

What Is STEAM and Why Does It Matter?

STEM—the integration of science, technology, engineering, and mathematics—is an acronym credited to Judith Ramaley more than a decade ago when she worked at the National Science Foundation. She defined it not in the literal merging of these disciplines, but by describing the intent: “An educational inquiry where learning is placed in context; where students solve real-world problems and create opportunities—the pursuit of innovation.”

Educators, led by John Maeda at the Rhode Island School of Design, urged the insertion of art into this pedagogy, pointing to the importance of creative problem-solving and aesthetics in creating innovative solutions. Key elements in most educators’ definitions of STEAM include not only the merging of these disciplines, but also the critical learning processes: student-centered, project-based, interdisciplinary, iterative, and inquiry-driven. STEAM is more than a lesson or class; it is a culture focused on engaging students to solve real-world problems.

Science. The blending of art and science is not an unusual phenomenon. Prominent scientists are almost twice as likely to be engaged in sustained artistic practices as the general population. And 94 percent of Nobel laureates engage in significant artistic practices.

Art requires observation skills and practice, which are also key to science. Visually representing data is essential in science and math. Skills taught in a rigorous art education program—abstracting, analyzing, imaging, empathizing, modeling, recognizing patterns, playing with ideas and objects, synthesizing, and transforming—are also used by professional scientists.

Technology. Technology and art have always been linked in a symbiotic relationship. From prehistoric airbrush technology to the printing press and today’s digital cameras and 3-D printers—art is tied to the technology used to make it.

Engineering. Engineering and art share iterative processes of pre-visualizing, creating and refining, and using additive and subtractive constructive processes. Both disciplines are rooted in inquiry, imagination, design, building, evaluation, and refinement—all steps in solving problems.

Math. Math and art share content, habits of mind, and vocabulary. Think of how line, shape, and



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measurement are at the core of both fields. Ancient Greeks were inspired by the golden ratio and Fibonacci numbers. Tessellations and geometric forms have been used by ancient and modern civilizations. And coding—a hot field today—uses mathematical thinking and visual patterns to convey meaning.

So, what can educators do to authentically integrate art into STEM? Consider these suggestions:

- Collaboratively engage students in open-ended problems that are relevant to their lives;
- Address standards from each of the cross-curricular disciplines; and
- Have students practice the iterative design process, which includes multiple assessments, redesigns, and communications for continuous improvement.

Traditional teaching usually starts with adults deciding what students need to know. But STEAM problem-based learning starts with an interesting challenge that inspires students to figure out what they need to know and how to solve problems.

To more deeply engage in STEAM practices, attend the National Art Education 2018 Conference, March 22–24, 2018, in Seattle.

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