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Standards Analysis Assignment

Problem solving and engineering design are universal threads that run through many fields, both in and out of the STEM world. They tie together the processes followed by artists, scientists, engineers, mathematicians, Silicon Valley industries and more- emphasizing the iterative process of working towards a more efficient and better product or solution. Though the verbiage may differ among content areas, there are common ideas and patterns among each content area.

As a mathematics teacher, I am most familiar with the applications of these engineering ideals to mathematics. These are especially present in the Standards for Mathematical Practice in the Common Core State Standards. These standards address the need to ideate and work through problems with their discussion of modelling, sense making, and perseverance. They address the cycle of critique and revision with their discussion of constructing viable arguments, critiquing reasoning, and observing regularity in repeated reasoning. I am also impressed at how they addressed the use of tools appropriately and efficiently, something which is important to engineering.

These ideas are also embedded in the Standards for Technological Literacy. The stand out standard within these is the specific addressing of Design. Engineering design is specifically mentioned, as is troubleshooting,

research and development, invention and innovation, and experimentation in problem solving. Students are also asked to specifically apply the design process. The iterative process can be addressed through the study of technology and society, seeing the revisions technology has consistently experienced throughout history. They also study various technological systems and are make critical arguments about the impact of these technologies on these systems.

The Next Generation Science Standards also explicitly mention Engineering Design in their high school standards. These standards specifically address breaking large problems down into smaller, more manageable ones. They also specifically mention the use of constraints as a limiting factor in a problem and use of modelling to test proposed solutions. These tie many aspects of the 2 previous standards together. The Standards for Mathematical Practice discuss modelling real world phenomena and the Standards for Technological Literacy asks students to apply the design process, but the NGSS standards requires students to use technology to model within an application of the design process. Science, here, seems to act as a tie between the more theoretical world of mathematics and the more practical world of engineering. The mathematics standards do not specifically address real world issues and the technology standards lean almost entirely into the study of real world scenarios. Science specifically mentions qualitative and quantitative constraints and asks students to both design and critically evaluate solutions to complex problems.

These engineering standards truly do tie these content areas together. They address something bigger than specific concepts students must master. They address how students can continue to be lifelong learners and lifelong problem solvers. They can be tied to humanities and arts, not just STEM fields. They truly build a bridge between “school” skills and “real world” skills our students will need.