Wild Songs: Finding the Voice of the Land Through Imaginative, Mathematical Compositions

Jennifer Whiffin

University of British Columbia, Vancouver, BC, Canada; jwhiffin@sd43.bc.ca

Abstract

In this hands-on workshop, participants will work collectively to compose songs using sounds from the land and water, including real and imagined creatures that may reside there. Participants will create a collection of vocalizations that can be represented visually and classified by sound length. Sounds will be compared and arranged proportionately to produce bars of music patterns that groups of participants will combine and then perform. This is a classroom-tested activity that helps 9- and 10-year-old children deepen their understanding of fractions. It makes music composition accessible to learners regardless of their experience. Finally, it allows children and adults alike to connect with wild places and fantastical creatures of cultural folklore through deep listening, imagination, and musical performance.

Connecting

What might be the impact of using culturally responsive, multidisciplinary practices to enhance our children's understanding of local wild places and the ancient stories that are rooted to them? In 2017, I embarked on a project with my grade 4 and 5 students that brought together music and mathematics with the stories of Indigenous cultures. It was not only a wonderful way to connect my students to our local wild places and stories, but also a unique way to learn fractions through music.

Prior to the project, students observed photos and videos showing potlatch dance performances and read illustrated stories, but I wanted to give them a deeper experience that pushed them to connect these fantastical creatures with the forests surrounding our school. I also happened to be teaching about fractions and making connections to musical notation at the time. I wondered if listening to forest sounds and imagining these sounds as the voices of these creatures calling out to us from the distant, ancient past might inspire the eventual creation of wild songs that we could share with others. Creating these songs might also help students grapple with the portions represented by fractions and the relationships between them.

Although I am a teacher with a lack of musical training and experience, I have always felt that music was a beautiful, engaging, and meaningful context in which to potentially deepen fraction knowledge for all students. In my experience as an elementary school teacher, I have witnessed students with musical training transferring their understanding of music theory to mathematical concepts such as comparing and ordering fractions. This inspired me to connect music and fractional understanding over many years of my career; however, it wasn't until year seventeen that I was able to provide an experience that made sense to my students, and I felt was worthwhile sharing with the wider educational community. According to Schneiderman, "the intrinsic nature of mathematics and music suggests that the studies of both research mathematics and improvisational music could play valuable roles in modern education, as their abstract yet cohesive structures serve as models for developing flexible skills and the ability to generate spontaneous constructive thought [2]." Further, music and its rhythms, tensions, sound relationships, and proportions, is naturally connected to mathematical understanding [1]. What follows is the story of the mathematical learning that students accomplished while composing an original piece of music inspired by cultural learning.

Voices of a Coastal Temperate Rainforest

The mythical characters of the Kwakwaka'wakw people of southern British Columbia are colourful and scary—stealing wandering young children away from their parents and causing all sorts of mischief and chaos. These ancient characters were born from the rainy forests of giant cedar, fir, hemlock, and spruce trees of the temperate rainforest. They are brought to life by costumed, mask-wearing dancers at potlatch feasts and winter ceremonial rites [3].

How might we come to imagine their voices? The journey begins with listening. Students in my class were tasked with the job of walking and sitting quietly in the forest, noticing sounds of the wind through the branches, of trunks of vast trees swaying gently, calling birds, snapping branches, and the sound of footsteps in the moss. We also ventured out on rainy days, listening to new sounds provided by falling drops and pooling water. At the time, students were asked to collect the sounds in their memories and connect them to mythical creatures who lived in these places such as Dzonokwqa—the wild woman of the woods—and Hok Hok, Raven, and Crooked Beak—the cannibal birds. They shared their ideas with the larger group and I recorded them phonetically into a table.

Classifying and Representing Sounds Using Fractions

To get ready for composing a song of our forest, students spent time getting to know whole, half, quarter, eighth, and sixteenth notes. Using the definition of a whole note as 4 steady beats, students determined the relative length of the other notes. To simplify the eventual composition, eighth and sixteenth notes were bundled such that they were equivalent to the single beat of a quarter note in pairs of two and groups of four respectively.

Next, students in pairs or groups of three were supplied with a copy of the table of sounds which they cut to separate. They then spent time sorting their created sounds, deciding which sounds could be extended the four beats of a whole note, which matched half note or quarter note lengths, and which could be paired or grouped to match eighth and sixteenth notes. From here, the class selected a starting set of common sounds: one sound for each type of note. Each sound was punctuated with a drum beat at the start of each note. Drawing from a common set of sounds allowed us to practice as a group more effectively and to later share and combine separate compositions.

Now we needed to think about notation! I could have encouraged the use of the standard musical representation of each type of note, but I felt that students needed something that more clearly represented the fractional portion of each note and could more easily be read. Instead, I related standard music notation to fractional portions of coloured paper (see Figure 1).

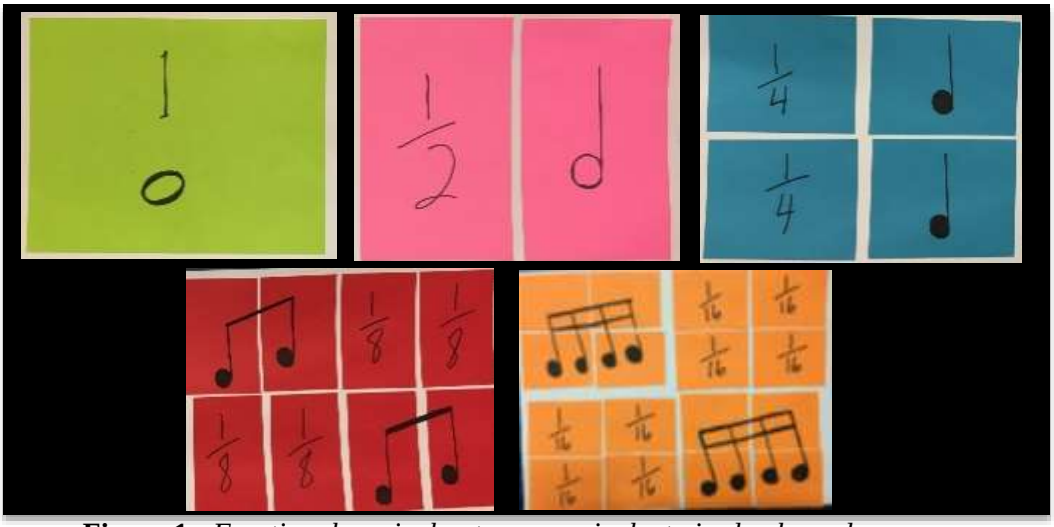

Figure 1: *Fractional musical notes on equivalent-sized coloured paper.*

Students worked with coloured paper—one colour for each type of note—folding and cutting to create fractional portions that matched each note. Many students also chose to write the sound they had chosen on each piece of paper to help them remember them better (see Figure 2).

Figure 2: *Initial cutting, labelling, and arranging fraction portions*

Composing

Students continued to work with partners or groups of three to arrange the coloured pieces of paper representing sounds into a pattern that pleased them. They began by simply laying the pieces out in a line and testing the sounds and the arrangement until they were happy with it.

Then, I supplied them with plain paper that they glued together into a line long enough to fit their composition (see Figure 3).

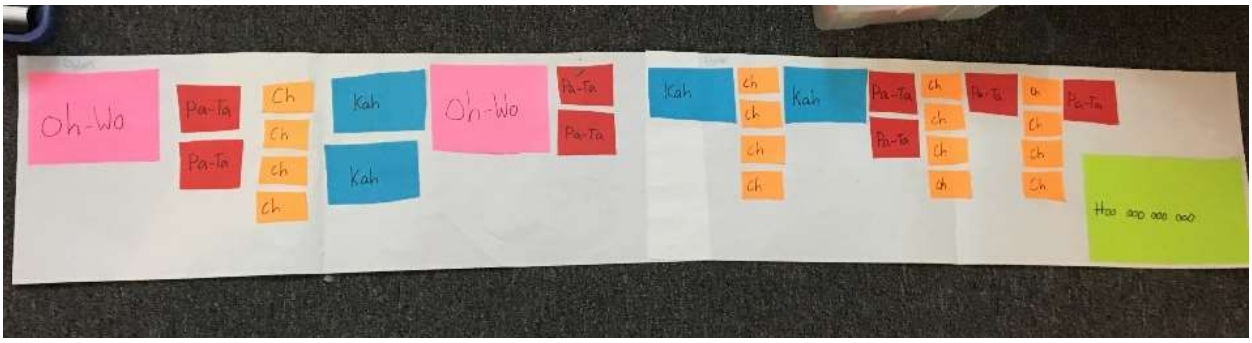

Figure 3: *Final arrangements glued onto white paper*

Practicing, Sharing, Reflecting

Partners and groups of 3 were combined to create larger groups of approximately 12 students each. Group member taught each other their smaller compositions and combined them to create larger compositions that they eventually performed together for the rest of the class (see Figure 4).

The activity was concluded with a written reflection on the creation and performance of each song, as well as understanding of fractions resulting from the experience. Students overwhelmingly enjoyed the experience and were both proud and critical of their compositions. Several felt that they had brought the spirit of our coastal rainforest to life and I noticed many students emulating Kwakwaka'wakw mythical characters in their imaginative play.

Importantly, many felt that they could feel the relationship between the fractions. Following this activity, I also noticed that I could refer to the relationship between the notes to help explain the notion of equivalency. When I taught fractions in the past, I often referred to the relationship between measuring cups to compare fractions. However, many students do not have baking experience and it was difficult to provide this in the context of the classroom to the extent that students needed to develop a firm referent. The experience of arranging music over this multi-day activity provided them with a clear referent: they could easily articulate the relationship between sixteenth, eighth, quarter, half, and whole notes by the end of it and could transfer this learning to other contexts.

Figure 4*: Students sharing and practicing combined compositions*

Conclusion

In our 90-minute workshop together, we will experience an abbreviated version of what my students experienced over the course of a couple of weeks. In the first 45-minutes, we will collect and create sounds, inspired by videos of local landscapes and from our respective cultural backgrounds. I will provide each group with a template for recording favourite sounds and take everyone through the sorting and representing process experienced by my students. We will collectively select a set of starting vocalizations that are aligned to whole, half, quarter, eighth, and sixteenth notes and work in pairs to arrange these sounds (as represented by portions of coloured paper) into small compositions.

In the second half of the workshop, we will discuss ways to adapt the activity to different cultural contexts, involve the use of technology, and deepen the connections between mathematics and music. We will also examine ways to adapt the activity for a younger audience and/or extend it to higher grades.

References

[1] G. Roberts. *From Music to Mathematics: Exploring the Connections.* Johns Hopkins University Press, 2016.

[2] J. Schneiderman. “Can you hear the sound of a theorem?” *Notices of the American Mathematical Society*. 58: 7, 927-937, 2011.

[3] U'mista Cultural Society, S. A. I. *Potlatch: Living Tradition, the Kwakwaka'wakw potlatch on the Northwest Coast. Potlatch*. (n.d.) https://umistapotlatch.ca/potlatch-eng.php.