STANDARDS ANALYSIS
Course: The E in STEM
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After examining three sets of standards -- the *Common Core Math Standards*, the *ITEEA Standards for Technological Literacy*, and the *Next Generation Science Standards* – I decided to focus on certain sections of each set of standards for this report. The eight *Standards for Mathematical Practice* (http://www.corestandards.org/Math/Practice/) within the *Common Core Math Standards* seems to be the math standards related to problem solving; these math practice standards also seem to appear in *each* set of math standards for *each* content-specific area for *each* grade level. This tells me that these math practices are considered invaluable throughout the whole common core math curricula. Within chapter 5 of the *Standards for Technological Literacy*, there is a discussion of technology standards related to engineering design and problem solving (2007, pp. 90-112). The *Next Generation Science Standards* has a set of standards focused on engineering design, and I decided to concentrate on the high school level standards (http://www.nextgenscience.org/dci-arrangement/hs-ets1-engineering-design); there are also several standards within each science content area that are focused on engineering design/problem solving, but I think that the set of engineering design standards could be applied to any of the science content area standards.

A general similarity between these *sections* of the math, technology, and science standards is that they can all be applied to the content-specific standards; they all give applicable and general guidelines for encouraging collaboration and perseverance in solving problems presented within the classroom for each subject, which can also be transferred to the concept of multidisciplinary lessons/units. For example, each *section* takes into account the complexity of problem solving and/or engineering design; learners have to research and consider various factors for solving problems (i.e. constraints, givens, qualitative criteria, quantitative criteria, possible connections/relationships to society, etc.), learners likely have to break down problems into simpler problems to solve in order to solve the bigger problem, finding a solution can require lots of trial and error, and the learner must question the solution/final design to determine if it is logical and/or could continue to be modified. Problem solving and/or engineering design can be regarded as never-ending processes.

A main conspicuous difference between these *sections* of the math, technology, and science standards are the considerations specifically for math, technology, and science respectively. For example, the *Standards for Mathematical Practice* section focuses on modeling and designing with *mathematic* concepts while solving problems; furthermore, the math standards overall seem to be more directly focused on problem solving without a clear focus on engineering design as well. The high school engineering design *science* standards seem to emphasize real-world problems to solve – *global challenges* to take into consideration (i.e. climate change). The technology standards seem to also be focused on real-world problems to solve – but with a focus mostly on the business and industry sectors of the real world.

These differences, however, do not seem profound enough to separate the math, technology, and science domains for engineering design and/or problem solving concepts/skills. I feel that engineering design problem solving helps to unify the math, technology, and science courses; however, it obviously requires planning and collaboration between the subject teachers to prepare lessons/units that bring together the different domains to utilize engineering design to solve a problem(s) presented as a common problem(s) to solve between the different classes. I also feel that presenting real-world problems in the different courses to solve via engineering design helps to prepare learners for the real world where they have to take into account different aspects of problems, collaborate with others to solve personal and/or job-related problems, and accept 'failure' while trying to solve real world problems. Engineering design problem solving definitely helps to encourage the collaboration that is necessary for encountering real world problems beyond the classroom.

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