Motion Movies

Grade Cluster- 6-8

NETS-S- 5 - Digital Citizenship

Quick Look:

Students design and conduct an investigation using the scientific method that demonstrates the relationship between variables dealing with force and motion, such as acceleration, momentum, speed, and mass. Experiments are recorded and made into videos to be shared with younger students and posted to *YouTube*.

Scenario:

After a massive snowstorm, students enter Mrs. Smith's science class all excited about their weekend adventures sledding. Riley shares about all the fun he had sledding down the hill in his back yard on a toboggan with several other friends. He shared that he and his friends picked up some aggressive speed as more friends boarded the toboggan. Amber chimes in about her day sledding on a snow tube down the hill at her neighbor's house. She mentioned that she and her friends gave each other pushes to get them going down the hill as fast as possible. Stanley adds his experiences sledding on a saucer down a hill in his neighborhood. He described several instances where he bumped into his friends who were also sledding, and changed his direction.

Mrs. Smith joins the class discussion and comments on how the students' weekend experiences are actually tied to their studies on force and motion. She challenges the class to think about how their weekend adventures relate to the force and motion concepts they have been studying for homework. Amber suggests that they can discuss their ideas in a forum in their science course in *Moodle*. Mrs. Smith sets adds a forum to the *Moodle* and students add their ideas and questions outside of class.

The next day, the class continues with a brief discussion on the main conversation points from the *Moodle* forum. The students are all excited and somewhat confused by how the force and motion concepts apply. So, Mrs. Smith challenges the class to apply their experiences in order to create videos for younger students that demonstrate their knowledge and understanding of essential force and motion concepts. In class, students form collaborative groups of 3-4 students to design investigations to test the relationship between variables dealing with force and motion, such as acceleration, momentum, speed, and mass. Students choose an activity of their choice to illustrate the concepts such as sledding, snowboarding, skiing, and bicycling.

Outside of class, students use a *wiki* developed by Mrs. Smith to select a force and motion concept to investigate. Some of the concepts include:

- how the acceleration of an object is proportional to the force on the object and inversely proportional to the mass of the object
- how a change in mass or velocity affects an object's momentum

- how a change in the direction of an object changes the forces acting on that object
- how an object's acceleration and mass determines the force it can apply to another object

Then, each group uses the *wiki* to collaboratively plan an investigation by forming a question, planning research, creating a hypothesis, generating a list of materials, and developing a procedure (5b, 6a, 6b).

During the next two days in class, students work in their groups to further design their experiments. Once experiments are ready, students begin their investigations. They use *Flip video cameras* to record an explanation of their use of scientific process and their actual investigation (6b, 6c, 6d). Students use *Pasco Passport Sensors* (digital data probes) such as accelerometers, force sensors, and motion sensors to collect data (6a, 6b, 6c, 6d). Data is recorded using a spreadsheet in *Google Docs* so all group members can have easy access. At home, students meet online to collaboratively analyze their data--they all have the *Google Docs* spreadsheet open so they can collaboratively edit it and they communicate using *Skype*. (5b, 6a, 6b, 6c, 6d).

Over the next week of school, each group downloads its video footage and uses video editing software such as *Windows Movie Maker* to create a one to three minute video of their investigation (6a, 6b, 6c, 6d). They cover all the steps of the scientific process, their investigation, analysis of the results, and a conclusion. Next the students add special effects, transitions, images, and music to enhance their videos, which prompts a discussion. Riley's group asks Pete's group where they are getting their images and music. Pete said he has been downloading mp3s and images that he finds from the web. Stanley overhears the conversation and questions if it is okay to do that because he is on the school's news team and recalls learning about copyright issues that impact what you can and cannot use in projects (5a, 5c).

Mrs. Smith hears the conversation among the students and opens up a class discussion. The students share what they know about copyright based on past class experiences. Stanley, Joanne, Steve, and others in the class share resources that they have learned about in the school news team and from the school's library media specialist. The class determines that it's especially important for them to follow copyright guidelines for this project because they intend to share their final projects and post them on *YouTube.*

Mrs. Smith agrees to share what she knows and starts a new page on the class *wiki* where she and the students add links to resources that outline fair use of images and music for student projects (5a, 5b, 5c, 5d). They also add links to a variety of web sites they find that have images and music that is royalty-free and/or published with creative commons licenses that explicitly grant students the right to use them. David and Lisa also add links to sites that provide guidelines for citing resources used in student projects (5a, 5d).

Upon completion, the students share their resources with the school's library media specialist. She contributes more resources and creates a link from the school's web page (5a, 5d). One student from each group is invited to the staff meeting later that week to present their fair use and copyright resources to all the teachers to share with their classes (5a, 5d).

Over the next three days, the students continue editing their projects and add music and images using the resources and guidelines the class created (5a, 5b, 5c). They document all of their sources and resources (5a). Upon completion of videos, students upload their projects to *YouTube* to share with the class and a greater audience. The next day in class, students use the *SMART Response System* (student response system) to vote on which videos are the best for each concept**.** They use the results of this voting to determine which videos should be presented to fourth and fifth grade classes in the district who are studying the same science concepts.

Mrs. Smith coordinates with other teachers in the district to arrange sharing of the videos. Throughout the next two weeks, students share their videos with different fourth and fifth grade classes using the *LNV* (5b). The fourth and fifth grade students ask Mrs. Smith's students questions about the science concepts and also offer feedback on the videos. The videos are added to the district's science resources for sharing with future classes.

Student Standards – The following NETS-S are noted in the Scenario:

1. Digital Citizenship—A, B, C, D
6. Technology Operations and Concepts—A, B, C, D

Teacher Standards –Teachers who teach this unit address the following NETS-T:

1. Facilitate and Inspire Student Learning and Creativity—A, B, C, D
2. Design and Develop Digital-Age Learning Experiences and Assessments—A, B, C, D
3. Model Digital-Age Work and Learning—A, B, C, D
4. Promote and Model Digital Citizenship and Responsibility—A, B, C
5. Engage in Professional Growth and Leadership—B, C

Content Grade Expectations

The scenario writer has identified the following content grade expectations that s/he felt might be assessed in this scenario. In most of these scenarios, there may well be opportunities to assess other or additional content grade expectations across a variety of disciplines. If you are interested in developing a unit or lessons based on the following scenario, and you don't see any grade expectations in your content area, we encourage you to capture the ideas presented in the scenario and make it your own by adding components that address the grade expectations you are most interested in assessing.

S7-8:1 Students demonstrate their understanding of scientific questioning by…

- Developing questions that reflect prior knowledge.

S7-8:2 Students demonstrate their understanding of predicting and hypothesizing by…

- Proposing a hypothesis based upon a scientific concept or principle, observation, or experience that identifies the relationship among variables.

S7-8:4 Students demonstrate their ability to conduct experiments by…

- Accurately quantifying observations using appropriate measurement tools.
- Using technology to collect, quantify, organize, and store observations (e.g., use of probe).
- Recording multiple perspectives to scale

S7-8:7 Students demonstrate their ability to explain data by…

- Using scientific concepts, models, and terminology to report results, discuss relationships, and propose new explanations.
- Sharing conclusion/summary with appropriate audience beyond the research group.

S7-8:19 Students demonstrate their understanding of Motion by…

- Designing investigations that illustrate the effect of a change in mass or velocity on an object's momentum.
- Describing and explaining how the acceleration of an object is proportional to the force on the object and inversely proportional to the mass of the object.

S7-8:21 Students demonstrate their understanding of Force by…

- Diagramming or describing, after observing a moving object, the forces acting on the object before and after it is put into motion