

Wild Cheetah Speed Test Article from Nature.

<https://www.nature.com/news/speed-test-for-wild-cheetahs-1.13179>

This data was used to address motion of objects and Newton's Laws. Before doing Newton's laws it was important to talk about speed, velocity and acceleration. The web article was used to provide some background to students. The journal article was consulted and since the data in the scientific publication was rather complex I made a simplified data set so that it was more accessible. Students graphed data and also did calculations using the data.

For a few years a focus in my science classes has been collecting, presenting and analyzing data. Using real life data has had a multitude of benefits. First, students are more engaged by real life data, it is unique, it is challenging, it has some connections students can think about especially when there is a narrative connected. Next, it helps connect students to the Nature of Science because students see science being used in different ways and that it is relevant. Several of the NGSS SEPs can be addressed in a valid and more authentic manner when using a real data set, using mathematical and computational thinking, analyzing and interpreting data, engaging in argument from evidence, and obtaining, evaluating and communicating information are all SEPs that are directly addressed when using data. It is also great when students can look at data and then ask questions and define problems because it gives context to their experiences.

This data source was fun to use in class, we compared a cheetah to Usain Bolt, we also connected to a video showing a cheetah hunting prey and another video showing a falcon catching prey. The science was connecting to motion of objects and talking about Newton's Laws. The technology was how this data can be collected in new and more valid ways now that technology has improved. Scientists can now place a gps tracker, accelerometer, and transmitter into a device an animal carries (even a very small animal), this opens up to huge number of things like tracking athletes or other moving objects in the world (boats, balls, flying or land vehicles). The math was done by reading the graph and looking at the simplified data set and doing calculation of velocity and acceleration and thinking about the forces involved in moving a cheetah. The engineering was not directly addressed in my class but could come in especially based on the article. Students could look at how mechanics of a cheetah allow for their speed and agility. Students could think about designing ideas for implementing this in man made machines, for example looking at prosthetics or potentially robots.

Like I said, I have been using data in my class for a few years already. It is important for creating authentic experiences for students and helping students see science as alive not just learning content out of context. Looking at data, manipulating it and interacting with it will allow students to see that science doesn't need to be complex and difficult to approach. But it needs to be scaffolded to meet students at their level, which is why I simplified the data from the journal article, however, by showing a video and reading the article students could access the data and expand on it. For example, I presented the data as a cheetah running in a straight line, however, it is obvious from the article and the journal publication some of the acceleration a cheetah experiences is from changing direction, this was an important connection to be made so that students could think about forces and Newton's Laws.