

Nathan Belcher: Technology-Enhanced Lesson Plan

Topic: Waves

Date: 23 November 2009

Subject: Physical Science

Grade level: 8

SOL: PS.8

The student will investigate and understand characteristics of sound and technological applications of sound waves. Key concepts include:

a) wavelength, frequency, speed.

Daily Question: What are basic properties of waves?

Procedures for Learning Experience	Guiding Questions	Materials Needed	Evaluation (Assessment)	Approximate Time
<p>Engagement/Exploration: Activity with Slinkys to create different kinds of waves.</p> <p>Directions: I will model how to create a wave ‘pulse’ by shaking the Slinky up-down quickly (transverse wave). The students will then practice the same technique, and then move to measurements. The measurements will consist of the height of the pulse and how long it took to get down and back. I will then model how to create a wave ‘pulse’ by pushing in-out quickly (longitudinal wave). The students will then practice and make the same measurements. This time the ‘height’ measurement will be the length of the pulse. The students will be in groups of four.</p>	<p>What kind of waves can we make with Slinkys?</p>	<p>Slinkys</p>	<p>Student participation</p> <p>Lab worksheet</p>	<p>20 minutes</p>

<p>Explanation: Vocabulary development with a mini-lecture on types of waves and wave parts.</p> <p>Directions: I will introduce the vocabulary necessary to describe waves in a more technical way, use a simulation to show waves in motion, and show drawings of waves with parts labeled. If the projector/computer are not working, I will simply use the whiteboard to explain the concepts to the students.</p>	<p>What are the types of waves? How are different parts of waves defined?</p>	<p>PowerPoint presentation Guided notes</p>	<p>Questions</p>	<p>20 minutes</p>
<p>Extension: Drawing waves.</p> <p>Directions: During presentation, I will show the different parts of waves and how each part is labeled. The students will then draw three waves of their own: one as a base with a set wavelength and amplitude, one with a different wavelength but same amplitude, and one with the same wavelength but different amplitude. With this, I will also discuss independent and dependent variables. The students will be in working individually, but may discuss wave drawing with their table partner.</p>	<p>How many electrons? Where are electrons located?</p>	<p>Whiteboard Paper/pencil</p>	<p>Student drawings</p>	<p>15 minutes</p>

Notes:

Vocabulary: transverse, longitudinal, frequency, period, amplitude, hertz, peak, trough, wavelength

Differentiation:

- Guided notes will range from open to closed (for those with IEPs).

Technology

- Presentation using computer and projector with embedded link to simulation (from PhET at University of Colorado at Boulder).
- Whiteboard to show how to draw and label waves.
- Slinkys to model waves.

Technology Product: Presentation; see accompanying attachment.

Reflection:

For this lesson, the technology is mostly non-digitally based, but still important in my teaching. With the Slinkys, the two wave types are easily seen, and this will help the students visualize how waves move in one medium and facilitate transfer to the same concept in a different medium. I could just as (relatively) easily show a video or applet to illustrate wave patterns, but I want the students to have a hands-on feeling of creating the wave, watching it move through the Slinky, and measuring various properties. This will also give them a better reference to connect the various vocabulary terms than simply showing the students, because (again) they have something solid on which to hold. For the presentation, I would prefer to use the computer and projector. These will allow me to sequence the vocabulary in the order I want them with a visual, and to have a digital record of the vocabulary for students to access through Blackboard. By embedding a simulation into the presentation, I can bring waves in motion to life and introduce the vocabulary in a highly contextual manner. This leads directly to further examples of the vocabulary, and presents the information in two (slightly) different ways. Finally, the students will be drawing waves of their own. This is an exercise in which they can relate what they saw in the Slinky activity with the vocabulary in the presentation, and give them more practice with the technical vocabulary. By making the assignment open-ended, I allow room for students' creativity to be displayed and give the students choice in how their work will look. We could draw waves as a group, or have just me draw waves on the board and the students labeling, but I want all students to be involved in drawing their own waves. With these technologies, I have the students interacting in a variety of ways with each other and myself to understand waves.

Screen shot of the simulation:

