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Description: This lesson explores the concepts of Frequency (speed of a vibration commonly known as pitch) and Duration (length of vibration) through movement and sound.

Curricular Outcomes: This lesson is best for older Primary and younger Junior students (grades 3-5). At the conclusion of this lesson, students will be able to understand the various layers that make up the texture of gamelan music. Given that these layers are based upon the duration and frequency of the vibration of each instrument, they will then be able to apply their knowledge to more complex problem solving related to the physics of sound production.

Materials: large room with plenty of space for movement plus the following items: a frame-drum, a xylophone (with wooden bars) and a metalophone; a white board with different-colored dry-erase markers; and a CD or MP3 player. You will also need: the notation and a recording of “Bubaran Kembang Pacar,” and the Introduction to Javanese Gamelan power-point slides (in the resources folder), plus a projector.

Getting Ready

- Write out the notation for “Bubaran Kembang Pacar” on the white board. Just write out the numbers for the balungan without any extra symbols for the structural parts; these will be added later. Set up the xylophone (the one with wooden bars) and the metalophone in the following manner: take off the E key, put the F key in its place and add an F# key. Put stickers on the instrument with number 1 being a B, 2 = C; 3 = D; 4 = F; 5 = F#; and 6 = G.

Warm-up Activity: Exploring Frequency (Pitch) and Duration through Movement Games

- Divide the class into groups of three or four students and place these groups in scattered formation throughout the movement space. Demonstrate the difference between five different pitches (1, 2, 3, 5, & 6) on the xylophone (leave out pitch 4 for now). What we are hearing is a difference in the frequency of the vibrations. A low note vibrates slower than a high note. Ask: “Does the scale I just made with these pitches sound anything like the scales you know?”
- Ask each group to create a shape (tableaux) for each pitch with one being the lowest to the ground and six being the highest up.
- Congratulate the groups for a job well done! Next, practice hearing and expressing the six levels of pitch elevation by playing a simple cyclical-melody on the metalophone such as: 3 6 3 5 or 2 1 2 6 or 5 3 5 6. Write these patterns on the board as pattern (a) 3 6 3 5; (b) 2 1 2 6; and (c) 5 3 5 6. After trying each of the examples, have the groups demonstrate one of the patterns to the rest of the class and see if the class can guess which pattern was being expressed. One member of each group will step out to play the pattern on the xylophone so that there is continual reinforcement of the sound with the visual.

- Next bring out the metalophone and compare the two instruments in terms of the duration of each pitch. Challenge students to count the number of seconds pitch “1” rings on the xylophone as compared with the metalophone. What happens when we try to play one of the patterns too quickly on the metalophone? The length of time something vibrates is called the Duration.
- Let’s do the same patterns but this time we will play them on the metalophone so that each pitch will vibrate for a longer duration. Instruct the metalophone players that they cannot move to the next pitch until the previous one ends. Ask: “How could we shorten the duration of each pitch so that we can play faster?”
- Change the number of people in each group and have the class make up new melodic patterns.

Development

Step One: Introduction to the Javanese Gamelan

- Show the power-point slides 1 through 5 (up to “Gamelan Musical Structure”).
- Have students describe the instruments that they see on slide three. All the instruments are percussion instruments (vibration is created by hitting the instrument with a stick or beater. There are two main types of instruments: metalophones; and two types of gong instruments: sitting and hanging. The smaller sitting gongs are organized in large groups of notes and the bigger ones are organized in smaller groups. The largest hanging gong is at least three feet in diameter.
- Show slide seven “Gamelan Texture.” Explain that the gong-type instruments have a different function from the metalophone instruments.
- Talk about the tuning systems and modes all of which are pentatonic, just like the scale we used in our warm-up exercise. Show slide eight and explain: The instruments used to play the skeletal melody, called the “balungan,” are the metalophone instruments called the sarons.

Step Two: Expressing the Balungan Pitches in the Gamelan piece: “Bubaran Kembang Pacar”

- Start with students standing in scatter formation looking forward to the whiteboard.
- Draw their attention to the notation for “Bubaran Kembang Pacar” you have placed upon the whiteboard. This is the part that the Sarons’ play in the gamelan texture. Play the recording as you point to the pitches on the board. Have students express the pitch levels using their hands and bodies.
- Challenge the class to add their voices to the actions they have chosen for each pitch.
- The third time through have the students sing and move to the piece without the recording.
- Ask: “Do you notice any patterns in this piece of music? Where do the patterns start and end?” Point out that in Javanese Gamelan music the most important moments come not at the beginning of each four-note group (gatra) or at the beginning of each line (gongan), but at the end. These end-notes are emphasized or accented by the larger instruments in the gamelan called the structural instruments. Show slides nine and ten: pictures of the structural instruments: kenong, kempul, gong agung, kethuk, and kempyang

Step Three: Adding the Structural parts to form a Human Gamelan.

- Ask, “Can we add the structural parts?” Ask: “If an instrument is bigger does it have a faster or slower frequency? If an instrument is as big as the gong agung, does it vibrate for a long or a short duration?”
- Instruct the students to pick a partner. One will be the gong and the other will be the beater. Demonstrate by modeling yourself as the gong agung with one student as your beater. Students will not actually hit each other, but they will mime the motions. Ask: “When the beater hits the gong agung will the gong vibrate fast or slow? How long will the vibration last?” Have all partners demonstrate their gong agung.
- Go through the above process again for the kenong and kempul. Note that for the Kenong students will make the gong horizontal rather than vertical.
- How do the structural instruments know when to play? Each type of gamelan music has a prescribed number of beats between each gong stroke, called a gongan, and between each kenong stroke, called a kenongan. Show the students the symbols for: Kenong = N; Kempul = P; and Gong which is represented by a circled note. The piece we have been learning is a Lancaran where the kenong plays at the end of each gatra, the kempul plays on the second beat of gatra two, three and four, and the gong agung sounds every sixteen beats.
- Play the recording and have each set of partners act out either the kenong, or the kempul, or the gong agung part. Be sure to point to the notes as they go by so that the class can keep track of where they are in the music. Also point out that the gongs can vibrate into the next gatra or two depending upon their size.
- Divide the class in half. One half will express the balungan part on their body-Sarons while the other half will divide themselves into kenong, kempul, and gong agung parts. Play the recording again and have the class become a Human Gamelan. Be sure to point out the notes as they go by.
- Switch parts.

Application

- Divide the class into four groups. Give each group a large piece of paper and a couple of markers. Each group will be asked to compose their own Lancaran using the same structure as the piece they just learned. However, their Lancaran will only be two-gongans long (half the length of the one learned in class).
- One person in the group will play the piece on a xylophone or metalophone so that the whole group can learn to sing their Lancaran.
- Have the groups organize themselves into balungan and structural parts so that they can “act out” their human gamelan as they sing their Lancaran
- Give each group enough time to practice their piece before performing it for the class.
- Each group will perform their piece for the class.

Conclusion

- Ask students to reflect back on the entire process and share what they have learned either through class discussion or journal writing.