Lesson Review – Mars Rover Pasta Lesson

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https://www.jpl.nasa.gov/edu/teach/activity/planetary-pasta-rover/

I chose the Mars Rover Pasta lesson to conduct with a 5th grade class. I chose this lesson because of the 5th grades current lesson on Space and the moon phases.

Engineering Design:

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. 3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. 3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems ♣ Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1) ETS1.B: Developing Possible Solutions ♣ Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2) ♣ At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2) ♣ Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3) ETS1.C: Optimizing the Design Solution ♣ Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)

Crosscutting Concepts

Influence of Engineering, Technology, and Science on Society and the Natural World ♣ People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1) ♣ Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)

I began the lesson with a video on the Mars Rover that I found on You Tube. (Click on MARS ROVER ADVENTURE in Powerpoint) It was a great "hook" for the kids because I introduced the lesson by telling my students that they

were now working for NASA! We watched the movie and discussed what might have happened to the Rover. We made a list of possibilities and then we looked at what might be the best criteria when building a Rover. Then I presented the task. (Please see the Powerpoint that I have included). Their task was to re-create a news Mars Rover that would allow it to maneuver in the valleys of Mars and hopefully not lose communication with Earth. I then asked the students to get into groups and there would be 4 assigned roles: Engineer, Accountant, Quality Control Manager and Presenter. (See job responsibilities in Powerpoint) Each student would be primarily responsible for each of these responsibilities, but all would be required to participate in the building of their Mars Rover. I then re-created the budget forms and I used “Deal or No Deal” money. Each team had $150,000 to spend on their Mars Rover and I gave each team their $150,000. I also re-created the pasta names and created a price list for each of the supplies that would be used to build the Mars Rover: Heat Shields(lasagna noodles), Radiation and Heat blocks (Styrofoam blocks) , Radiation Protectors (Manicotti pasta) , Wheel Rods (spaghetti), Curly Rods (curly pasta), Colored Curly Rods (colored curly pasta), and Wheels (life savers). I created a Mars Rover Design sheet where they had to draw their design first before they began the process of building their project. (see artifacts in Powerpoint). We decided to go to the science lab to begin the process of building their Mars Rovers. I was super impressed by some of the designs I saw! Some teams were getting frustrated as the pasta broke at times. I reminded them that if they needed to purchase extra supplies, they needed to be sure they had enough money to purchase their needed supplies. We ran out of the heat blocks, so they were forced to use some of the other materials available. We discussed the real-life scenarios that engineers go through when building their prototypes. Sometimes their first build is not necessarily their best. Frustration set in on some of the students as they realized that it was difficult to recreate their designs on paper. The real test came when they realized that their Rover would not move because they had glued their wheels to the body of their design instead of designing it so the wheels would move. We then discussed the solutions to each of their problems to see if they could critique their Mars Rover for the future! I have attached a short video of their results. I closed the unit by discussing the constraints of the project (money, materials, and time). We had each team present their Rover to the class and discuss why their build would be the best Rover to present to NASA! I created a certificate(see in artifacts in Powerpoint) to present to each student!! It was a huge success!

The changes I would make would be to put students in groups of 2 rather than 4. I found some students not participating in the building portion of the task and allowing the other teams members to complete the project. I would also allow more time to build as we seemed to run out of time. Otherwise it was a project I would complete with my students in the future!