

Kelsey Birdwhistell  
Standards Analysis Engineering

There are many different standards that relate to problem solving and engineering design. However, when considering my content as an English and language arts teacher, one that stood out the most to me was ELA-Literacy.W.8.7. With this standard, students are required to “conduct short research projects to answer a question (including a self-generated question)” and then devise possible solutions to these questions by “drawing on several sources and generating additional related, focused questions” that allow for multiple avenues of interpretation and solutions. This ELA standard connects to STL benchmark standard 8 2Q: Predict outcomes of a future product or system at the beginning of the design process; NGSS standard ETS1.C: The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately an optimal solution; and CCSS Math Standard 6.SP.5: Summarize numerical data sets in relation to their context.

These standards are similar to one another in that the driving force for mastering the standards is the motivation to pose and solve a problem - a feat that can be more easily said than done. Together these standards communicate the complexity of identifying a problem, the research involved in devising possible solutions and outcomes, and interpreting data to determine the impact of a particular solution. Not to mention the importance of making observations and changing track in the middle of a project to arrive at the best possible (or most pertinent) outcomes.

These standards are different in that they are almost stair-steps to one another. The ELA standard forms the foundational basis for inquiry and leads to informed questioning,

decision making, and interpretation. The engineering standard focuses on making predictions based upon the data that was collected through the research and asking a whole new set of questions based on the inquiry that has already been established. Following up the predictions, the science standard builds upon the given prediction with an opportunity for revision and modification to best adapt to the developed line of inquiry. Finally, the math standard targets a student's ability to interpret numerical data in context as a source of information. A student must be able to take this data into account and not rely solely on informational text. This interpretation of data may then lead to more additional research, and so the building process starts over once again.

I can appreciate the idea of engineering design problem solving as a unifying concept or skill, because it really is a "big picture" idea. I think it is helpful for students to understand why they are engaging in a particular task. It can be extremely motivational for them to have an idea of the importance or the implications of their line of questioning. Not to mention that it can be very rewarding for them to start with a problem they are passionate about and for them to follow the process to the end to see how they might be instrumental in developing a possible solution. In the same way, if students become derailed or follow a side-line of inquiry along the way, it could also give them a bigger sense of the problem at hand and help them to understand that many issues are not always clean cut or black and white as they may seem.

My only concern with implementing something like this would be making sure that I could break down the steps into manageable pieces for my students and to be able to provide them with enough guidance and feedback to keep them on track throughout the process.