The Nature of Science and Math

Analysis of The New York Times Article

"In Coral Skeletons, Microscopic Portraits of Resilience?"

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PART A:

Scientific Investigations Use a Variety of Methods: New technologies advance scientific knowledge

This article demonstrated that scientists use a variety of methods to investigate the natural world. Paul Falkowski and his research team used an advanced microscopy technique to explore the minute details of the calcification process in coral. Using this new technology the team was able to get a different perspective of the structure of mature coral skeletons. They believe the data they collected is evidence of a mechanism of control that is contrary to the prevailing school of thought. As humans develop new technologies they are able to explore natural systems in ways that they previously could not. Advances in technology have the power to enhance our knowledge of the world around us.

Scientific Knowledge is Open to Revision in Light of New Evidence: Most scientific knowledge is quite durable but is, in principle, subject to change based on new evidence and/or reinterpretation of existing evidence.

This article is a perfect example of how scientific knowledge is subject to change and how models and theories are a continuous work in progress. The researchers in the article collected data that they believe provides evidence for an alternative theory of coral calcification. An advanced microscopy technique allowed the scientists to collect data that was previously unavailable. In light of this new information and with further research, the current model of calcification may need to be adjusted or reconstructed entirely. Scientific knowledge is dynamic, and as such, scientists must continually refine their theories to take into account new findings.

Science as a way of knowing: Science is a unique way of knowing and there are other ways of knowing. Science distinguishes itself from other ways of knowing through the use of empirical standards, logical arguments, and skeptical review.

The research on coral calcification in this article was originally published in *Science. Science* is a peer-reviewed scientific journal read by scientists around the world. When a scientist submits an article to a peer-reviewed publication they are knowingly putting their research up for critical review. Their techniques, the data collected and conclusions made will all be scrutinized by other experts in the field. Reviewers will be looking for validity of methods, strength of data and the soundness of the author's argument and conclusion before the article is published. This ensures the accuracy and authenticity of the research conducted before the study is disseminated. As you can see in the article, even when a study is published it is not immediately accepted as

scientific fact by the entire scientific community. A dialogue begins between experts as they try to determine where this new information fits in with current or conflicting models.

PART B: Common Core Mathematics Practices

Construct viable arguments and critique the reasoning of others

Use appropriate tools strategically

Make sense of problems and persevere in solving them.

While there was not any math discussed explicitly in this article, I did see connections to some of the skills addressed in the Common Core Mathematics Practices. Scientists on both sides of the coral calcification discussion have taken data and used it to support their arguments on calcification. Dr. Falkowski uses the images of coral structure that he collected using a scanning helium ion microscope as evidence to support his suggested mechanism. Another scientist, Alexander Venn, cites a collection of data that refute Dr. Falkowski's argument. The scientists interviewed use the tools and the data collected from them to make assertions about calcification to support their theory. In doing research, scientists identify a problem or a question within a particular context first. They develop methods to answer their questions, collect and analyze data and refine their methods until they have sufficient evidence to support their claim.

References:

Yin, S. (2017, June 1). In Coral Skeletons, Microscopic Portraits of Resilience? *The New York Times.* Retrieved from nytimes.com