

Presenter Name: _____

Subject (Circle All That Apply): **Science** **Technology** Engineering Arts Mathematics

Grade Level (Circle All That Apply): **Middle School** **High School** **Collegiate**

Topic Title: The Stanford Ocean Acidification Experience

Lesson Focus and Goals

SUBJECT OBJECTIVE:

1. To explain how climate change is affecting the oceans and the biodiversity in it

JHSL OBJECTIVE:

1. Work with students to get them a hands-on experience with Virtual Reality technology in the classroom.
2. Expose students to critical thinking skills in the STEM field.

Texas Essential Knowledge and Skills (TEKS)

Principles of Applied Engineering; c.6.B. Digital Electronics; c.6.B & c.6.G. Extended Practicum in Science, Technology, Engineering, and Mathematics; c.6.A. Computer Science I; c.1.A.

Structure/Activity

1. **Halliburton Introduction Talk** (*approx. 5 minutes, only if not have been completed before with students*)
Even though Halliburton is an oil and gas industry, Halliburton is also very invested in the next generation of STEM Workforce. The Javelina Halliburton STEM Labs provide the opportunities to enhance high level critical thinking and problem solving skills associated with sciences, technology, engineering, math and geosciences (STEM) to talented, first-generation, at-risk and underserved high school and undergraduate students. Halliburton provides meaningful engagement and resources for students that want to explore the engineering field.
2. **Project Introduction** (*approx. 5 minutes*)
Students will be explained how everyday carbon dioxide emissions can affect the oceans and they will be immersed in this Virtual Reality experience of underwater. Students will first be explained about CO2 emissions from cars and industrialization and how this CO2 reaches ocean surface and lead to the formation of Carbonic acid (H2CO3) and in turn corrodes the sea shells and other living organisms affecting the ocean ecosystem.
3. **Level 1** (*approx. 5 minutes*)
Students will be explained about CO2 emissions from cars and industries and how this can get mixed with water (H2O) in ocean and become Carbonic acid (H2CO3)
4. **Level 2** (*approx. 10 minutes*)

Students will be taken underwater into a reef in VR where they learn how a seashell under the phylum Mollusca is getting affected by the sea water becoming corrosive due to the formation of Carbonic acid. This increasing corrosion can affect not only the sea shells but also other species like the corral reef, some planktons which in turn affect the food web and the entire biodiversity of ocean is under risk.

Learning Objective

Content Review

Students should know that...

- CO2 is emitted everyday due to the industrialization
- CO2 is a greenhouse gas
- Acids are corrosive in nature
- Global warming occurs due to the greenhouse gas emissions

Students have been asked...

1. What is climate change?
2. Why is climate change a major concern?
3. What is ocean acidification?
4. What is carbon footprint?

New Content

Students will know...

- How CO2 emissions contribute to climate change
- Why creating an awareness about climate change is important
- What is carbon footprint and the importance of it
- How corrosive sea water affect the species living in it

Students will be able to...

- Explain the importance of mitigating climate change
- Understand that reducing carbon footprint is being initiated all over the world
- Understand what scientists and researchers are doing to mitigate climate change

Assessment

Students will be asked to complete a quick evaluation after the workshop so we can continue to improve our services.

Sources of Information:

1. Oculus VR application

2. <https://news.stanford.edu/2016/10/18/virtual-reality-simulation-transport-users-ocean-future/>

Note: This application requires students moving to the corners within their VR boundary boxes for few seconds and caution must be exercised when there are people or things near the boundary boxes