

Lucy Blackford
Astronomy and Space Science, Spring 2021
Teach: 9/10 Physics to ELLs at a transfer school

Lesson Implementation & Reflection:

1. For my lesson I talked about the Perseverance Mars rover landing in February. I started with some background information on Mars. Then I used a youtube video of the descent from NASA. I chose this video because it showed the velocity and altitude of the rover as it was landing. I took the video and created an edPuzzle with it. This way I could embed questions into the video. The students had just finished a unit on speed and how to calculate speed. This video fit in nicely to connect calculating velocity in space as the rover was landing. I embedded multiple choice questions about calculating how long it would take the rover to land if it continued on the trajectory it was on without slowing down. The students were able to analyze the units and calculate the time. Due to time constraints with the pandemic I only talked about speed and we did not get into acceleration with the unit, so that is why I did not calculate the acceleration of the rover as it landed.
 - a. Video: <https://www.youtube.com/watch?v=4czjS9h4Fpg>
 - b. My Edpuzzle: <https://edpuzzle.com/media/60415b7777e20242a00e1077>
 - c. My powerpoint from the lesson: [PowerPoint Presentation](#)

2. Student Work from EdPuzzle

- a. A multiple choice question example to show that they needed to know the equation and which units to use to solve for speed.

If the rover continues with the speed of 450 m/s, how long will it take to travel the 12 km (12,000m) and land?

Berte, Alassane

time = distance / speed
time = 12/450 = 0.26 s

time = distance * speed
time = 12,000*450 = 5400000 s

time = distance / speed
time = 12,000/450 = 26.67 s

time = speed / distance
time = 450 / 12 = 37.5 s

100 of 100

Comment

- b. After having some multiple choice questions they had to solve on their own and show their work. Question: *The current speed is 30 m/s at an altitude of about 300 m. How long will it take to land? Show your work.* As you can see, there was a variety of work shown.

Barrie, Thierno	$300/30 = 10$
Thiam, Assane	$300 / 30 = 10 \text{ s}$
Koumbassa, Zakaria	$t = 300 \text{ m} / 30 \text{ m/s} \ t = 10 \text{ s}$
Titikpina, Yamin	Time=distance/speed distance=300m speed=30m/s $300/30 \ T=10\text{s}$

c. The next question asked, "Why are they celebrating?" Students gave a variety of answers including some that were very specific.

Barrie, Thierno	Because they achieved their mission after many years of study
Thiam, Assane	They getting signals of MRO and the perseverance safely on the surface of mars, and they are ready to begin seeking the signs of past life.
Koumbassa, Zakaria	These people celebrating because the rover land on mars.
Titikpina, Yamin	The astonaut lande safely on planet mars.
Danso, Mahamed	because they arrive safe way to mars
Nguyen, Thi Cam An	Because the spaceship was safely on the surface on the Mars, human are ready to begin seeking the signs of past life.
Diallo, Oumou	they celebrated because touchdown confirmed perseverance safely on the surface of mars they are ready to begin seeking the signs of past life.

d. The last question asked, "Why do you think the speed changed from 450 m/s, to 145 m/s, to 100 m/s, to 90 m/s, to 83 m/s, to 75 m/s, to 30 m/s before landing? What caused the change in speed?" Students thought it had to do with the mass, the different gravity on Mars, or the wind.

Barrie, Thierno	I think the robot getting closure and the parachute can hold the pressure, the parachute did that in my opinion.
Koumbassa, Zakaria	The speed changed because the gravity are not be the same.
Berte, Alassane	i think the speed changes so many times because of the wind.

3. Lesson implementation experience and reflection:

Whenever I do astronomy or space related activities in class or lessons the students are very engaged and interested. As always I wish I had more time with them to explore the content. This activity provided a nice break from our normal routine and made me wonder about implementing more astronomy into my units. I started class by asking the students three

questions. Have humans been to Mars? Have we seen photographs of Mars? How do we learn about other planets? I was surprised by how many of them answered that yes humans have been to Mars. I want to blame movies for that. Only one or two of my 54 students answered that we had just recently landed a rover on Mars. They are high school students and do not follow NASA updates as often as I do.

After the introduction to class I shared some facts about Mars exploration, Mars the planet, and the Perseverance rover. I shared some of the first images from Perseverance as well. Those images amaze me because they look so much like a desert here on Earth. In this part of the lesson it was more teacher centered, but the students were interested and engaged and wanted to know more. They asked questions about how the rover was powered on Mars and how it moves. This led to more investigation and discussion. I also was able to tie it into some of the coding we have done earlier in the year. The third part of class was spent on the EdPuzzle and was more individual.

The activity made use of authentic space data and images from NASA which I linked to the presentation. I shared the NASA image gallery of Perseverance and we spent some time exploring the photos. I also included a few more resources if students are interested in learning more about Mars and Perseverance. To improve this lesson, I would spend more time on it. I would use it with a conversation about acceleration as well and gravity. The students shared ideas about why the rover slowed down, but it would be nice to bring back their ideas and talk about them in class. It could be fun to start the class with an image from Perseverance and ask the students to do an "I see ... I think ... I wonder ..." before we start to look at Mars.

One of the things that doing this activity made me reflect on was how I can incorporate more of this into my classes. Before pandemic my classes met every day for an hour, but currently they meet twice a week for an hour. Once the schedule returns back to fully in person it would be good to include a weekly 20 minute astronomy activity that highlights current events in space, or spend one day a month on it. If I start this at the beginning of the year, I imagine the students would start to look forward to learning about astronomy during that time. I have been wanting to do more of an astronomy unit in my two year physics course, but I have been hesitant to do so because of my lack of knowledge. I have definitely appreciated getting to learn about more resources and discuss how they could be used in our respective classes. I hope to spend at least a day talking about the James Webb Deep Space Telescope in October when it is launched.