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Round Reflection

Round 1/30: Engineering Lesson 3: Classify Different Bridge Materials and Folding Techniques by Strengths and Weaknesses

After reviewing student work as well as the videos taken from both lessons, I noticed some obvious areas of great learning happening and some areas to change the next time I teach this lesson. By discussing my Rounds questions with my peers and mentors, I could really focus on my own teaching and facilitation of this style of lesson. This unit requires me to have a hands-off approach and allow students' to participate in the productive struggle of uncovering their own conclusions around the selection of materials, folds, and techniques for collaborating to build a successful bridge model.

I was very interested to see if there was evidence of students using prior knowledge about the Engineering Design Process to guide their thinking while exploring the materials and folds. In both lessons, I wanted to know if my students could hold thoughts about the next steps and final tests while also actively engaging in the classification of the materials and folds. After review and discussion, I know that some students were able to think ahead and back around which step in the EDP we were currently in, where we were, and where we are going next. This shows me that if I want students to get better at holding multiple thoughts in their minds, I need to scaffold and model what that looks like as well as provide charts or accessible information to help them articulate those thoughts.

In general, these lessons are the lessons in the unit which most relate to the only Engineering-specific standard. The standard is based around having students be able to analyze data from two different objects intended to solve the same design problem and compare the strengths and weaknesses of how each object performs. This is exactly the skill I wanted my students to practice in these two lessons. Not only did I want them to diversify their thinking around what a bridge's design can be and get more creative with their models, I wanted to be intentional about how I introduced those concepts.

My students showed a large improvement in their collaboration skills in these lessons. I was very pleased with their ability to split up the work of writing, designing, recording, and testing. I saw some groups struggle but also persevere through their struggle. Students were able to be successful in their models and most could articulate why a material or folding style would be good or bad for their bridge designs. They understood which materials were more effective and which designs ended up being more effective even if they had a different hypothesis at the beginning of each lesson. Students' abilities to change their minds and update thinking to solve problems shone through in these two lessons regarding choice of materials and folds.

Something I noticed after the first lesson that did not change in the second was that despite my students being able to verbally or physically explain their thinking around their reasoning why a material or fold would be good or bad for bridge-building, they were not successful in recording those thoughts in the chart in writing. Most students left the "why" section of the chart blank as you can observe in the Student Work Appendix below. This concerned me because I was not sure why they were not able to write those ideas down onto their assessment but could explain their thinking when prompted verbally.

In my post-Round discussion we spoke about ways I could have improved this lesson and my instruction to make space for even more success for my students. Like I had mentioned, I was not sure why they had so much success in collaborating and explaining their thinking to me and each other but unable to produce quality written work to reflect that thinking. One suggestion that really stuck out to me which I knew I had skipped over was providing vocabulary and visuals for my students. I needed to show them the words I needed them to use and we needed to define those words. My students were not writing what I expected because I had not provided the right scaffolds necessary for them to use and take ownership over the language they needed to be successful at that aspect of the lessons. This is a concept in which I will be drafting my next lesson completely around.

It is extremely important that my students understand the “Improve” section of their EDP for this project because as I had mentioned before, the only engineering standard they have to accomplish in second grade is around being able to compare similar models designed for the same purpose and their effectiveness. I knew my students could do this work because I had heard their thinking aloud. I need to do an intervention and explicitly model and scaffold what I was expecting them to get out of these two lessons.

This intervention lesson would have visuals of the materials and folding techniques for students to see. We would collectively define each one and identify its strengths and weaknesses regarding this project and the use we need from it. Then, students will work independently to reflect on these lessons and begin to make improvements to their designs to be retested in the final design.

Another suggestion made to me in the post-Round discussion which I had not considered was the color or paper I chose. In the video we watched, and in the screen capture I included in their packets for them, there are four different colored papers to represent the different folding techniques. I only provided orange paper because I assumed it would not make a significant difference. In the film and from my peers comments, I realized that most pairs got confused slightly around which models they had made and tested and which ones were left to do. Some students made duplicates and omitted types of folds which could have also contributed to them having difficulty completing the chart.

Moving forward, I need to reevaluate the ending to this unit and design a new lesson to help solidify the learning goals from these lessons in order to ensure my students can make well-thought out and informed decisions regarding how to improve their designs and models to make the strongest bridges possible. After that intervention, we will make our final designs and conduct a final test. It is crucial they understand why they improve and how to make rational choices for improvements.