

Using STEAM in Marine Science: Incorporating Graphic Design Into an Existing STEM Lesson

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EXECUTIVE SUMMARY

This case summarizes two perspectives on inclusion of Arts in STEM/STEAM education, and how they influence the modification of an existing STEM lesson. Teachers are encouraged to use many instruction models throughout their careers, and inclusion of new methods can seem daunting. This case hopes to illustrate how STEAM education can be included in a classroom through intentional use of graphic design in an everyday lesson or a longer unit. Students in the case are asked to design and build a robotic arm that is capable of accomplishing a task such as move or grasp an object. The specific context is Marine Science in nature, but can be adapted to many other content areas.

LITERATURE REVIEW

PBL. PLTW. DBQ. Inquiry. 5E. Backward by Design. STEM. STEAM. Educators are exposed to so many methods, models, and hopefully, best practices, throughout their careers that it's no wonder we sometimes ask why and how we will incorporate them all. One challenge that faces teachers today is how to cover the breadth of required content that will be tested by the district or state each year and how to

incorporate methods (see list above) that seem to be “bigger” than the time allotted in the course. Specifically, in terms of STEAM (an acronym for Science, Technology, Engineering, Art, and Mathematics) education, we are faced with the thought that in order to incorporate content and lessons from each of the 5 included disciplines, we must create an elaborate project based lesson that might require weeks of instruction.

For example, the Dream Factory at Elizabeth Forward Middle School integrates all of these disciplines by having students set up their very own chocolate business—students work with a local candy factory, print 3-D molds for the chocolate, create artistic labels, analyze cost and sales, and even look at the chemistry of the chocolate itself (Keruskina, 2015). Projects like this are inspirational. They are experiential in nature, provide links between disciplines, allow for connections to be made outside the classroom, and promote rigor in education in an engaging and fun way for students. However, some educators may find challenges such as time, technology, and even support to recreate something similar in their own school.

STEAM education is by nature interdisciplinary, but it doesn't have to be a giant “project” like the Dream Factory. Some teachers are finding ways to inspire the creativity, collaboration, problem solving, and reflective learning that STEAM proponents encourage by simple tweaks to their everyday lessons. Take, for example, Henriksen's (2014) description of a teacher who integrates art into science lessons by having “students create visual advertisements to describe a science idea, or a concept, organism, and so on.” The classroom described features daily use of STEAM inspired lesson content, rather than a project or problem based approach, but is still successful in developing the skills sought in quality STEAM education programs. Students are afforded opportunities to use creativity, visual communication, critical thinking (through comparison, explanation, and modeling) and collaboration in this case, just as in the project based approach of the Dream Factory.

Why STEAM? (STEM + A)

My experience as an educator and in education, indicates that it is possible to incorporate quality STEAM learning on both levels—the in depth, time consuming project and the everyday lesson that allows for coverage of the many standards. According to Beers (2011), quality STEM Education “exemplifies the cross-curricular learning that is the foundation of a 21st-Century curriculum,” and promotes the 4 C's: Critical thinking and problem solving, Communication, Collaboration, and Creativity (p. 5). STEAM Education, then, should promote these skills, but additionally provide greater opportunity for new ways of seeing, thinking, and learning for each discipline through the additions of arts education.

Take a look at any science textbook, engineer's notebook, NOVA video publication, or architectural installation, and it is clear that art is already a fundamental

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