

Heather Wetzel

6/10/19

Methods Class

Nature of Science & Math: Analyzing the Presence in Everyday Communication Assignment

The article I chose to analyze the nature of science and math was, Blue Origin Unveils Lunar Lander, by Jeff Foust. The article describes the unveiling of Blue Origins Blue Moon Lander, which is being developed and tested. The Blue Moon Lander is a concept being developed to support human returns to the moon by 2024. The article includes quotes from Blue Origins owner, Jeff Bezos, about the expectations, research, and testing of the Blue Moon Lander, as well an engine named BE-7.

Science is a Human Endeavor

In the article, Mr. Bezos explains that his company has been working on the Blue Lander for over 3 years with many revisions over that period of time. NASA awarded Blue Origin with two awards in 2018, "One of those awards covers cryogenic fluid management needed for the lander's propulsion system and the other involves testing of the landing technologies, such as lidars altimetry sensors." (Foust 2019) According to Appendix H, "Scientific knowledge is a result of human endeavor, imagination, and creativity." (NGSS 2013) Blue Origin is demonstrating imagination and creativity with revealing the full-sized model of the Blue Moon Lander, as well as working on prototypes for multiple years using teams of experts. As stated in the article, Mr. Bezos is working towards being able to land humans on the moon by 2024, which is also supported by Vice President Pence's new policy.

Scientific Investigations Use a Variety of Methods

According to Appendix H, "Scientific investigations use a variety of methods, tools, and techniques to revise and produce new knowledge." (NGSS 2013) The article discusses how the Blue Moon Lander will use liquid hydrogen and liquid oxygen propellants. These propellants already exist, but Blue Origin will be using them in a new manor by getting the hydrogen from the water on the moon. Water on the moon is information that has been previously obtained by other space missions. Using the water from the moon to help propel the lander and other aspects of the vehicle shows that Blue Origin is using a variety of methods and tools to revise and produce new knowledge. Bezos stated, "Ultimately, we're going to be able to get hydrogen from that water on the moon, and be able to refuel these vehicles on the surface of the moon." (Foust 2019) The article also describes how the boil off from the liquid hydrogen will be used to cool the oxygen tanks and producing electrical power.

Science is a Way of Knowing

According to Appendix H, “Science knowledge has a history that includes the refinement of, and changes to, theories, ideas, and beliefs over time. “ (NGSS 2013) In the article it states that, “...the lander has gone through several design cycles to arrive at the current concept. The work has included refining the requirements and the vehicle design...” (Foust 2019) Blue Origin has had to come up with models and prototypes to test their theories. The testing reveals new information for Blue Origin Engineers to use to refine and modify their theories, as well as using data to make changes. The Blue Moon Lander has been in development for over three years, so that also shows that beliefs over time have/could change based on the evidence collected.

Persevere in Make Sense of Problems and Solving Them

The Blue Moon Lander is a concept in development to meet the needs and wants of humans returning to the moon by 2024. Blue Origin began developing and testing their Blue Moon Lander and an engine named BE-7 that powers the spacecraft over three years ago. They addressed a challenge by creating a model and testing that model over time. The article describes how the Blue Moon Lander will use liquid oxygen propellants rather than storable hypergolics, which indicates that the engineers and scientists have looked into what will work the best and be sustainable for the trip. They also worked to solve the issues of cold lunar night, which last 2 weeks. Bezos stated, “We chose hydrogen fuel cells for this vehicle rather than solar cells because we want to be able to survive the lunar night.” (Foust 2019)

Attend to Precision

Landing on the moon takes precision and adding humans and/or cargo adds to the necessity of that precision. The article states, “The engine will be able to produce 10,000 pounds-force of thrust and is deeply throtttable.” (Foust 2019) It is important for the engineers to know exactly how much thrust will be produced to make sure that the Blue Moon Lander will reach its destination. The company plans on having an initial version of the lander ready by 2023. A full lander that will include both descent and ascent stages is planned for 2024. That lander will include astronauts aboard for testing. In order for Blue Origin to safely use astronauts they will have to test their lander and engines, showing that they are safe for humans.

Use Appropriate Tools Strategically

The article states, “The spacecraft is able to land 3.6 metric tons of cargo on the lunar surface, with a “stretch tank” version capable of landing 6.5 metric tons on the surface.” (Foust 2019) Engineers have to be able to use technology to create models of the Blue Moon Lander and the BE-7 engine. They also have to use formulas and algorithms to determine the volume that the spacecraft will be able to carry.

References

1. Foust, J. (2019, May 9). Blue Origin Unveils Lunar Lander, *Spacenews*, <https://spacenews.com/blue-origin-unveils-lunar-lander/>
2. NGSS Release, (2013, April). Appendix H, <https://www.nextgenscience.org/sites/default/files/Appendix%20H%20-%20The%20Nature%20of%20Science%20in%20the%20Next%20Generation%20Science%20Standards%204.15.13.pdf>