

Music Integration with Stand-alone Mathematics

Music specialists and classroom teachers collaborated to investigate how music can integrate into stand-alone mathematics planning to deepen conceptual understanding across disciplines in a challenging, engaging way. The PYP mathematics and arts scope and sequence documents were used to investigate connections and produce a scaffolding document. This document is below for your convenience. Findings revealed strong connections via the concepts of pattern, symbols and fraction relationships.

Using maths manipulatives such as coloured cubes, pipe cleaners and pattern blocks in musical inquiries gave students tangible tools to represent their responses to music; analyse patterns and create with more freedom than more traditional notation devices. Investigations into pattern through musical composition resulted in students demonstrating increased creativity. For example, when teaching maths as a stand-alone subject, students created repeating and growing patterns. When students translated their patterns into music (coloured cubes representing specific pitches), they also flipped their patterns (sparking discussions on symmetry); completely rearranged them (same pitches, different order) and became very engaged in investigating the results of layering their patterns and playing them simultaneously.

In developing the concept of fractions, composing using pattern blocks gave a visual representation for their investigations into the fractional relationships between shapes. Translating these representations into rhythms engaged the students in playing with possibilities in creative ways. Some interesting observations occurred:

- 1) Students realised how rhythms seem to naturally group themselves into wholes: one $\frac{1}{2}$ beat plus two $\frac{1}{4}$ beats sounded more natural than one $\frac{1}{2}$ beat plus three $\frac{1}{4}$ beats, reinforcing the concept of fractions representing whole-part relationships.
- 2) Some children became fascinated with complex rhythms – for example, using mixtures of thirds, quarters and sixths.
- 3) Students applied patterning concepts, experimenting with different variations of rearrangement and layering. Layering, in particular, gave students an extra challenge as they investigated fraction patterns that could combine successfully.



Music -Maths Conceptual Links

Possible conceptual lenses:

change, form, function, creativity, systems, pattern rhythm, melody, number, symmetry

Key: red = scope and sequence phase 1, blue = scope and sequence phase 2, green =phases 3 and 4

Music conceptual understanding	Music Learning outcomes	Maths conceptual understanding	Maths learning outcomes	Possible inquiries
People make meaning through the use of symbols	Express their responses in multiple ways Recognise that sound can be notated in a variety of ways	Making connections between our experiences with number can help us to develop number sense (Measurement) Objects have attributes that can be measured Patterns can be represented using numbers and other symbols.	Understand that numbers can be constructed in multiple ways (CM) Connect number names and numerals to the quantities they represent (TM) Extend and create patterns (AM) Understand that attributes can be compared and described (Measurement CM) Describe patterns in various ways	Sounds of different lengths and how we can represent them Describe and compare different timbre/ pitches Use manipulatives (ie pipe – cleaners/ maths manipulatives to represent sounds that they hear – ie how many beats, rising/ falling pitch, increasing, decreasing, different tempos
Our experiences and imagination can inspire us to create	Use the voice and body to create musical patterns Participate in creating music	Patterns and sequences occur in everyday life Patterns repeat and grow (Pattern)	Understand that patterns can be found in everyday situations (CM) Describe patterns in various ways (TM)	“Copy cat” listening activities –(can the students figure out the pattern and continue it?)

	both individually and collectively		<p>Extend and create patterns (AM)</p> <p>Use number words and numerals to represent quantities in real-life situations (AM)</p>	<p>Create musical patterns using body, percussion, raininbow bells etc. Share patterns in “copy cat”manner. Represent patterns ie with coloured cubes/ different maths manipulatives</p>
Applying a range of strategies helps us to express ourselves	Collaboratively create a musical sequence using musical elements	<p>Whole numbers exhibit patterns and relationships that can be observed and described</p> <p>Fractions are ways of representing whole part relationships (number)</p>	<p>Understand that patterns can be found in numbers (CM)</p> <p>Represent patterns in a variety of ways (TM)</p> <p>Extend and create patterns (AM)</p> <p>Model simple fraction relationships (CM)</p> <p>Use fractions in real-life situations (AM)</p>	<p>With limited pitch choices (pentatonic scale -doh, ray me, soh, la). How many patterns can they make. What can you do to these patterns to change them? Can you arrange these patterns into a composition? Multiple patterns?</p> <p>Physical representation of fractions using body movements -ie whole beat, half beat, quarter beat -connect to musical notation.</p>
We use what we know to interprt arts and deepen our understanding of	Analyse different compositions describing how the musical elements	By analysing patterns and identifying rules for patterns, it is possible to make predictions.	Understand that patterns can be analysed and rules identified (CM)	Analyse simple pieces for form – ie ABA form. Use physical movements to identfy

<p>ourselves and the world around us</p> <p>We explore a range of possibilities and perspectives to communicate in broader ways through our creative work</p>	<p>enhance the message</p>	<p>Fractions and decimals are ways of representing whole-part relationships. (Number)</p>	<p>Describe the rule for a pattern in a variety of ways(TM)</p> <p>Represent rules for patterns (TM)</p> <p>Select appropriate methods for representing patterns (AM)</p> <p>Model equivalent fractions (CM)</p> <p>Read, write, compare and order fractions</p> <p>Read and write equivalent fractions™</p>	<p>recurring themes, motives in music.</p> <p>Analyse simple patterns in music (rhythmic and melodic) – played forwards and then backwards, repeated, parts repeated How would you represent these patterns?</p> <p>Continued compositions using patterns</p> <p>Create 'fraction composition'. What do students notice about grouping of notes?</p>
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