

Music and maths

While we arbitrarily separate learning into boxes in educational institutions, it is clear that we learn in an holistic and integrated way. While there are demands of faculties and timetabling at tertiary and secondary level, the primary teacher has the opportunity to integrate learning across disciplines. In fact, with the current demands on the curriculum, it is the only way to fit everything in.

The relationship between music and mathematics is borne out by the number of people who are equally comfortable with and proficient in each discipline. A colleague of mine changed from being head teacher, maths to head teacher, music in a Sydney high school. Many of the participants at any Mathematics Association of NSW Conference are accomplished singers, instrumentalists and dancers. Music and mathematics share aspects of structure and form, patterns and rhythm. Notes which harmonise have a strict numerical relationship in terms of vibrations per second. There are aspects of rote maths learning that are of their very nature rhythmic and have natural phrasing. The young child can make a veritable musical production of chanting tables. Many maths learning activities lend themselves to instrumental, vocal and dance contexts.

The following activities capitalise on this special relationship between mathematics and music, and most of them also integrate human movement into the activity. Movement activities will support many students, particularly young students, in the learning of mathematics.

A musical number game

Play any lively, **instrumental** piece with a **strong beat**. No lyrics. Folk dance music is ideal. When the music stops, quickly form a group of the number called out by the teacher. People who are “out” join the “orchestra”. They take a non-melodic instrument (hand drum, sticks, tambourine, etc.) and play along. While playing they discuss: How many groups were there? How many were in each group? Which number can we call that will catch the most “out” this time?

The Venn approach to non-melodic instruments

Place all the non-melodic instruments in a pile. Ask a group of children to sort them according to the material of which they are made. For those that are made of more than one material, sort according to the sound-making attribute: which part of the instrument makes the sound. An instrument like a tambourine with a head(skin), will have two sound-making sources, the metal jingles and the skin, thus placing it in an intersection set.



Intersecting sets of instruments



Prime music and dance

Chant numbers to 24 slowly and rhythmically, introducing a body percussion sound, e.g. finger snap, between the numbers, e.g. 1 snap 2 snap 3 snap, etc.

Repeat, with a small group of students adding a wooden instrumental sound on every third number.

Repeat, with another group adding a metal sound on each fourth number. (What happened at 12? Did a group make a mistake? If not, why did they both play on 12?)

Repeat, with another group adding a drum beat on every even number. Repeat, while a group adds a stamp on every fifth number.

Are there any numbers which have no instrumental sound? What are they? What do we know about these numbers?

When these issues are discussed, organise another group of students to move creatively to the prime numbers only. On each prime number they make one large movement, using a different level and body shape each time. These students need to be secure about their knowledge of which numbers have only two factors and anticipate when to move.

Take the chant up to 36. Perform the whole piece. Now perform again, but omit the chanting of the numbers, which is now done internally. The performance now becomes a dance with instrumental accompaniment, based on the sequence of prime numbers.

“Factors and products” country dance

Play the music for the dance Circassian Circle. *Music and Dance for the Regular and Special Classroom*, by Lorna Parker and Diana Humphries, two booklets and a tape, is available at a cost of \$18 plus postage from Department of School Education, telephone (02) 9748 8410.

First version

Dance freely to music, in groups according to the displayed number, held up on a large card by the teacher:

6 4 3 2 1.

What is the smallest group that you would need to create a dance in which you could be in all those groups with nobody left out? (12)

Analyse the music. How do you know it is the end of a section? (Chord change) How many sections? How many phrases or musical sentences in each section?

Task: Create a dance in which you are in groups of 12, 6, 4, 3, 2, and 1 at some time in the dance. Give the dance shape, balance and a pleasing quality aesthetically.

Perform for everyone.

Second version

Form circles of 12. Any children not in groups of 12 become the non-melodic orchestra. They invent an accompaniment to the music, playing at different times and in different rhythms. They can notate their arrangement graphically.

The circles of 12 copy the teacher in the dance by simultaneous imitation. Try the usual walking in and out for the first section, clapping on the change of direction. In the second section of the dance, couples usually swing together. In this “factor” dance, they dance round in circles with an increasing number in each circle each time through: first by themselves (1), then with a partner (2), then in threes, fours, sixes and lastly all twelve together. For the third section, re-form the circle of 12 each time, stand and clap until the end of the section, thus:-

First time:

- Section 1: Circle of twelve. Into the middle and out, twice through.
- Section 2: Dance around by yourself (1)
- Section 3: Re-form circle. Stand and clap.

Second time:

- Section 1: Circle of twelve. Into the middle and out, twice through.
- Section 2: Dance around with a partner (twos)
- Section 3: Re-form circle. Stand and clap.

Third time:

- Section 1: Circle of twelve. Into the middle and out, twice through.
- Section 2: Dance around in threes.
- Section 3: Re-form circle. Stand and clap.



Continue for fours, sixes and twelves.

Other ways of performing dances for 12s can be freely invented. This kind of activity certainly helps visual and kinaesthetic learners, in particular, to internalise the concepts involved in the mathematical processes.

Musical tables

For the rote learners who enjoy chanting their tables, try a musical extravaganza to make it more exciting. A small group of students can invent a movement “ostinato” or repeated pattern, while another group sets up an underlying chant such as “nine times ta-ble, nine times ta-ble” with body percussion or non-melodic instrumental accompaniment. If you wish to sing, try using the major or minor triad. The one times table is sung on doh, some students go up to the third, me, on the 3 times tables, while another group sings soh on 5 times table. Why not on 6 times table? Make a dance, a singing game, or whatever the students can invent, based on their tables.

Simple adaptation of a well-known song

There were thirty-six bottles hanging on the wall, etc.
And if nine green bottles should accidentally fall, there’d be
Twenty-seven bottles hanging on the wall.

It’s surprising how many children, and adults, find this difficult!

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