

Composing and Creating in Code on the iPad - Hopscotch

Why should we bring coding into the music room?

Isn't this a STEM subject reserved for Technology and Mathematics?

I can tell you I was a skeptic at first. After going to a coding workshop last year I saw that students could code their own instrument and so I thought I would investigate further to see if it could be an authentic music lesson.

The best iPad coding app I found for coding music is [Hopscotch](#).

Firstly please be aware that iPad coding apps are not as advanced as coding software on the computer, such as Scratch, and therefore has some limitations to it's functionality.

Hopscotch I have found to be the best one to use in a music classroom as it has a full 2 octave melodic sounds range plus a kick and snare sound. It also has lots of environmental sounds and sound effects. While it's not perfect, it still has great opportunities for coding in the music classroom.



[Hopscotch](#) is a coding app designed for students to learn to code by creating their own games.

Website: www.gethopscotch.com

It uses a simple jigsaw puzzle method of dragging blocks of code into the window to create an instruction for your character to do, eg move or play a sound.

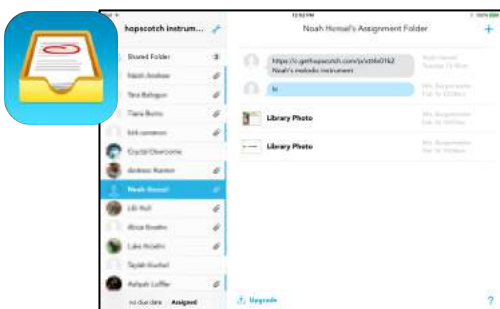
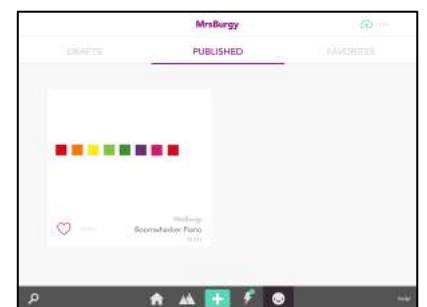
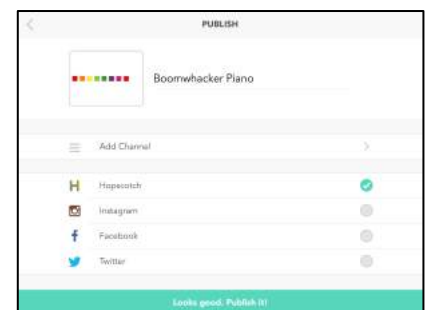
It has multiple coding fundamentals including, conditionals, variables, loops and many more.

Hopscotch works with an online account, students need a username and a password, but they do not need to put in an email address.

While it is online, you can choose to publish your work in the Hopscotch community or just keep them as drafts. As drafts, students can not share their project with you, you will need to view it on their iPad.

I give my students the choice whether they want to publish or not. Those that do not publish are required to take screen shots of their coding and upload the screen shots to [Showbie](#) for me to view.

Those that publish can simply click on the link icon next to the heart to copy the weblink, and send to me in a message in [Showbie](#). From the weblink I can view their project in hopscotch on my iPad, I can even save their project as a draft to my own account to have a collection of them all.



UNITS OF WORK

This year I have written and taught 2 units using Hopscotch:

Coding Instruments

With my Year 6/7 class I decided to see how well we could code a musical instrument to then play a song together.

Activity 1: Create a Boomwhacker Coloured Piano

This lesson was very structured with students asked to code exactly the same melodic middle C – high C instrument with the intention of then playing Twinkle, Twinkle Little Star at the end of the lesson.

Coding a melodic instrument is easy, selecting when character is tapped (we chose a square), dragging the play sound button into the code area. We also set each character/square to be a the boomwhacker colours. Playing a coloured Boomwhacker score at the end of the lesson.



Activity 2: Create a percussion or abstract music app

My students were given the instructions to create their own instrument using any sound, image and animation they wanted. Some made the characters/instrument keys move when touched or change colour.



Activity 3: Arrange a 3 or 4 part composition

My students choose a simple song such as Hot Cross Buns and wrote arrangements in groups of 3 or 4, incorporating the instrument apps they had coded. They performed them in front of the class.

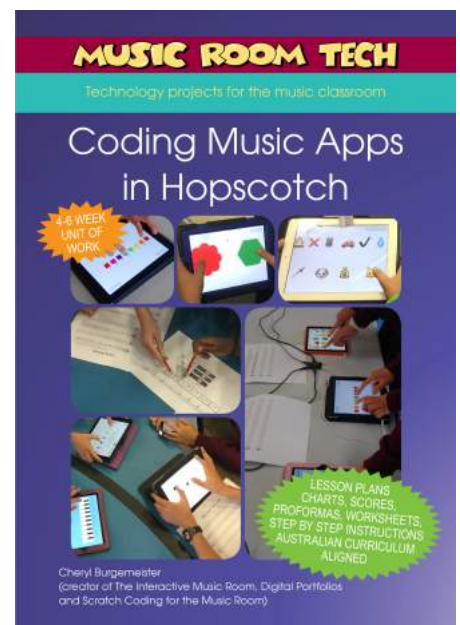
I use a Belkin Splitter to connect multiple iPad's to a speaker.

To see some examples of my students work, have a look at my blog post:

<http://wp.me/p3OxEF-kC>

Purchase the new *Coding Music Apps in Hopscotch* publication with step by step instructions, scores, worksheets and assessment proformas at:

<http://bushfirepress.com/musicroom/tech/index.html>



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Composing in Code on the iPad

To tie in with the Year 3/4/5 unit of inquiry on 'Time', I wrote a unit of work based around beat, note length/duration and tempo to be transdisciplinary in my approach to teaching music, hence the composing in code as the perfect medium to inquire and explore.

Originally when I started teaching this unit I found an issue with the melodic sounds. When coding a Harmony, it seemed to play out of sync. Assuming that the sounds were not all the exact same length or had a silence at the start, I contacted the developers of Hopscotch to query the note length, explaining what I am using it for and their first response was ...

“How cool! This is awesome. How did you get this idea?”

Unfortunately my suspicion was correct and their second response to my note length question was that some notes are slightly (milliseconds) shorter/longer than each other and some do have a small silence at the start before it plays.

But I didn't give up on the idea of coding composition, I used it at the time as a lesson on note length/duration and tempo, which actually was the whole reason I came up with this idea for a unit on coding composition in the first place.

I am excited to say in the latest update they have fixed the sound length issue, plus they added an extra note, C below middle C, as originally they had one note shy of 2 octaves, C# to C above middle C.

So how do we teach this?

Each melodic note in a score plays for a certain length of time (duration), depending on the value it has been given:

- Quaver/ti = ½ beat
- crotchet/taa = 1 beat
- minim/too-oo = 2 beats

When we talk about time in music we talk about time signature, or meter, indicating how many beats in the bar. Then there is also another measure, Tempo, determining the speed at which each note is played, or the duration each beat will last in seconds i.e. how many beats per minute - BPM.

In Hopscotch, there is only one sound block:



This instructs the 'character' (image) to play middle C and then wait __?__ milliseconds before the next action occurs.

For example:

The actions occur in order – first it will play the note sound middle C until it is finished, then it will wait 500 milliseconds. By changing the milliseconds value you can create the 'feel' of different note lengths being played.

In the composing activity with my students we decided that for a

- Quaver/ti note it would play and then wait 250ms
- crotchet/taa note it would play and then wait 500ms
- minim/too-oo note it would play and then wait 1000ms



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Using this method, my students successfully coded Twinkle Twinkle Little star (and were very proud). However, what amazed me, was the additional/incidental learning that occurred without me planning it.

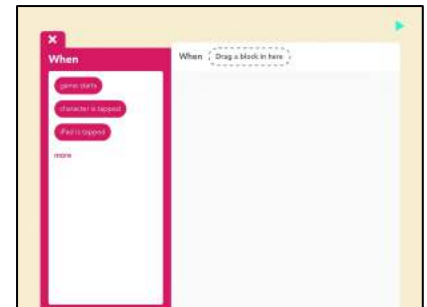
Students coded and then tested, coming to me and saying it didn't sound right, showing that when testing their coding, they were doing it aurally, not visually.

Students went back, calculating at which point in the coding it was wrong, checking the music score and then correcting their coding without any instructional help from me. This was the part that blew me away.

And the skeptic in me was finally convinced this is a real authentic music activity, that while they are not physically playing an instrument, in their mind they are learning and practicing every aspect of composition.

Lesson 1: Maths in Music!

- Revise note lengths ti-ti (1/2 beat each), taa (1 beat) and too-oo (2 beats) and how they link together e.g. 2 ti's equal a taa, 2 taa's equal a too-oo etc.
- Give the note lengths a time value in milliseconds, too-oo = 1000ms, taa = 500ms, ti = 250ms. Spend some time playing around with the values so the students understand the maths involved
- Introduce Hopscotch and show how the maths correlates using Twinkle Twinkle Little Star.
- Spend the rest of the Lesson setting up student accounts in Hopscotch(have a 2nd activity or worksheet for students to go on with)



Lesson 2: Composing in Code

- Revise note lengths and correlation to ms
- Go through Worksheet and write note lengths in ms under each note of Twinkle Twinkle Little Star (taa = 500, too-oo = 1000)
- Teach how to create a new project
- add a character (+ in the top right corner)
- Add a new rule
- Drag 'game starts' into the dotted area
- Select the Green looks and sounds tab
- Drag Start sound (choose the note required and type wait: taa = 500, too-oo = 1000)
- Using the Staff Chart to decode, students can code the character to play Twinkle Twinkle Little Star

Lesson 3: Can you add a drum beat, ostinato or harmony?

Add another 'character' repeating the same steps as above to:

- Investigate adding a harmony (code the same as above changing the notes where you need the harmony)
- Investigate adding a drum beat using the blue repeat block
- Investigate adding an ostinato using the blue repeat block
- Which ones work and which ones don't?

Composing in Code using Scratch

<https://scratch.mit.edu/>

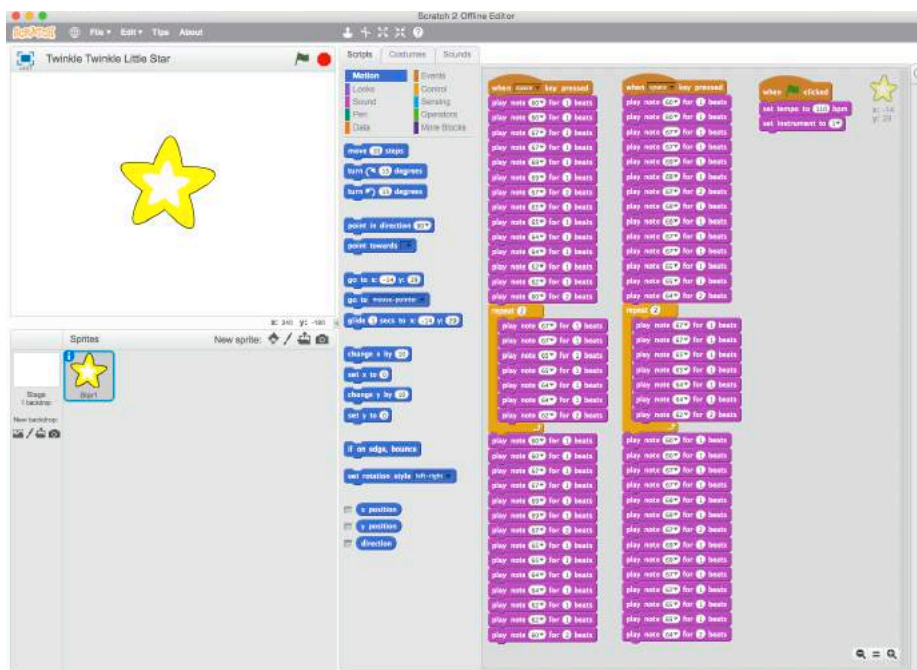
Scratch is computer base, online software program. You can also download the Offline editor.

Where Hopscotch limits you, Scratch gives you a little more freedom/flexibility to change settings.

In Scratch you have many different sound blocks available to you, including:



However while you can code a harmony, you still can not code a repeated ostinato or a drum beat, just like Hopscotch it goes out of sync.



MUSIC ROOM TECH

Technology projects for the music classroom

[Signature Ringtones](#) contains 4 iPad projects (each taking 1-2 lessons):

Pitch Maps - drawing and recording in the Explain Everything app.

Melodic Rhythms - composing and then recording untuned and tuned percussion instruments in the Explain Everything app.

Ringtones - playing, recording, arranging and producing in the Garage Band app.

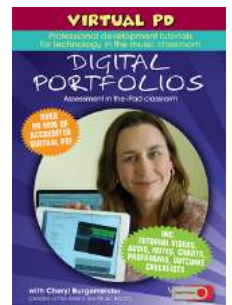
Digital Portfolios - Putting it all together in the Explain Everything app.



Join author and presenter Cheryl Burgemeister as she steps you through the process of recording, collating and sharing evidence for Assessment in a digital form, allowing you to view and listen to your student's work in the one document. Access can be provided to teacher, student, school and parent as required.

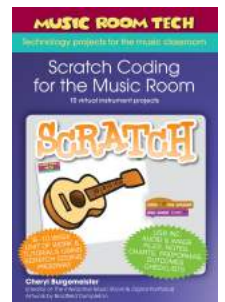
By the end of this tutorial you will be able to:

- Work with the apps dropbox/Google Drive, i-nigma, Book Creator and Explain Everything
- Create QR codes
- Create templates for your students to access
- Document a unit of work from start to finish in one app
- Inc. tutorial videos, audio, notes, charts, proformas, outcomes checklists
OVER 90 MIN OF ACCREDITED PD!



[Scratch Coding for the Music Room](#)

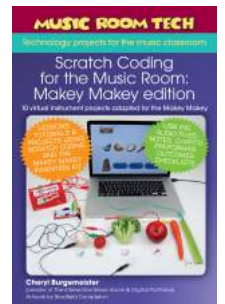
Use this 8 - 10 week unit of work to teach your students to code their own virtual music instruments using Scratch, an online/offline, computer based, coding program used to teach the basics of coding.



[Scratch Coding for the Music Room: Makey Makey edition](#)

Use this 10 week unit of work to teach your students to code their own virtual music instruments in Scratch and turn them into an electronic instrument with the Makey Makey INVENTION kit!

Scratch is an online/offline, computer based, coding program used to teach the basics of coding.



[Interactive Music Room](#)

Books 1-3 of the Music Room curriculum from Bushfire Press adapted for use on the interactive whiteboard. Includes all audio and media content plus interactive activities.

