



Experiencing maths through music

PROJECT OVERVIEW

JAMATH is a collaboration between:

- **The YuMi Deadly Centre (YDC):** A research centre within the Faculty of Education at the Queensland University of Technology (QUT). YDC is dedicated to enhancing the learning of all students to improve their opportunities for further education, training and employment, and to equip them for lifelong learning.
- **Join Australian Music (JAM):** A music group that engages participants in fun, interactive music programs to achieve positive educational, social, health and employment outcomes and assist communities to produce their own music and develop local creative opportunities, initiatives and career pathways.

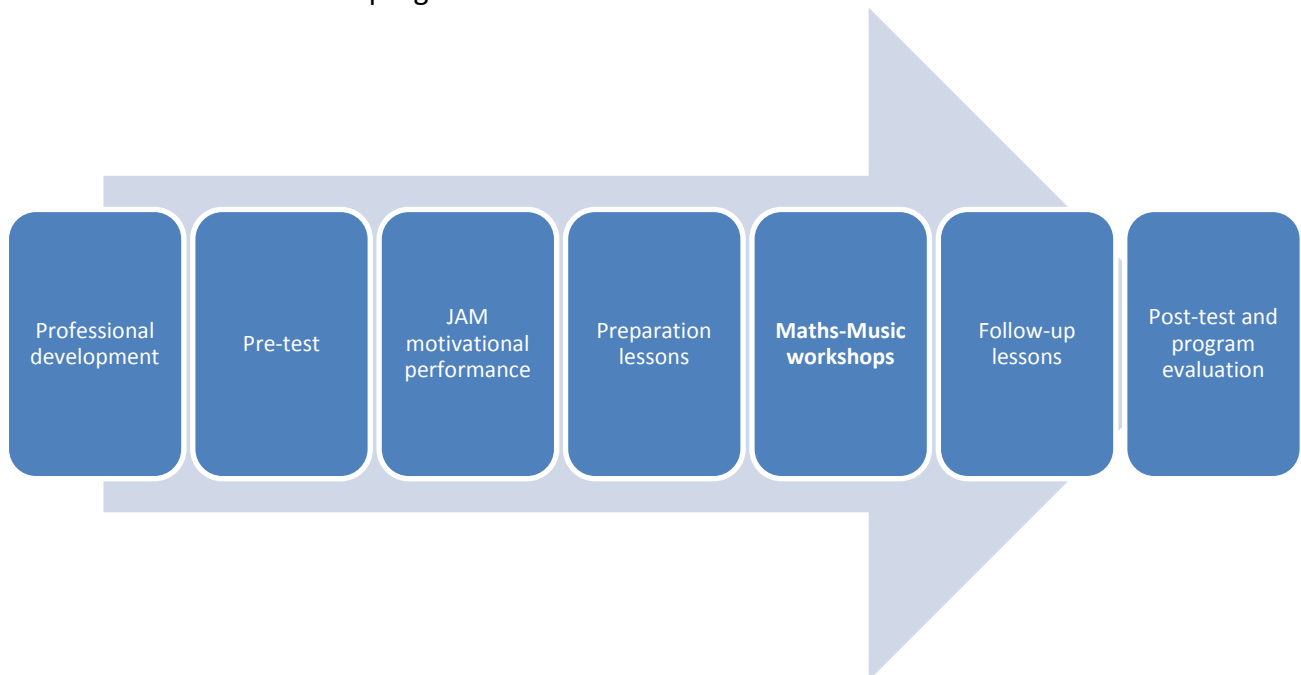
What is the program about?

- making mathematics learning an enjoyable experience by connecting it with music
 - understanding mathematics through music
 - real-life applications of mathematics that make sense
 - interdisciplinary approaches to teaching and learning (maths, music, science, literacy)
 - using music as a vehicle to enhance student engagement in creative works, mathematics, science and literacy education
 - providing teachers with alternative, innovative and fun ways to teach mathematics
 - improving mathematics results
 - learning about the music industry and vocational pathways in the music business
- ***JAMATH aims to motivate students in learning mathematics to improve their life chances and employment opportunities!***



PROJECT COMPONENTS

JAMATH is built around maths-music workshops with optional teaching and learning components. The overall structure of the program is illustrated below:



Program structure of JAMATH

Each component of the program is described below.

Professional development

Professional development (PD) sessions will be held on site for teachers who are to implement the program in their classrooms. The PD is structured as follows:

1. *Introduction to the program components.* Teachers are introduced to the program's teaching and learning philosophy. The aim is to provide teachers with a clear understanding of the background of the project, to introduce the idea of combining music and mathematics to enhance mathematics learning, to explain teachers' involvement in the project and to provide detailed explanation of the program's structure and process.
2. *Introduction to preparation and follow-up lessons.* Teachers are introduced to musical concepts applied in the lessons and how they relate to mathematics. Each teacher receives a preparation and follow-up lesson booklet and each lesson is explained using musical instruments and other resources referred to in the booklets. The aim is to provide teachers with a good understanding of the aims and objectives of the lessons, information on how to conduct the lessons including hands-on activities, and clear guidance on how to make reference to mathematical concepts while applying musical activities.
3. *Introduction to research components (optional).* Teachers are introduced to data gathering procedures, particularly with regard to the pre-post tests and observational procedures that can be used while conducting the maths-music lessons. This is so that the teachers are able to evaluate the effectiveness of the lessons.



JAM motivational performance

The band will perform for 15 minutes at a school assembly to motivate students for the preparation lessons and the maths-music workshop day(s).

Preparation lessons

The idea of the preparation lessons before the maths-music workshops is to introduce the mathematics underlying the music via hands-on activities like clapping and singing but without the formal music notation. Preparation lessons cover the following topics:

- *Patterns and Music:* Repeating patterns as the basis of rhythm, lyrics and song structure.
- *Fractions, Ratio and Pitch:* Fractions or ratios of distances as the basis of pitch.
- *Shape, Volume and Loudness:* Area and volume as the basis of loudness.
- *Time, Notes and Beat:* Fractions of time as the basis of notes and timing in music.

Maths-music workshops

The maths-music workshops delivered by professional musicians consist of song writing, instrument building, sound engineering and music event organisation. Schools can choose different components and lengths of workshops.

Follow-up lessons

After the preparation lessons and the maths-music workshops, the follow-up lessons extend and apply the ideas from the preparation lessons and the workshops to investigate the mathematical basis of music in a more formal manner, including music notation and hands-on activities. The follow-up lessons include the following:

1. *Measuring a Song.* Lessons extend on time and fraction, the meaning of and difference between duration and tempo of a song.
2. *Patterning.* Lessons extend on patterns that can be found in rhythm, lyrics and song structures. Students are asked to explore and produce pitch, noise, rhythm, tone, lyric and chord patterns using symbols of musical notations and hands-on activities.
3. *Fractions and Time.* Lessons extend on fraction and time using musical notations and corresponding mathematical fractions of note values. Musical hands-on activities like clapping are used to demonstrate note values and relationships of whole and parts, equations of musical notations and how this can be translated into mathematical terms.
4. *Length and Volume.* Lessons extend on volume and pitch by using hands-on activities similar to those in the instrument-building workshops.

Lessons align with curriculum requirements for Years 7–9. However, lessons can be adjusted to meet specific requirements of classes. The comprehensive package includes additional lessons on sound engineering and music event organisation.



Pre-post tests and program evaluation

As a mathematics research centre, YDC is committed to improve teaching and learning results. To measure the impact of the program, YDC conducts program evaluation and pre- and post-testing of students.

JAMATH PACKAGES

We offer the following three packages to cover specific needs of schools:

	Basic	Upgrade	Comprehensive
<i>Approximate duration of program</i>	2–3 weeks	4–5 weeks	6–8 weeks
<i>Professional development</i>	½ day	1 day	1–2 days
<i>JAM motivational performance</i>	✓	✓	✓
<i>Instructional teaching material (booklets)</i>	8 preparation lessons	8 preparation lessons + 9 follow-up lessons	10 preparation lessons + 12 follow-up lessons
<i>Lesson support online/telephone</i>	✓	✓	✓
<i>Lesson support on-site (location dependent)</i>	✗	on demand	on demand
<i>Pre-post tests</i>	✗	✓	✓
<i>Music workshops</i>	½ day song writing ½ day instrument building	1 day song writing 1 day instrument building	1 day song writing 1 day instrument building ½ day sound engineering / music production ½ day organising a music event
<i>Additional resources</i>	✗	Metronome, tuner, worksheets	JAMATH ‘Gigbag’ including: metronome, tuner, worksheets, additional lesson material

JAMATH has been successfully trialled in several state schools in Queensland. If you are interested in implementing JAMATH in your school please contact Alex on 07 3138 1169 or alexander.stuetz@qut.edu.au

