

February 2014

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Recommended Citation

Gottlieb, Emily (2014) "STEM Art Learning Outcomes," *The STEAM Journal*: Vol. 1: Iss. 2, Article 22. DOI: 10.5642/steam.20140102.22

Available at: <https://scholarship.claremont.edu/steam/vol1/iss2/22>

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STEAM is a bi-annual journal published by the Claremont Colleges Library | ISSN 2327-2074 | <http://scholarship.claremont.edu/steam>

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Keywords

STEM, animation, art, education

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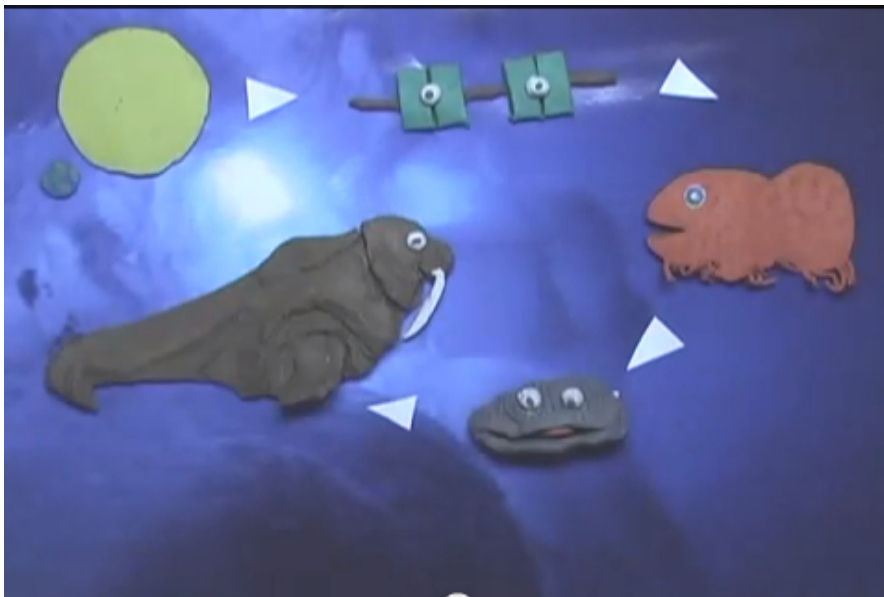


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STEM Art Learning Outcomes

Emily Gottlieb

This is a world of standardized tests, where many classrooms are “taught to the test”, where students demonstrate their mastery of material by filling in bubbles and those bubbles are used to measure progress from the level of the individual to the state. I propose a different method, called STEM Art Outcomes, which may be integrated into STEM learning. Through this method, students will explore STEM topics and demonstrate their comprehension of these topics. STEM Art Outcomes are pieces of collaborative artwork created by students to communicate STEM topics that they have learned. STEM Art Outcomes are tools to concurrently teach students STEM topics and to allow them to practice skills necessary for future work in STEM fields.



A young walrus explains how ocean acidification may impact the marine food web

To execute a STEM Art Outcome, students must engage all learning styles (visual, audio, kinesthetic, and all combinations therein) to synthesize information about STEM topics into completed art projects. They must select and create the most effective images needed to describe topics and to convey a message. To do this, students must learn how to visualize the problem or topic as a whole, adapt their project throughout its progress, and edit their own work. Visualization, adaptation, and editing are crucial skills

to solving problems in the STEM disciplines as well. For instance, a scientist must visualize the problem that she is working to solve in order to plan her research. As the research unfolds, unanticipated aspects of the problem will become apparent, calling for adaptation. The scientist must conclude her research by carefully editing the data that she has collected, allowing certain data sets that prove unimportant to fall to the “cutting room floor”.

STEM professionals must also learn to communicate their research in grant proposals, outreach to the general public, and education. In order for students to become effective STEM practitioners, they should be taught the link between communication and the study and practice of STEM disciplines at an early age. STEM Art Outcomes allow students to explore and practice this link by learning STEM topics and then clearly communicating what they have learned.

Furthermore, it has become important for STEM practitioners in some fields to communicate their research in order to inform policy decisions and social action. Conservation science, for instance, which lies at the intersection of human action and ecosystem functions, must be communicated to the general public simply and clearly so that people can make more informed decisions about their use of natural resources. STEM Art Outcomes for topics like conservation science can expose students to all of the previously mentioned skills: visualization, adaptation, editing, and communication. The resulting product can serve as an informative tool for the general public about that topic, thus extending the significance of the lesson far beyond the classroom.

In 2009, EPOCA (European Project on Ocean Acidification) commissioned students from the Ridgeway School in Plymouth, UK to create a short animated film entitled “The Other CO₂ Problem”, about ocean acidification (“EPOCA,” 2009). According to the school’s Deputy Head Teacher, Kevin Harper, the project “*enabled them to use skills and share understanding; the result not only educated them but enabled them to educate others (“Plymouth,” 2009)*”.

There exists great potential for dance, performance, and visual STEM Art Outcomes. While the Ridgeway School ocean acidification video is exceptional for the fact that it was funded, similar videos or other STEM Art Outcomes could happen with

little to no budget. I have used this example of a video STEM Art Outcome because it encompass all of the benefits of using art as a tool to learn about STEM topics and to practice skills that are important in STEM disciplines and have impact beyond the classroom.

In this world of standardized tests, there may appear to be little classroom time or money for STEM Art Outcomes. However, this is also a moment of changing science education standards, a moment when the need for better STEM communication is greater than ever. In this moment, innovative educators may embrace the opportunity to integrate STEM Art Outcomes in their classrooms. With little more than household objects, a digital camera, and imagination, their STEM lessons can have an impact that goes far beyond the bubble.

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