The E in STEM: Meaningful Content for Engineering

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Standards Analysis

In this paper, I will examine mathematics, science and technology and engineering education standards documents to analyze how they overlap in the area of engineering design and problem solving. My focus is on Common Core Math Standards, Next Generation Science Standards and The International Baccalaureate Primary Years Programme Science Scope and Sequence as I am currently working in an international school and it will help me to better understand how to connect to my own teaching.

In the Common Core Math Standards (2010), there are eight general pedagogical goals suggested for all mathematical education. The first practice of Common Core math is “Make sense of problems and persevere in solving them”. It requires students starting by explaining to themselves the meaning of a problem and looking for entry points to its solution.

The Next Generation Science Standards provide a foundation in engineering design that allows students to design solutions to problems that arise from phenomena. The Framework (2017) recommends that students explicitly learn how to engage in engineering design practices to solve problems by defining and delimiting engineering problems, designing solutions to engineering problems and evaluating potential.

In the Primary Years Programme (PYP), the science component of the curriculum (2008) also provides opportunities for students explore various topics of science and develop a range of science-specific skills and processes. One of the important skills is problem-solving. “Identify or generate a question or problem to be explored (for example, students will ask questions or show

curiosity about the natural and physical environment; ask questions or identify problems that may lead to investigations; pose questions and define problems that will facilitate effective investigations or inquiries).”

Both Common Core Math Standards and IB PYP Science Scope and Sequence see students as a problem solver and encourage students approach learning by identity problem first, then investigate potential solutions. They describe similar process of problem-solving that cultivate students’ ability to analyze, monitor, evaluate their learning progress. They only difference is that IB PYP SS puts more emphasis on students’ agency and inquiry. Students are encourage to ask questions about the world and identity problem. NGSS also focus on developing students’ problem-solving skill. It involves engineering design as practice that promotes problem solving and project-based learning while strengthening critical thinking skills. It helps develop students’ engineering habits of mind by tying together multiple disciplines, and enabling students to work in teams to solve real-life problems.

Reference

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