RESIDENCY PLAN

Artist Contact Information
Name: Chris Kahl
Residency Title
The Science of Sound: Exploring Science Through Musical Instrumentation **Led by: Chris Kahl** **For students in grades: 3-5**
Scope
Number of Sessions: 5 **Time length of Sessions:** 40-50 minutes **Preferred Timeline:** 1 session per week **Maximum number of classes that can be served:** 3
Description
In this residency, students explore the connections between science and music by studying and creating musical instruments. Specifically, students will construct and use instruments to demonstrate their understanding of pitch, frequency, wavelength and timbre. The residency culminates in students undertaking an arts design challenge. Chris Kahl, musician and teaching artist, will lead students through this engaging STEAM arts-integrated residency.

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Rationale
This STEAM arts-integrated residency engages and motivates students to learn while developing critical thinking and problem solving skills. Essential Question: How do we explore science through music? Focus Standards: SC.4.P.10.3, MU.4.F.1.1 Other Standards covered: MU.3.F.3.1, MU.4.H.3.1, MU.5.C.1.2, SC.3.P.8.3, SC.4.P.8.1, SC.5.P.10.1, SC.3.P.10.1, SC.5.P.10.1 Marzano Design Question 4 – 22. Engaging students in cognitively complex tasks involving hypothesis generation and testing.

Expected Results

The students will know:

1. How musical instruments work.

2. How components of pitch and timbre relate to different instruments.

3. Concepts of sound waves and how they travel.

4. Definition of pitch, frequency, wavelength and timbre (students will explore and make observations that will lead them to the definition of each before it's explicitly stated).

The students will be able to:

1. Construct musical instruments, and identify various components of sound.

2. Compare and contrast different instruments and their sound qualities.

3. Demonstrate physically, and through measurement, how pitch, frequency, and wavelength relates to sound waves.

4. Demonstrate sonically the components of pitch and timbre.

The students will appreciate:

1. The process of constructing an instrument.

2. The thought behind choosing an instrument for a specific sound.

3. How sound can be explained through science.

4. Their own ability to demonstrate the scientific qualities of sound.

Logistical Factors

The school must provide: Classroom space (either a classroom, media center space, or open room). A projector, screen, and laptop. Paper plates, beans (small and lima), rice, staples, crayons, straws, tape, craft sticks, string, rulers, beakers, food coloring.

RESIDENCY OVERVIEW

SESSION	DESCRIPTION
Artist Performance/ Demo/Exhibit	**Chris Kahl – The Science of Sound: Exploring Science Through Musical Instrumentation**

CONTENT KNOWLEDGE STUDENTS NEED BEFORE THE RESIDENCY BEGINS			
Students should be familiar with various musical instruments. They should also have an understanding of what a musician does.			
SESSION	**OVERVIEW**	**TEACHER ROLE During Sessions**	**TEACHER ROLE Before Next Session**
Classroom Session #1	**Essential Question: How does a musician use different instruments and sounds to create a song?** 1. **Preview the residency: Explain what will take place during the sessions.** 2. **Artist will introduce his instruments and folk music style by performing a song.** 3. **Students will compare and contrast the acoustic guitar to the mandolin.** 4. **Students will have a chance to play the lap steel guitar.** 5. **Artist will lead a reflection.** **In this lesson the artist will start by introducing his acoustic guitar and harmonica by performing a folk song. The artist will then perform on the mandolin and lap steel guitar to compare and contrast sounds. Then after receiving instructions, each student will have a chance to play the lap steel guitar.**	• **Observe**	• **Prepare materials**

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SESSION	OVERVIEW	TEACHER ROLE During Sessions	TEACHER ROLE Before Next Session
Classroom Session #2	**Essential Question: How does sound travel, and how is it measured?** **1. Artist will introduce the concepts of sound by having students explore and make observations of different sound waves. These discoveries will lead them to the definitions of pitch, frequency, and wavelength.** **2. Artist will lead students in the activity titled Stringwaves.** **3. Students will participate in STEAM-related exercises and activities to demonstrate understanding.** **4. Artist will lead a reflection.** **In this lesson the artist will have students explore and make observations that will lead them to the definitions of pitch, frequency, and wavelength. Students will then take part in an activity titled Stringwaves where they will manipulate a piece of string to demonstrate different frequency and wavelength measurements. Students will then take part in an activity where the artist will play 5 different Boomwhacker instruments. The students must listen to each note and put it in the correct order of pitch (each note will have a corresponding letter). If the order is correct, the letters will spell S O U N D.**	• **Observe**	• **Prepare materials**

SESSION	OVERVIEW	TEACHER ROLE During Sessions	TEACHER ROLE Before Next Session
Classroom Session #3	**Essential Question: How do the components of an instrument affect pitch?** **1. Artist will lead students in constructing a pan flute made of straws.** **2. Students will demonstrate their understanding of pitch, frequency, and wavelength using their instrument.** **3. Artist will lead a reflection.** **In this lesson the artist will lead the students in constructing a pan flute made of straws. Each student will receive 5 straws and cut them to 5", 4.5", 4", 3.5", 3". Each of the straws will then be taped to a popsicle stick in order of size. The students will recognize that the largest straw produces the lowest pitch, while the shortest straw produces the highest pitch. The artist will then show the students how to play the tune "Hot Cross Buns" on the flute.**	• **Observe** • **Assist**	• **Prepare materials**

SESSION	OVERVIEW	TEACHER ROLE During Sessions	TEACHER ROLE Before Next Session
Classroom Session #4	**Essential Question: How does the material used to make an instrument affect timbre?** **1. Artist will lead students in constructing a percussion instrument.** **2. Students will experiment in timbre using their instrument.** **3. Students will participate in a rhythmic activity titled Rainforest Rhapsody.** **4. Artist will lead a reflection.** **In this lesson the artist will the lead the students in constructing a rhythmic instrument. Each student will receive 2 paper plates and a type of filler material (rice, pinto beans, lima beans). After coloring and decorating their plates, the artist will complete each student's instrument by stapling the edges. The students will then recognize that the plates filled with rice create the brightest sound, while the lima beans create the deepest sound, and the pinto beans are in the middle. The artist will then lead the students in playing the instruments a number of different ways using different techniques.**	• **Observe** • **Assist**	• **Prepare materials**

SESSION	OVERVIEW	TEACHER ROLE During Sessions	TEACHER ROLE Before Next Session
Classroom Session #5	**Essential Question: How do we use our prior knowledge to generate a hypothesis, and solve an arts design challenge?** **1. Artist will lead students in an arts design challenge.** **2. Students will use their knowledge of prior lessons to solve a STEAM-related music problem.** **3. Artist will lead a reflection.** **In this lesson the artist will lead the students in an arts design challenge working with 3 sets of beakers and water (the artist will handle the beakers). The students will make a prediction on the correct amount of water needed to fill each beaker to make 3 consecutive notes to produce the tune "Hot Cross Buns". The artist will tap the sides of the beakers to produce the notes. Before starting, the students will form a hypothesis on how much water they think will be required for each beaker. When finished, the students will compare the actual amount of water used compared to their hypotheses.**	• **Observe** • **Assist** • **Document activities (photos, written notation)**	• **Lead A Reflection**

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SESSION	DESCRIPTION
Culminating Session	**(Optional 6th Class Session)** **Artist will lead students in a share-formance.** **Students will share their knowledge gained in the residency lessons while presenting to administrators and guests.** **In this optional session the artist will lead the students in a performance titled "Rainforest Rhapsody" where the students will use the percussion instruments they constructed. The students will be divided into groups based on the filling in their instrument. The groups will then also be assigned an animal sound of a species that lives in the jungle. While playing their instrument, they will also make their corresponding animal sound. The audience will hear the differences that the rice, pinto beans, and lima beans make, and each group will be recognized by their animal sound as well. Each group will play one at a time, then the finale will be all the groups performing together, thus making an enthusiastic sound of the jungle.**

Optional components for this residency include a Planning Meeting with participating teachers, follow up Reflection Meetings in between Classroom Sessions and a Follow-Up Evaluation Meeting.

RESUME AND REFERENCES

Pablo Remonsellez – Brevard Cultural Alliance
Emily Freeman – Orlando Repertory Theatre
Bill Yoh – Stevenson Elementary Music Teacher
Mary Palmer – Mary Palmer and Associates