ECI306: Science in the Elementary School
Signature Assignment
Kelsey Haasch
Terry Hehr, Ph.D.
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Introduction

When creating this lesson, I incorporated hands on activities that made students have to make predictions on the pitch that three nails of different sizes make will produce when tapped with a pencil. Students will be exploring how sound travels from place to place. Also, the students will be using critical thinking skills by comparing and describing the sounds produced by two different sized turning forks and then analyzing how sounds travels from place to place. Then discussing how pitch and volume are not the dame.

ECI 306 Signature Assignment 2014-2015 SCOPE AND SEQUENCE

Third Grade Science-Gilbert Public Schools

	42 Days	
1	Dates:Aug. 6-Oct. 3	
Units	# of Lessons	Arizona Science Standards
Unit 1: Observations, Questions, And Hypotheses Observe, ask questions, And make predictions.	Lessons (45	Unit 1:Observations, Questions, and Hypotheses (2 lessons) PO 1. Formulate relevant questions about the properties of objects, organisms, and events of the environment using observations and prior knowledge. PO 2. Predict the results of an investigation based on observed patterns, not random guessing.
Unit 2: Scientific Testing (Investigating and Modeling) Participate in planning and conduction investigations, and recording data.	6 Lessons (45 minutes each)	Part 1:Safety (2 lessons) PO 1. Demonstrate safe behavior and appropriate procedures (e.g., use of instruments, materials, organisms) in all science inquiry. Part 2: Descriptive Investigations (2 lessons) PO 2. Plan a simple investigation (e.g., one plant receives adequate water, one receives too much water, and one receives too little water) based on the formulated questions. PO 3. Conduct simple investigations (e.g., related to plant life cycles, changing the pitch of a sound, properties of rocks) in life, physical, and Earth and space sciences. Part 3: Metric Measurements and Tools (2 lessons) PO 4. Use metric and U.S. customary units to measure objects. PO 5. Record data in an organized and appropriate format (e.g., t-chart, table, list, written log).
Unit 3: Analysis and Conclusions Organize and analyze data; compare to predictions.	Lessons (45 minutes each)	Part 1: Organize and Analyze Data (2 lessons) PO 1. Organize data using the following methods with appropriate labels: • bar graphs • pictographs • tally charts PO 2. Construct reasonable interpretations of the collected data based on formulated questions. Part 2: Compare to Predications (3 lessons) PO 3. Compare the results of the investigation to predictions made prior to the investigation. PO 4. Generate questions for possible future investigations based on the conclusions of the investigation. PO 5. Record questions for further inquiry based on the conclusions of the investigation.

Unit 4: Communication Communicate results of investigations.	Lessons (45 minutes each)	Unit 4: Communication (2 lessons) PO 1. Communicate investigations and explanations using evidence and appropriate terminology. PO 2. Describe an investigation in ways that enable others to repeat it. PO 3. Communicate with other groups to describe the results of an investigation
2 nd	32 Days	
	Dates: Oct. 13- Nov. 26	
Units	# of Lessons	Arizona Science Standards
Unit 5: History of Science as a Human Endeavor Identify individual and cultural contributions to scientific knowledge	4 Lessons (45 minutes each)	Unit 5: History of Science as a Human Endeavor (4 lessons) PO 1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., John Muir [naturalist], supports Strand 4; Thomas Edison [inventor], supports Strand 5; Mae Jemison [engineer, physician, astronaut], supports Strand 6,; Edmund Halley [scientist], supports Strand 6). PO 2. Describe science-related career opportunities.
Unit 6:Nature of Scientific Knowledge Understand how science is a process for generating knowledge.	10 Lessons (45 minutes each)	Unit 6:Nature of Scientific Knowledge (10 lessons) PO 1. Describe how, in a system (e.g., terrarium, house) with many components, the components usually influence one another. PO 2. Explain why a system may not work if a component is defective or missing.
3	14 Days	
	Dates: Dec. 1- Dec. 13	
Units	# of Lessons	Arizona Science Standards

Unit 7: Changes in Environments Describe the interactions between human populations, natural hazards, and the environment.	5 Lessons (45 minutes each)	Unit 7: Changes in Environments (5 lessons) PO 1. Identify various technologies (e.g., automobiles, radio, refrigerators) that people use. PO 2. Describe how suitable tools (e.g., magnifiers, thermometers) help make better observations and measurements.
Unit 8: Science and Technology in Society Understand the impact of technology.	5 Lessons (45 minutes each)	Unit 8: Science and Technology in Society (5 lessons) PO 1. Identify ways that people use tools and techniques to solve problems. PO 2. Describe the development of different technologies (e.g., communication, entertainment, transportation, medicine) in response to resources, needs, and values. PO 3. Design and construct a technological solution to a common problem or need using common materials.
4	43 Days Dates: Jan.	
	5- March 6	
Units	# of Lessons	Arizona Science Standards
Unit 9: Characteristics of Organisms Understand that basic structures in plants and animals serve a function.	_	Unit 9:Characteristics of Organisms (4 lessons) PO 1. Describe the function of the following plant structures: • roots – absorb nutrients • stems – provide support • leaves – synthesize food • flowers – attract pollinators and produce seeds for reproduction

Unit 11: Organisms and Environments Understand the relationships among various organisms and their environments.	lessons (45 minutes each)	Unit 11: Organisms and Environments (10 lessons) PO 1. Identify the living and nonliving components of an ecosystem. PO 2. Examine an ecosystem to identify microscopic and macroscopic organisms. PO 3. Explain the interrelationships among plants and animals in different environments: • producers – plants • consumers – animals • decomposers – fungi, insects, bacteria PO 4. Describe how plants and animals cause change in their environment. PO 5. Describe how environmental factors (e.g., soil composition, range of temperature, quantity and quality of light or water) in the ecosystem may affect a member organism's ability to grow,
Unit 12: Diversity, Adaptation, and Behavior Identify plant and animal adaptations.	lessons (45 minutes each)	Part 1: Adaptation (6 lessons) PO 1. Identify adaptations of plants and animals that allow them to live in specific environments. PO 2. Describe ways that species adapt when introduced into new environments. Part 2: Environmental Changes (5 lessons) PO 3. Cite examples of how a species' inability to adapt to changing conditions in the ecosystem led to the extinction of that species.
5	25 Days Dates: March 16- April 20th	
Units	# of Lessons	Arizona Science Standards
Unit 13: Properties of Objects and Materials Classify objects and materials by their observable properties.		No performance objectives at this grade level

Unit 14: Position and Motion Objects Understand spatial relationships and the way objects move.		No performance objectives at this grade level
Unit 15: Energy and Magnetism Investigate different forms of energy.	16 lessons (45 minutes each)	Unit 15: Energy and Magnetism (16 lessons) PO 1. Demonstrate that light can be:
6	24 Days Dates: Apri	1
	20-May 21	
Units	# of Lessons	Arizona Science Standards

Unit 16: Properties of Earth Materials Identify the basic properties of Earth materials.	9 lessons (45 minutes each)	Part 1: Earth Layer (2 lessons) PO 1. Identify the layers of the Earth: • crust • mantle • core (inner and outer) Part 2: Types of Rocks (4 lessons) PO 2. Describe the different types of rocks and how they are formed: • metamorphic • igneous • sedimentary PO 3. Classify rocks based on the following physical properties: • color • texture Part 3: Fossils (3 lessons) PO 4. Describe fossils as a record of past life forms. PO 5. Describe how fossils are formed. PO 6. Describe ways humans use Earth materials (e.g., fuel, building materials, growing food).
Unit 17: Objects in the Sky Identify objects in the sky.		No performance objectives at this grade level
Unit 14: Changes in the Earth and Sky Understand characteristics of weather conditions and climate.		No performance objectives at this grade level

Signature Assignment: 5E Inquiry Lesson Plan

Teacher: Kelsey Haasch #7	Specific Science & Topic: Physical Science; Sound	Grade Level: 3rd grade
	Total Anticipated Time: 45 minutes	

Standard(s) (code and entire standard(s) written out):

- SC03-S5C3-04: Demonstrate that the pitch of a sound depends on the rate of the vibration (e.g., a long rubber band has a lower pitch than a short rubber band).
- SC03-S1C1-02: Predict the results of an investigation based on observed patterns, not random guessing.
- SC03-S1C2-05: Record data in an organized and appropriate format (e.g., t-chart, table, list, written log).

Objective (Explicit & Measurable Evidence of Mastery)

SWBAT Students will be able to: make predications about the pitch that three nails of different sizes will produce when tapped with a pencil. Students tap the nails and compare the resulting sounds with their predictions. Students will recognize that vibrations can be changed to alter the pitch of a sound. Overall understanding of sound and will be evulated by comparison of sounds made by the truing forks with the three different size nails.

Summary of Connections Across Curriculum:

- Students will write in their journals.
- · Making music with nails
- Reading

Sub-objectives, SWBAT (steps that lead to completion of objective; sequence from simple to more complex)

SWAT, Students Will Be Able To:

- Brainstorm ideas of sounds, nails make by completing a circle map.
- Make predictions of the sound of each size nail makes by completing the record sheet and give reason to their answer.
- Demonstrate the pitch that the nails of different sizes will produce when tapped with a pencil.
- Complete the record sheet of the sound produced by the nails of different sizes make.

Lesson Summary and Justification (summary gives general description about what students are doing Justification - why is this lesson being taught):

How?

Students will analyze the sounds made by tapping three nails of different sizes. Introducing students to the idea that objects of different sizes can be used to produce sounds of different pitches. Why?

Exploring how sound travels from place to place. Students learn new vocabulary pitch and volume. Students begin with by comparing and describing the sounds produced by two different-sized turning forks and then by analyzing how sound travels from place to place. Then discussing how pitch and volume are not the same.

Background Knowledge (What do students need to know to complete this lesson):

- Sounds are produced by vibrating objects that make the air around them vibrate.
- May not be able to see the vibration that cause the sound.
- The differences between pitch and volume

Misconception (what possible misleading thoughts might students have?):

That all three nails of different sizes have the same pitch.

Inquiry Questions (IQ) (testable in the here and now):

- 1. (to explore) What?
- Will these nails all sound the same or will each one sound different from others?
- Why do you think the sounds will be different, or why do you think they will be the same?
 - 2. (to elaborate) What if?
- Which nail produced the lowest pitch sound?

Key vocabulary (list and define):

- 1.Pitch: high or low
- 2. Volume: loud or soft
- 3. Frequency: number of times the back-and-forth movement occurs in a second
- 4. **Decibel**: the unit used to measure the intensity of a sound.

Materials (list item and possible quantity): For each student:

- 1. Record sheet: Sounds Produced by nails (24)
- 2. Circle Map: What Kind of sounds do nails make? (24)

For every two student:

- 3. 1 Plastic tray (12)
- 4. 1 piece of convoluted foam-rubber sponge (12)
- 5. 1 set of three steel nails (size 40D, 20D and 12D) (12)
- 6. 1 unsharpened pencil (12)

Engage (10 min - In this section <u>you</u> should activate prior knowledge, <u>hook</u> student attention, <u>pose a</u> question (IQ#1) based on your lesson objective that students will seek to answer in Explore.

Teacher Will:

- Ask students what they know about making predictions.
- What is the difference between a prediction and a guess?
- Allow student to raise their hand and define in their own words of what they think prediction and guess.
- Review the sounds produced by the two tuning forks. How were they different and how were they similar?
- Write students answers response down and to be shown through the doc cam
- · Show the three nails.
- IQ#1: Will these nails all sound the same or will each one sound different from others?

Students Will:

- Raise their hand and answer the question, "What is the difference between a prediction and a guess?
- Raise their hand and answer the question, "
 How were they different and how were they
 similar?"
- Raise their hand and answer the question, IQ#1: Will these nails all sound the same or will each one sound different from others?

Explore - (15 mins.) In this section <u>students</u> should take the <u>lead</u> and <u>actively use materials</u> to <u>discover information that will help them answer the question</u> posed in Engage. Teachers may choose to give steps to follow, especially for younger or special needs students, but the goal is for students to discover some or all of the sub-objectives of the lesson.

Teacher Will:

- Pass out the circle map to each student
- Ask students what kinds of sounds do nails make?
- Allow 3 minutes for students to write answers to the circle map
- Discuss as a class, sounds that nails make.
- Write the students answers on the circle map and shown under the doc cam.
- Pair two students together
- Have each pair collect their materials and two copies of the record sheet
- Go over safety and behavior expectations
- Tell students to keep nails on foam-rubber sponge
- Make sure all students understand the directions for completing the record sheet
- Ask students to write their predictions about the sound that each nail will make in the column labeled "Sound Predicated" on the record sheet
- Remind them to write out reasons for their predictions
- Tell the students that will conduct their experiment by placing the nails on the sponge to make the sound last longer than it would on a hard surface.
- Ask students to test their predications by tapping each nail with a pencil. One student should tap while the other listens. Have them exchange roles and repeat the activity so that all students try both activities.
- Encourage students to discuss and compare words they could use to describe the sounds they heard. Using words such as low, high, or deep.
- Once students write a description under column "Sound Produced", have students return material to the center table.

Students Will (list all steps):

- Fill out the circle map of what kind of sounds a nails makes.
- Raise their hand with an answer for teacher to fill in on the whole class circle map
- Write answers they see from the teacher's circle map, that they do not have on their circle map.
- Get with their partner and gather materials
- Make predications of the sound each nail will make on the record sheet. In the column labeled "Sound Predicated". Also writing their reason for their prediction.
- · Listen to directions
- Each student will conduct the experiment by tapping each nail and listening to the sound each nail makes. One will tap and one will listen then will switch rolls
- Discuss with one another and compare what sounds they heard. Using words such as low, high, or deep.
- Write descriptions of the sounds produced in the column labeled "Sound Produced" on the record sheet.
- Return materials at the center table

Differentiation Strategy: Teacher will walk around helping students tapping the nails and listening to the sound.

Explain - (8 mins) In this section <u>students</u> share what they discovered, teacher connects student discoveries to correct content terms/explanations, students articulate/demonstrate a clear and correct understanding of the lesson sub-objectives by answering the question from Engage before moving on.

Teacher Will:

- Ask students to review their predictions and compare them to the actual sound they heard.
- Ask student to think about how they described the sounds. What words did they use. If they used "pitch", let them know that "high and "low" can be describe pitch.

Students Will:

- Raise their hand and share their predictions to the actual sound they heard.
- Raise their hand and will share how they described the sound of each nail.

Differentiation Strategy:

What other items or instruments have different pitches?

Elaborate -(5 mins) In this section <u>students</u> take the <u>basic learning gained</u> from Explore and clarified in Explain and <u>apply</u> it to a new circumstance or explore a particular aspect of this learning at a deeper level. Students should be using higher order thinking in this stage. A common practice in this section is to ask a What If?

Teacher Will:

- Obtain 8 to 10 nails of various sizes.
- Have students assemble the nails into xylophones so that they can make their own song.

Students Will:

· Create a song with a variety of pitches

Differentiation Strategy: Doing this as a whole group

Evaluate - (7 min)In this section every <u>student</u> demonstrates mastery of the lesson objective (though perhaps not mastery of the elaborate content). Because this also serves as a closing, students should also have a chance to summarize the big concepts they learned outside of the assessment.

Teacher Will:

- Ask students to compare the sounds made by the turning forks with those made of nails and to write six ideas in their in their science notebooks.
- If necessary, focus their thoughts by using questions about how the size of the turning fork or nail seemed to affect the sound it made.
- I will ask students to share with me what they learned about pitch and the transmission of sound vibrations
- I will also go over their worksheet to get an idea of which students grasped concepts of pitch with the different size nails related to sound vibrations and pitch.
- Pass out exit ticket, "Sound off"
- · Student will answer exit ticket, "Sound Off"

Students Will:

- Students write six ideas in their science notebook on the comparison of sounds made by the truing forks with the three different size nails.
- Answer exit ticket, "Sound Off"

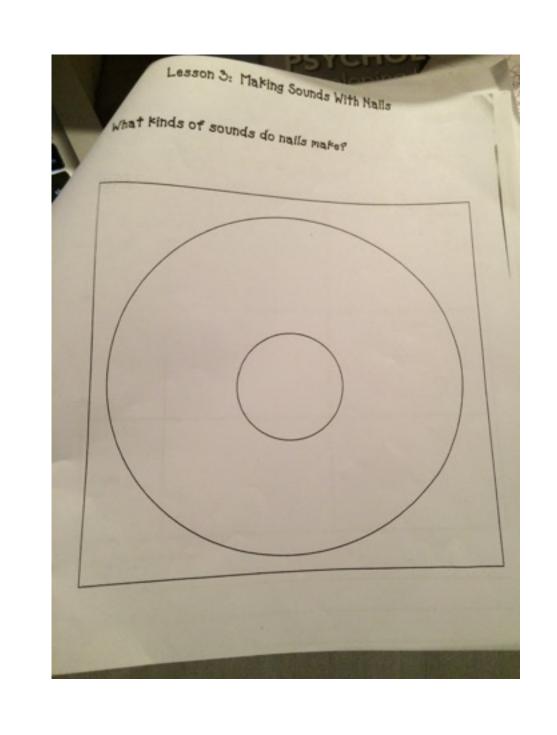
Closure (revisit objective, IQ's and make real world connections):

Students will have identified the pitch of the three nails of different sizes will produce when tapped with a pencil.

1. Cite resources used to create this lesson.

Sound-Teacher's Guide; Science and Technology for Children. Smithsonian/The National Academics. 2002

2. Attach all artifacts used in this lesson.



	Date		
	Sounds Produced	by Nails	
Size of Nail	Sound Predicted	Sound Produced	
Large			
			-
			1
Medium			
			1
233			
Small			
Reason for my predic	tions:		
mall nail			
TC* / Sound			



Sound off



- 1. What sound did the large nail produce? Was your prediction correct or not?
- 2. Define pitch:
- 3. What are three things that you learned about pitch and sound?

Reflection

Great teachers all have a love for young people, sharing kindness and support for every student. As a teacher I will strive to get to know my students and to be attentive to them both in teaching and building positive relationships. For students to achieve success, I feel that it is necessary to understand that students learn at a different rates. Knowing that my teaching and knowledge will influence my future students in a positive way is very rewarding. As a teacher, I will be dedicated to providing the most effective learning environment, and allowing my students to have a successful, productive second grade year.

Teachers must also be organized to show their students they are prepared and focused each day. With organization, students will be focused to learn. An organized teacher needs to have a routine which includes monitoring and communicating student progress, returning phone calls home, sending relevant emails and reminding parents of activities going on in the classroom. Highly organized teachers promote responsible behavior in the classroom and provide opportunities to dialogue and work with parents. Teachers set the pace of the class. If a student is misbehaving, I must implement corrective strategies that hold the student responsible. Controlling natural impulse demonstrates to the students proper behavior when dealing with conflict. This allows me to correct the misbehavior and refocus the student. Having students contribute in developing shared classroom expectations and consequences gives the student and I a positive solution to classroom distribution. Corrective strategies hold students responsible for poor choices while maintaining their dignity through appropriate discipline and consequences.

Developing a multicultural curriculum around student interests fosters motivation and stimulates the passion to learn. Multiculturalism is important to develop productive citizens of the world among my students. It is my job to prepare students for the real world, and the real world is a multicultural one. Having lessons that emphasize critical thinking and show value and practicality in the world outside school will create more student interest, making the lessons memorable, relevant and valued. By teaching students to be critical thinkers, specifically about prejudice and discrimination, they will know when a word or an image is unfair or hurtful. Providing a learning environment that encourages critical thinking prepares students to be active and productive citizens.

My personal growth after completing this signature assignment is understanding the importance of the objective of the lesson. The objective of a lesson is main structure of the lesson on what you want your students to learn and how you teach to cover the standard. I found that this being a science lesson, I found success on integration of skills through reading, writing, listening, and speaking activities. Also finding that it is important to incorporate comprehension checks and activation of schema.

I learned that when creating a scope and sequence plan takes a lot of time and effort. First you have to write out all the standards and the objectives. Then figuring out how much you have to cover, you have to base that with the school calendar. I think creating a scope and sequence for

the first time can be overwhelming because you trying to design a years layout for the school year. Creating a lesson plan is also time consuming because you need to create a lesson that is very detailed on what and how you want to teach the lesson. Writing out exactly how you are going to teach and say to the students is beneficial. I learned planning for diversification is huge part when creating a lesson because not all students learn the same way so it is important to have different ways or helpful tools for a student learn what is being taught. Also having diversification in lesson is important for students with special needs. For example, a student who is visual impaired may need papers in larger print.

The InTASC standards are great for teaching students in the 21st century because these standards address what teachers should know and be able to do. As well as defining what constitutes effective classroom teaching. Standard Six improves on how a teachers assess a student's knowledge by how to develop a range of assessments. I find assessment to be important by with InTASC, I like how there is more a focus on understanding the student's progress and adjusting instruction to the students' need.

If my scope and sequence was used with students, may need to be adjusted on how many lessons on certain objectives because students can master the topic or they need more time on learning a certain topic or subject. I think when creating a scope My lesson plan would be very fun and engaging for the students because they are able to make music and while learning about sound. This is a science lesson but reading and writing standards are intertwined with a science lesson. Students must be able to comprehend text by making meaning with the text. Students will demonstrate their understanding by meeting the objective goal of the lesson.

My experience with creating a science lesson has been very meaningful because each semester, I am able to gain more knowledge on how to create a great lesson. I do remember trying to find activities that "worked" and trying to make sure that students were actively engaged in the material and the lessonsThough I do think some parts of the lesson template do not have to be in such detail because with so much