply their knowledge of the ocean floor features to develop a food web diagram that displays the food chain that is associated with the ocean floor abyssal zone. Recently, our school participated in activities for World Water Day

2019. Fifth graders were able to make a connection between human impact and their conceptual understanding of the ocean floor's features and characteristics.

First graders begin learning about natural resources that are present in our surrounding environment. To emphasize the importance of water quality and stewardship, students develop a filtration system using other natural resources like sand, lava rocks and mulch to clean polluted water. Students contribute to the "pollution" of the water by adding materials such as cooking oil, dyes, paper scraps, and plastic pieces that represent our human footprint and the accumulation of waste. Groups first test individual filtering medias and then they use that data to create a 3-layer filter using a combination of the tested natural materials. The data was collected using photographs with an iPad device.

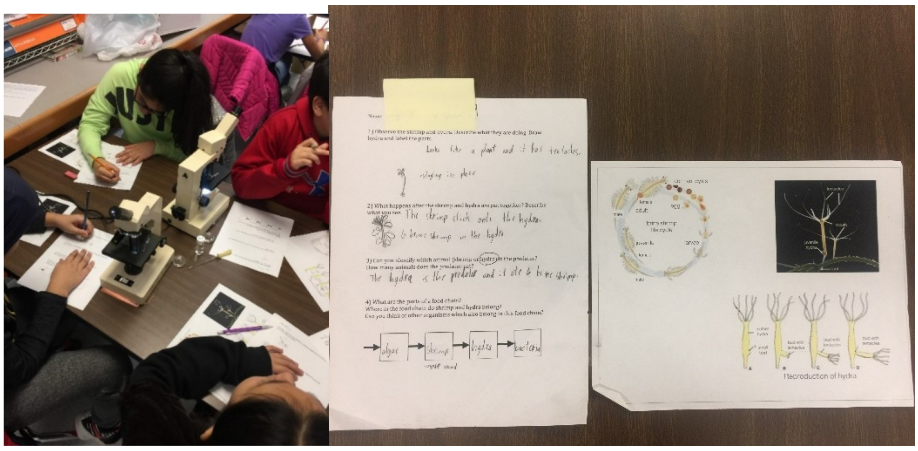


To further explore watershed concepts and water conservation, an environmental specialist came out to provide our fifth graders with a watershed presentation named “We All Live Downstream”. This photograph provides an example of students illustrating the movement of trash and pollutants within a watershed system. They learn about runoff in previous academic years, so this activity builds upon their prior knowledge of the water cycle to help them extend their learning about why our Chesapeake Bay is so degraded from the amounts of trash and pollutants that travel in our drainage basin.

Objective Three

Students that display successful implementation of the program must adopt inquiry and technology-based teaching and learning strategies and successfully implement them in the classroom[CITATION USS19 \l 1033].

In our STEAM Lab, it is essential that students interact with and apply the use of various technologies that help support their acquisition of new knowledge. Cells and their functions is a new concept for our fifth-graders. To help support their unit, we have collaborated with a local research center, Janelia Research Campus, that connects us with scientists and researchers in the biological field of science. Here, students were examining a food chain at the microscopic level. They worked in small groups to observe Hydra and Brine shrimp interactions. The use of microscope skills as an important technological tool for conducting the investigation was one of the core objectives for this lesson.



Our students have been fortunate to participate in a First Lego League and one of their competitions involved the designing and creating of a habitat that included a moving water source. Student groups were able to analyze the features and functions of a habitat by engineering a Lego-inspired ecosystem that illustrated the significance of water accessibility and movement in an environment. Students applied science and engineering concepts to create movement using motorized Lego pieces.

Features of our planet are introduced to our first-graders and they learn that our planet is mostly comprised of water. To help reinforce this concept, students learn to code a programmable robot, BeeBot, so they can play the "BeeBot Around the World" group game. The goal of the game is for students to move to the land portions of the world, based on a given cardinal direction, without "sinking" in the ocean. They must analyze and create a code that allows BeeBot to reach a piece of land safely. Students soon realize that the majority of area on our planet is water, so they understand the challenge of safely making onto land without "sinking" their BeeBot in the ocean waters.

Reflection

The instruction of marine and life science is an area of science that I feel is essential in helping students create a “big picture” view of how organisms on this planet are interconnected. This portfolio has helped me as an educator in seeing the various modes of instructional strategies that I have implemented in our STEAM lab to provide students with multiple opportunities to understand and internalize marine and life science concepts. The ACES curriculum aids educators and students in conceptualizing the many components that are part of aquatic science and a glimpse into the tasks that are employed by experts in the field. Through the development of this portfolio, I have been able to reflect on my own practices and I have discovered areas that I am very strong in and areas that I would like to gain improvement in so that I can continue to provide our students with a quality marine education through the supportive resources contained in the ACES program.

Through the implementation of the ACES program, I learned that students need chances to interact with the content at their own pace and with different grouping models. The program provides many collaborative interactions for students so that they can develop relation trust with their peers to accomplish a task. As a result, I found myself iterating lesson plans that I have so that they reflect the peer-to-peer learning that is reinforced by the lessons and activities from the ACES program. Furthermore, many of my lessons morphed into project-based learning tasks that granted our students with experiences that stretched across the curriculum. I began to understand the pedagogical approach to the lessons and soon understood that students need to draw upon their understanding of analyzing graphs, reading and interpreting maps and developing conclusions based on data. The natural multi-disciplinary nature of these lessons and

activities encouraged me to make iterations to my own lessons so that students could incorporate many different content areas to help them develop new knowledge and connections.

As a self-proclaimed long-life learner, the ACES program has broadened my own understanding of marine and life science. Learning those concepts through the lens of animal tracking has been a fairly novel concept for me in terms of classroom instruction. I have always been aware of animal tracking technologies, but this program has helped me to visualize using animal tracking as a tool for accumulating knowledge about animals, their environments and survival obstacles. Additionally, I have been able to unpack our district's standards in a way that has helped me bridge our state's standards with the lesson objectives present in the ACES lessons. Fortunately, our state's science standards include many marine life learning objectives that span across many grade levels. There is a vertical approach to the instruction of these concepts in our district and state, so I have found the ACES curriculum aligns very appropriately with the content and technological skills that are expected to be learned by our students. My goal is to implement the ACES lessons so that I can model and share those resources with classroom teachers, in hopes that they can also apply the program's learning goals to their own instruction.

Our school is currently implementing an instructional model that is referred to as Personalized Learning (PL). It involves the combination of student choice, data-driven decisions, use of technology tools, and student reflection. The ACES program is a supportive instructional resource that assists in the goals of PL for students. One main aspect of the ACES program is that it provides students with a lot of choice in their learning and a variety of avenues to engage in the content. They have the ability to work in small groups or individually to complete lesson tasks. From this, I have seen our students develop stronger collaboration and

communication skills with their peers. Classroom teachers have reported that their scores for classroom assessments in science have improved because students have interacted with the content in so many ways that they have bridged their learning with previous understandings and can see the connections between old and new knowledge.

On a personal level, I want to expand my use of the ACES curriculum by incorporating more of the lessons that involve the analyzing of map data to understand and make inferences about various marine animals. As a specialist teacher, it can be difficult to conduct long-term projects that involve a fair amount of technology because I do not have my own class. To combat this obstacle, I have a goal to implement portions of a ACES lesson or focus on one lesson objective that will align with a respective grade's science objective. Through this method, I feel that I can have a greater impact in modeling the usefulness of the map data technologies that are offered by the site. This also helps to differentiate the learning for students and as they become more comfortable navigating the site and its resources. Then, I will have more time with classes to develop independence and confidence in other students that may be struggling with the website's resources.

Ultimately, I want our students to see themselves as active learners that can have some choice and control over how they interact with and absorb marine life science concepts. The ACES curriculum is a resource that supports that pedagogical approach for teachers and students. Giving our students the tools they need to be successful learners should be the primary goal of educators. The development of 21st century learners involves the exposure and practice with career ready skills that mimic the real environment of scientists involved in marine life science. I appreciate and enjoy that the ACES curriculum provides teachers with a framework and resources that support this development of a future workforce.