

Standards Analysis

Julie Marsteller

E-STEM

Last week I had a student explain to me an assignment he was working on in a different class. He wanted me to know that the skills we had been focusing on in Science and STEAM he was also using in English, which for him was an epiphany for me a golden moment. This connection is apparent from a study of the different standards presented in Science, Arts and Mathematics. As a professional goal early in my teaching this connection or wholistic view of learning has always been present. Today's standards-based curriculums have based much of their objectives on shared skills. In this paper I will do a brief analysis of how problem solving, and engineering design practices are shared by varying disciplines as core applications.

The engineering design process is a set of behaviors used to systematically solve problems. It gives labels and goals to each component which enables an individual to approach problems in a more global method for communication purposes. The "Engineering Design Method" article describes the process taught at Dartmouth College, even at the college level the outcomes and necessary skills are similar to those emphasized in the earliest levels of the NGSS and other standard documents.

The "Standards of Mathematical Practice"(CCSS.Math.Practice.MP1) states that when students are attempting to solve problems, the first thing they need to do in make meaning from the problem, analyze the constraints, consider solution pathways, evaluate their progress and adjust as needed. These skills are the exact ones used in the NGSS in the description of Science and Engineering Practices, in Engineering Design Standard for all three levels, 3-5-ETS1, MS-ETS1 and HS-ETS1. Each requires students, at their academic level, to define a problem, define criteria and constraints, evaluate solutions and develop models. The Core Arts Standards students are required to make sense of problems, analyze work, convey and communicate meaning and evaluate criteria. Again, all of this action are required in the engineering design process.

The relationship between these disciplines as seen through the lens of engineering design is parallel in that the skills necessary for success overlap. The primary difference is the actual heart of the discipline itself: The base of mathematics is numbers, the art is creative express and the science, the understanding of how and why. Each of these taught in seclusion leaves a diminished understanding of the other as well as creates blinders to whole

world view. Using the common skills and language of the engineering design processes individuals can become more engaged in the world around them, find more purpose in their own pursuits and feel involved in a world that is becoming less personal and more isolating.