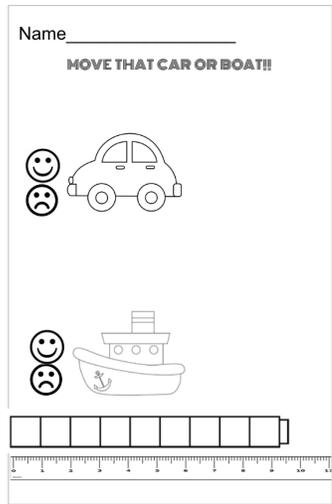


hands-on investigations, students discover that different magnets have different strengths, magnets have North and South poles that attract or repel each other and that magnets have a force field that needn't touch an object to be attracted to it.

- b) My understanding of the nature of science is dynamic in that students are active, engaged thinkers who work collaboratively to solve problems. An example of this depth of knowledge and learning is when students try to make plastic cars move- given a plastic car, wand magnet, masking tape and smaller bar magnet, learners must work on ways in which they can move their car. Interestingly, students will pull the car with the tape attached. Then more parameters are added about how the magnets might be used and what students know about attraction and repulsion. Students get the cars to move when a magnet is taped to the top of the car and a wand magnet is used with the polar opposite end to cause a repelling force. Students are easily able to move their cars and even race each other. Math is incorporated, as Unifix cubes are used to measure length and distance. A data sheet is included below showing the use of rulers and nonstandard measurement (Unifix cubes) to record data and information. Furthermore, students could be given a plastic boat and compare if this changes the outcome of how the magnets use the overarching principle of force and motion in the same manner.

This is a dynamic conclusion to the unit as engineering practices are used and students are able to manipulate materials to achieve a known outcome. They are owning their learning, asking questions and drawing conclusions based on prior knowledge and additional knowledge gained over the course of time. Students share with one another ways in which it worked and ways in which they could still improve. The lessons are meaningful as they explore phenomena and ways in which to make sense of it.



I think an extension could be to test material properties as mentioned in Science Buddies.
<https://www.sciencebuddies.org/teacher-resources/lesson-plans/testing-material-properties>

c) I chose the nature of engineering as my overlapping discipline.

Three ways that my example overlaps are:

1. "Habits of the mind- including systems thinking, creativity, collaboration and communication- all of which were clearly evident in my example.
2. The activity includes the design process- the engineering approach to solving problems. Children try several iterations to make the car move. They are not immediately successful on the first try and often must collaborate or communicate with others to obtain an acceptable outcome.
3. Children plan their project based on their knowledge and understanding.

References:

<https://www.nextgenscience.org/sites/default/files/Appendix%20H%20->

<https://www.sciencebuddies.org/teacher-resources/lesson-plans/testing-material-properties>

<https://www.nsf.gov/attachments/117803/public/1b-->

