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Methods of STEM Education Elementary

Nature of Science Assignment

Due: 6/10/2019

In Coral Skeletons, Microscopic Portraits of Resilience?

Scientific Knowledge is Based on Empirical Evidence

This tenet refers to the idea that scientists look for patterns and order when making observations. Scientists use tools to make observations and make connections between evidence and explanations (nextgenerationscience.org). The article meets this tenet because it explains how scientists have discovered a pattern in the ocean's coral. It was suspected that the acidification of the oceans would lead to the coral's inability to form. However, through microscopic observations and experimentation scientists were able to determine that the coral will calcify their skeletons regardless of the acidity of the ocean environment.

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

This tenet refers to the concept that natural events occur in patterns and are often repeated in history (nextgenerationscience.org). There are natural laws of the universe that occur everywhere in nature. The article makes mention of the structure of coral and that it goes through a specific process of calcification. The article meets this tenet because it explains that all coral goes through the same process of calcification and repeats this process as necessary. Even though the acidity of the oceans is constantly changing, the natural pattern of coral calcifying still exists and will still exist in nature.

Science Addresses Questions about the Natural and Material World

This tenet refers to the notion that not all questions can be solved with science. Instead science knowledge only refers to what can happen and not what should happen. Furthermore, science knowledge can describe a consequence, but it is not responsible for society's actions (nextgenerationscience.org). This article meets this tenet because it talks about the effects of the natural environment on coral. It explains how global warming, which is caused by humans, is what we have to worry about affecting coral. Therefore, science can explain how the coral can still calcify its skeleton in acidic ocean water however, it will not be able to survive if the algae living within the coral is affected by man-made global warming.

Make Sense of Math Problems and Persevere in Solving Them

This math practice refers to the fact that students must understand a problem, figure out how to solve it and then work until it is finished (teacherstep.com). This practice helps students work on the process of problem-solving and allows them to use their current knowledge to work on a difficult problem. The article meets this tenet because the scientists were confronted with a question regarding coral's ability to calcify its skeleton in certain conditions. The scientists then conducted an experiment that involved crystallization of aragonite to see if the coral would be able to calcify in sea water as well. They were then able to conclude that the coral still has the ability to grow back its skeleton regardless of the acidic environment. Therefore, the scientists were able to understand a problem, figure out how to solve it and they worked on it until it was finished.

Construct Viable Arguments and Critique the Reasoning of Others

This math practice references the idea that students are able to discuss and explain math and agree or disagree with other students' work (teacherstep.com). This practice deals with effective communication skills within the field of mathematics. This article meets this math practice because it described how when a question arose about coral's calcifying qualities scientists set out to conduct an experiment. Various scientists had differing opinions on whether or not the acidic ocean environment affected the coral's ability to regrow its skeleton. Once the scientists concluded their experiment, they were able to communicate their findings and respectfully disagree with those who thought otherwise.

Attend to Precision

This math practice discusses the fact that mathematics involves precision and exact answers (teacherstep.com). It goes on to explain that if a step of an equation is missed or an incorrect answer is found then this result could cause a greater problem in the real world. The article meets this math practice because if the scientists who performed the crystallization experiment were inaccurate in their results, then they would have not been able to determine that coral can regrow its skeleton regardless of the ocean's acidity. If the scientists made an error or arrived at an alternate conclusion then this would have negative effects in the real world because we would not have been able to determine that the acidity of the ocean does not negatively affect the coral.

Resources

Next Generation Science Standards. (2013, April). Retrieved June 06, 2019, from <https://www.nextgenscience.org/sies/default/files/Appendix H - The Nature of Science in the Next Generation Science Standards 4.15.13.pdf>

TeacherStep. (2018, September 14). Breaking down the Common Core's 8 mathematical practice standards. Retrieved June 06, 2019, from <https://www.teacherstep.com/breaking-down-the-common-cores-8-mathematical-practice-standards/>

Yin, S. (2017, June 01). In Coral Skeletons, Microscopic Portraits of Resilience? Retrieved June 06, 2019, from <https://www.nytimes.com/2017/06/01/science/coral-skeletons-ocean-acidification.html?ribbon-ad-idx=8&rref=science&module=Ribbon&version=contextion&action=click&contentCollection=Science&pgtype=article>