

Music Blocks

What is Music Blocks?

- Music Blocks is a visual programming language for music.
- Music Blocks is an open-ended tool for learning.



A teacher and a student using the Music Blocks software in music class

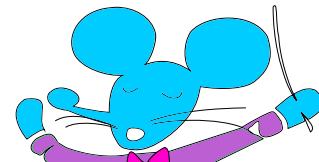


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The potential of children is limitless.

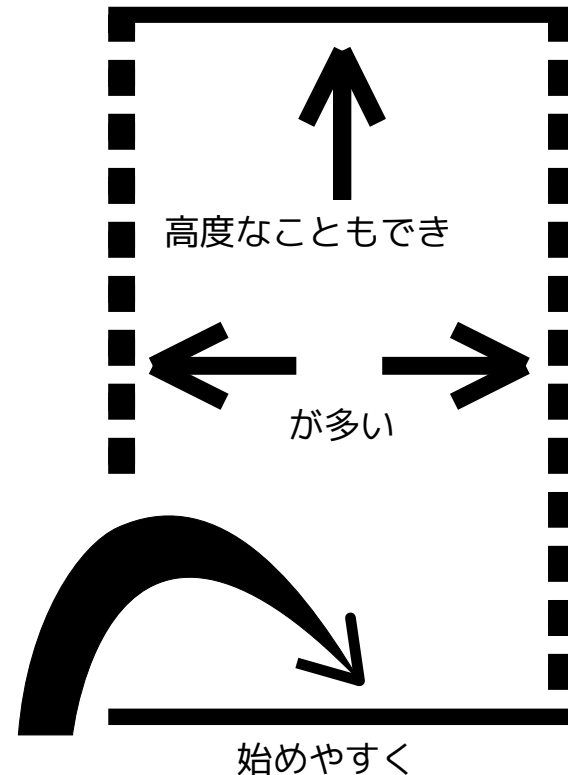
- An important concept embodied by this software is:

Low Floor (低い床)

Wide Walls (広い壁)

High Ceiling (高い天井)

- Anyone can start easily, do many things, and achieve a very high level with the Music Block software.

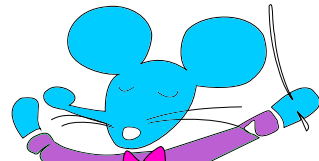


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Teaching for Understanding

“You never understand something unless you understand it in more than one way.”

「ひとつ以上の方法を知るまでは、ものごとを理解したことはない。」

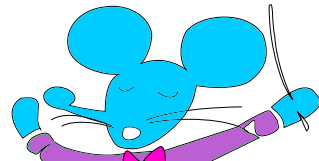
- マービン・ミンスキー



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Marvin Minsky



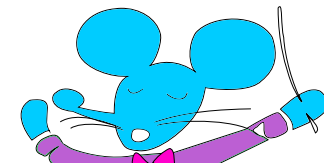
日本国際賞
1990年
「人工知能の
確立」
マービン・ミンスキー



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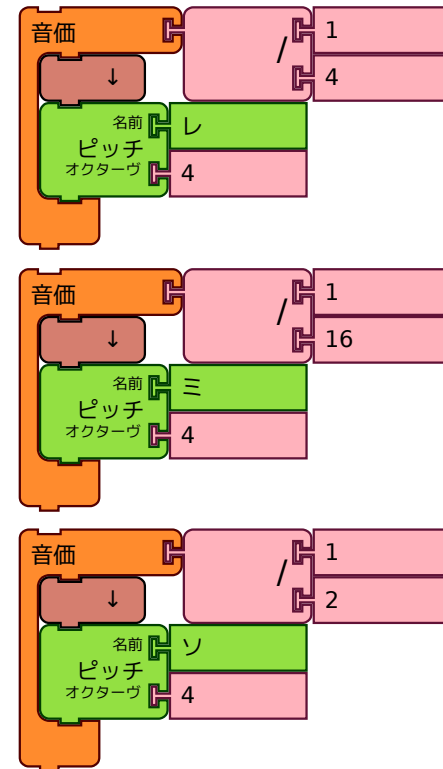


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Math and Programming through Music

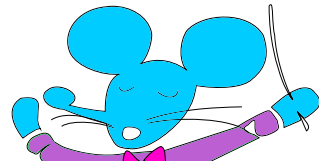
- Children who are already comfortable with music learn math and/or programming by making music.
- Children who are more comfortable with math and/or programming will reinforce their knowledge as well as learn more about music, an important skill.



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Music Fundamentals

- Unlike other coding languages (e.g. Scratch), Music Blocks was created with tools that are important to making music.
- Music pedagogy has a well-established history and reputation that can be used to maximize learning.



ミュージック・ブロックスからエクスポートされた「キラキラ星」の歌の楽譜です。

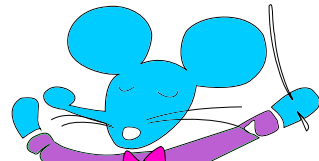


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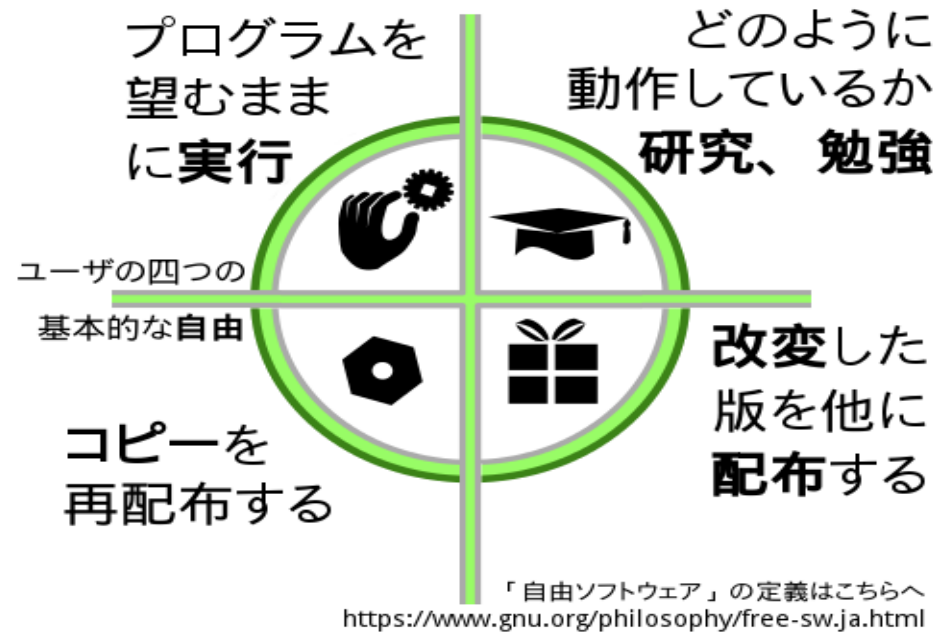
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What is essential to Education?

Freedom

- Music Blocks is licensed as “free software” (自由ソフトウェア).
- Free Software has four important freedoms. In practical terms, those freedoms allow students to exercise creativity.

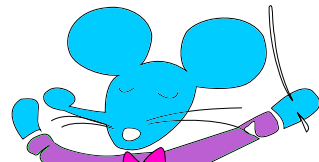


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Collaboration with Children Worldwide

- The source code for Music Blocks is published on Git Hub (github.com).
- Students from around the world have contributed, learning valuable skills in the process.

```
File Edit View Search Terminal Help
commit 47bfb86588b70e70df1da81f18c921abe72af348
Author: Devin Ulibarri <devin@ulibarri.website>
Date: Fri Dec 29 22:11:19 2017 -0500

    2017 12 29 new ja strings (#1020)

    * ...just a little progress with ja.po's new strings

    * Translations to new strings

:100644 100644 86021bb... c20ed9f... M po/ja.po

commit e48c1e10580ad32ac60b6dabd43de105cebddeae
Author: Walter Bender <walter.bender@gmail.com>
Date: Fri Dec 29 15:36:20 2017 -0500

    copy last note to previous when encountering a rest

:100644 100644 678206e... 5ccad84... M js/logo.js

commit 9e112f44459135a0bcba1382094bf5a424ab54b
Author: Walter Bender <walter.bender@gmail.com>
Date: Fri Dec 29 13:11:31 2017 -0500

    new example showing change-in-pitch block usage

:000000 100644 0000000... fe3064e... A examples/silent-night-plot.tb

commit 0bcbc5ae2808f9879cf26cf29fa9bf281c7744fa
Author: pipix51 <koh.pirong@dhs.sg>
Date: Fri Dec 29 05:07:54 2017 -0800

    Adding Example Program And Section 3 zhCN guide (#1018)

    * Translated Section 3.1/3.2

    * Translated Section 3.3/3.4

    * Translated 3.5/3.6

    * Adding Ut Queant Laxis Example Program

:000000 100644 0000000... dcdcd4f... A examples/ut-queant-laxis.tb
:100644 100644 00057d2... 1bdabeb... M guide-zhCN/README.md

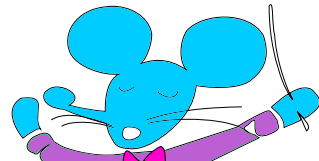
commit c03ec08397984e68eca7c1c105ecdbd99aba2897
Author: Emily Ong <ong.huiqi.emily@dhs.sg>
Date: Fri Dec 29 19:03:09 2017 +0800
:
```

ミュージックブロックスのコードヒストリーの映像

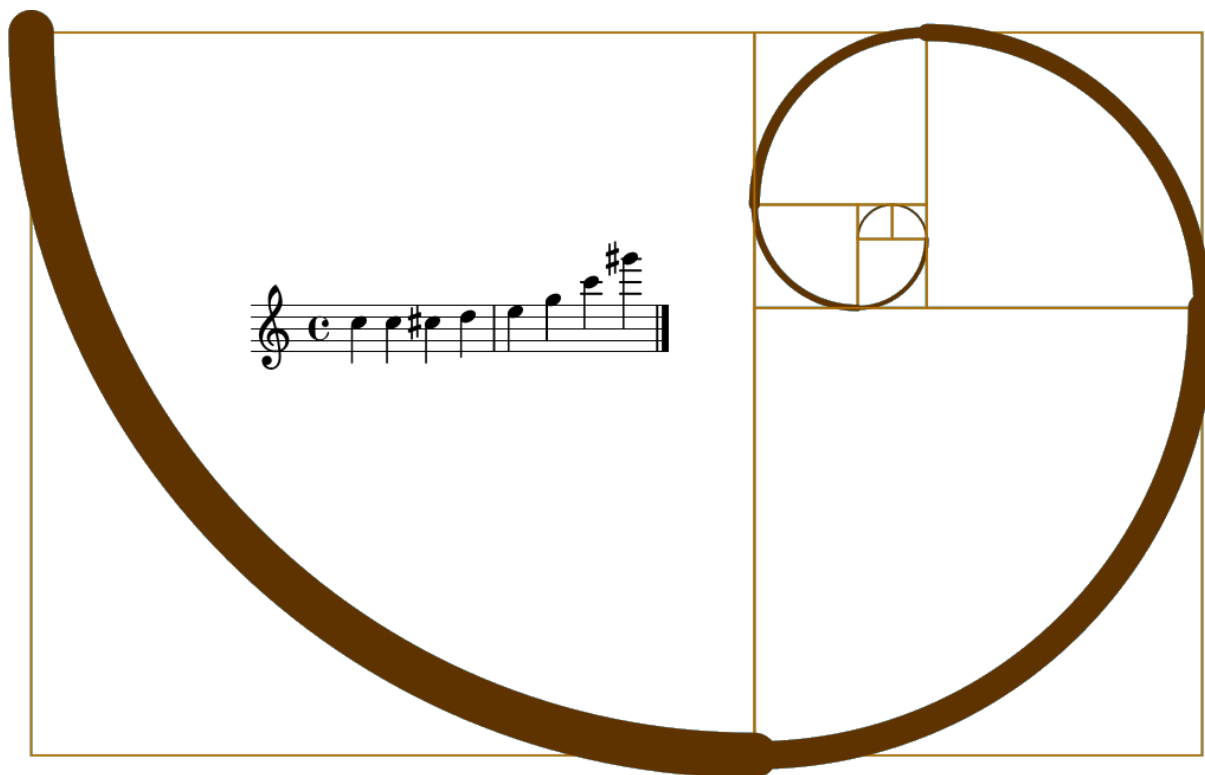


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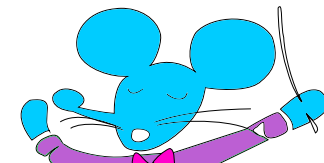
Music and Math Data Visualization



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Movement over Time, Dance

スタート

ペンの大きさの設定 5

色を設定 0

音価 ↓ / 1

4

ピッチ数字 0

角度 45

円弧 半径 0

回繰り返す 24

音価 ↓ / 1

4

音階的のステップピッチ (+/-) 1

角度 45

円弧 半径 1.16

ピッチ数字

色を設定 × ピッチ数字

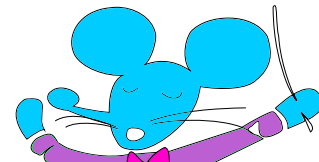
ネズミのキャラクターがリズムカルなダンスをするようにプログラミングが作れます。



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MIT と NEC の教授の共同

マサチューセッツ工科大学 (MIT)

Mr. ワルター・ベンダー



- OLPC「子供一人に一つのパソコン」と共同設立者
- SugarLabs「シュガー・ラボ教育ソフト」共同設立者)
- MIT メディアラボ 2 代目所長

ニューイングランド音楽院 (NEC)

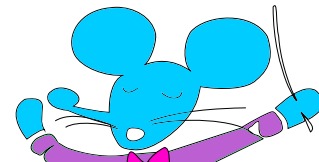
デビン・ウリバリ



- CMIE (私立音楽教育センター) 学生向け音楽カリキュラム研究者兼編集者
- MA 州モルデン市公立中学校「Learn Code and Music!」教師



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MB のそれぞれのウェブサイト

ミュージック・ブロックス (MB) のリンク

- ブログ - <https://musicblocks.net>
- 試せるリンク - <https://play.musicblocks.net>
- 案内書 (日本語) - <https://github.com/walterbender/musicblocks/guide-ja/>
- 案内書 (英語) - <https://github.com/walterbender/musicblocks/guide/>
- ソース・コード (Javascript) - <https://github.com/walterbender/musicblocks/>

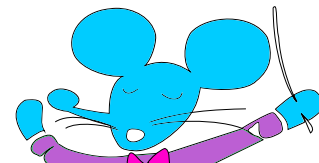


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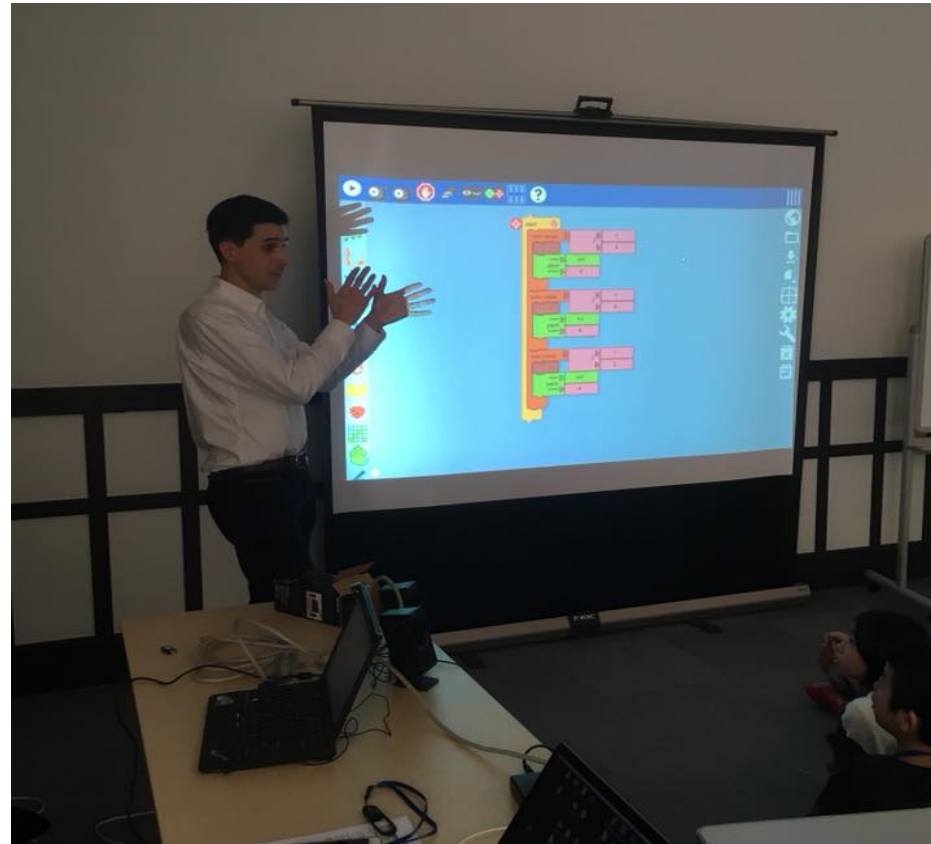


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Music Blocks in Japan



2017年末、日本（京都）、
中学生の授業（パンがエアン）

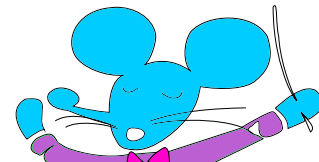


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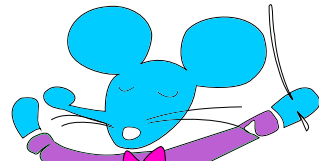
Benefits of Musician-Teachers

- Music pedagogy does well to teach young children (i.e. from elementary grade level) to do relatively complex tasks (e.g. perform complex pieces of music).
- Music pedagogy already has many valuable resources that may be utilized.
- Music has been proven to make you smarter, happier, and improve socio-emotional skills.
- Music is a “universal language”; multicultural



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Utilizing Japan's Trained Musicians: Jobs

<u>What:</u>	<u>Number:</u>
Musicians in Japan	115,020
Full-Time, Hired	17.9%
Part-Time, Hired	8.2%
Non-hired:	73.9%

*ref.: 2005 national census by Ministry of International Affairs and
Communications

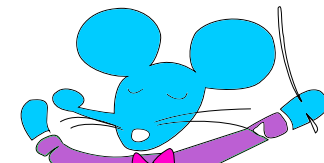


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Breakdown: Elementary School Lesson

~7-15 minutes	Musical Warm-up. No computers. Singing, Instruments, and Ear Training.
~7-15 minutes	Structured Activity. Students use Computers. Create a particular song, learn a key concept.
~7-15 minutes	Open-ended Activity. Students utilize the skills learned to create their own projects.
~5-10 minutes	Presentations and Reflection. Students show their work to their peers. Students reflect upon what they have learned.

[Click Here for Example Lesson](#)

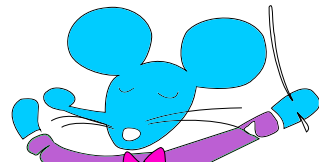


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Breakdown: Elementary School Term

Before Classes (if possible)	Assess students' familiarity with music, math, and coding
1 st Phase: First Few Weeks	Reinforce basic musical concepts (pitch, rhythm, musical structure)
2 nd phase	Slowly introduce abstract concepts in an age-appropriate way.
Whenever Possible	Presentations for peers and for school.
3 rd phase	Begin larger projects that utilize multiple fundamental concepts simultaneously.
Final Projects	Students Showcase their work at their school as well as community spaces.
Optional	5 th grade students participate in regional competitions; possibly utilizing simple robotics as well.

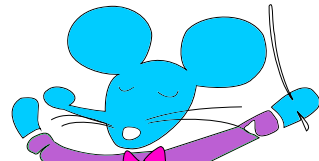


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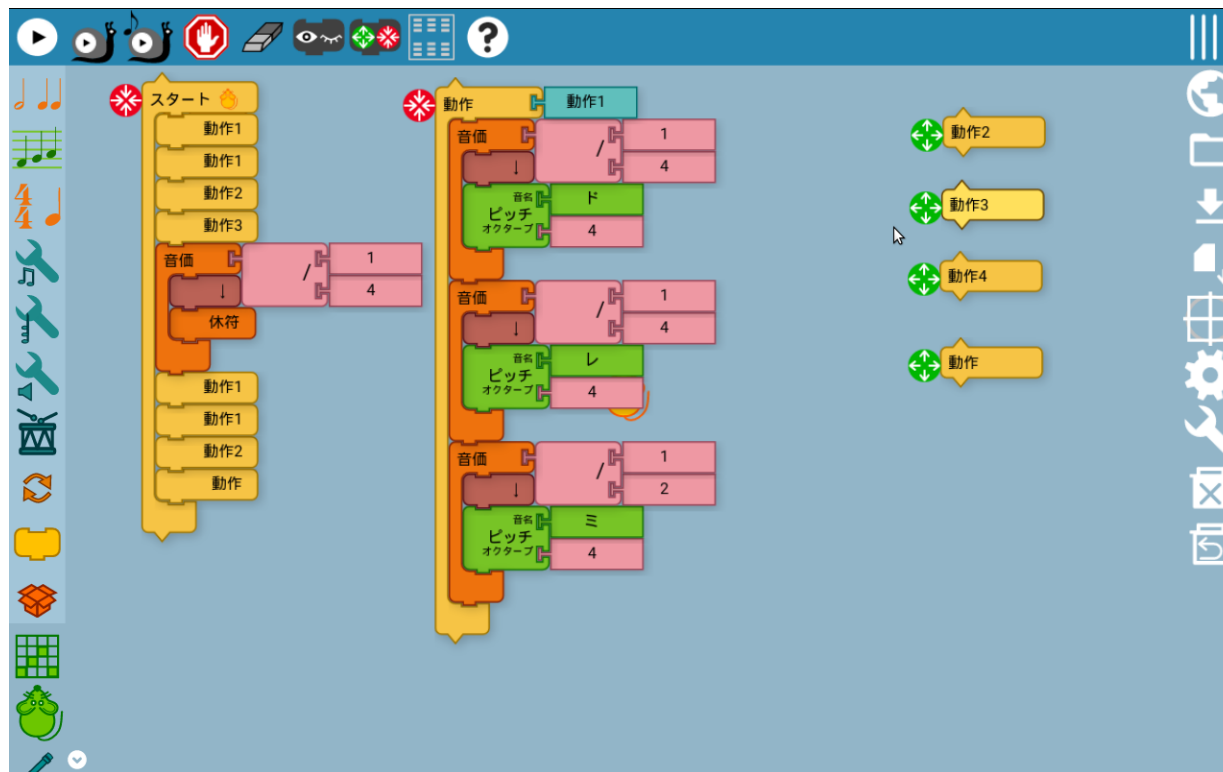


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Elementary School: Possibilities



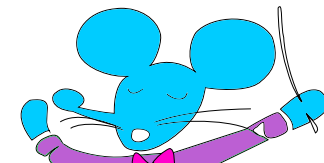
中学生がミュージック・ブロックスで作った「チューリップ」の曲



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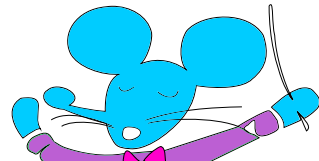


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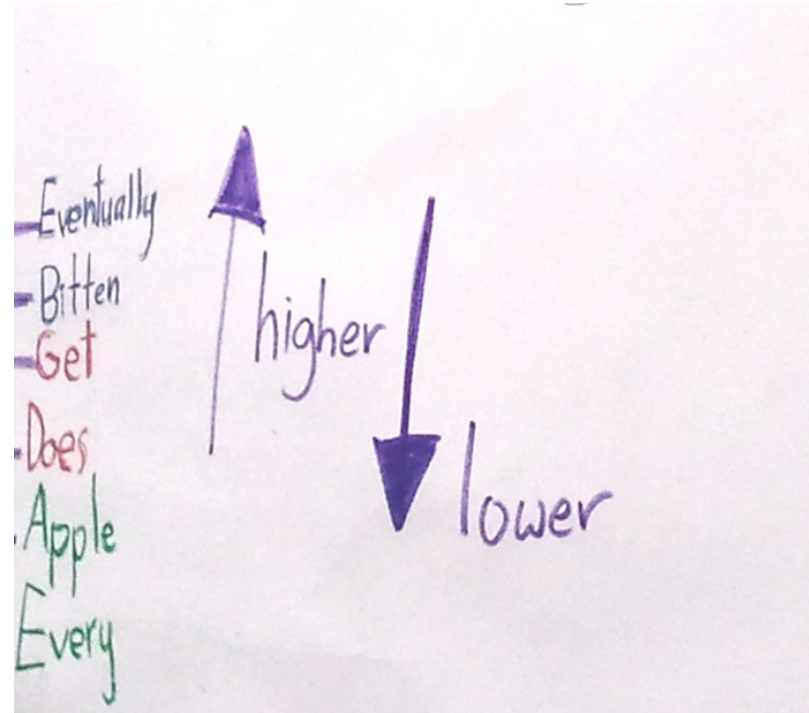
Scaffolding for Success

- Music: Many elementary school age children taking are already learning complex tasks.
- Musician Teachers: Already skilled in teaching music, which would be the starting point for Music Blocks education.
- Shared Concepts: A successful class is one where the shared concepts between disciplines are pointed out.



Simple Beginnings: Shared

- Preparing for complexity requires reinforcement of basic concepts.
- Music shares fundamental concepts with other disciplines.

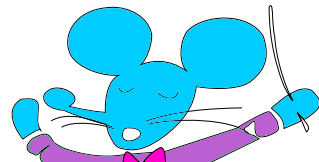


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Simple Beginnings: Unique

- Although music shares concepts with other subjects, it is unique as well.
- Learning harmonic and counterpoint reinforce important cognitive skills that are impossible to learn solely with other disciplines.

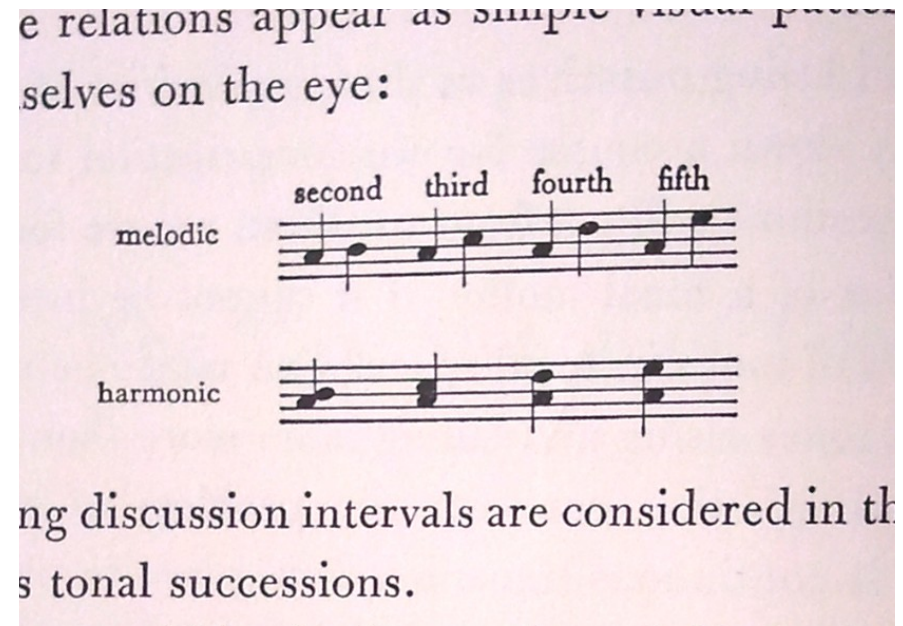
e relations appear as simple visual processes on the eye:

second third fourth fifth

melodic

harmonic

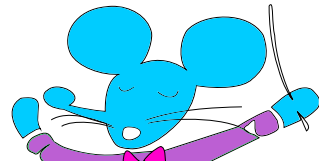
ing discussion intervals are considered in the
s tonal successions.

The image shows two musical staves. The top staff is labeled 'melodic' and shows a sequence of five notes on a five-line staff, with the intervals between them labeled 'second', 'third', 'fourth', and 'fifth'. The bottom staff is labeled 'harmonic' and shows four chords, each consisting of two notes on a five-line staff, representing the same intervals as the melodic staff.

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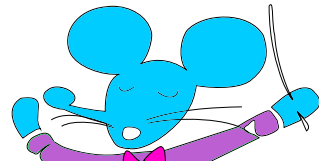


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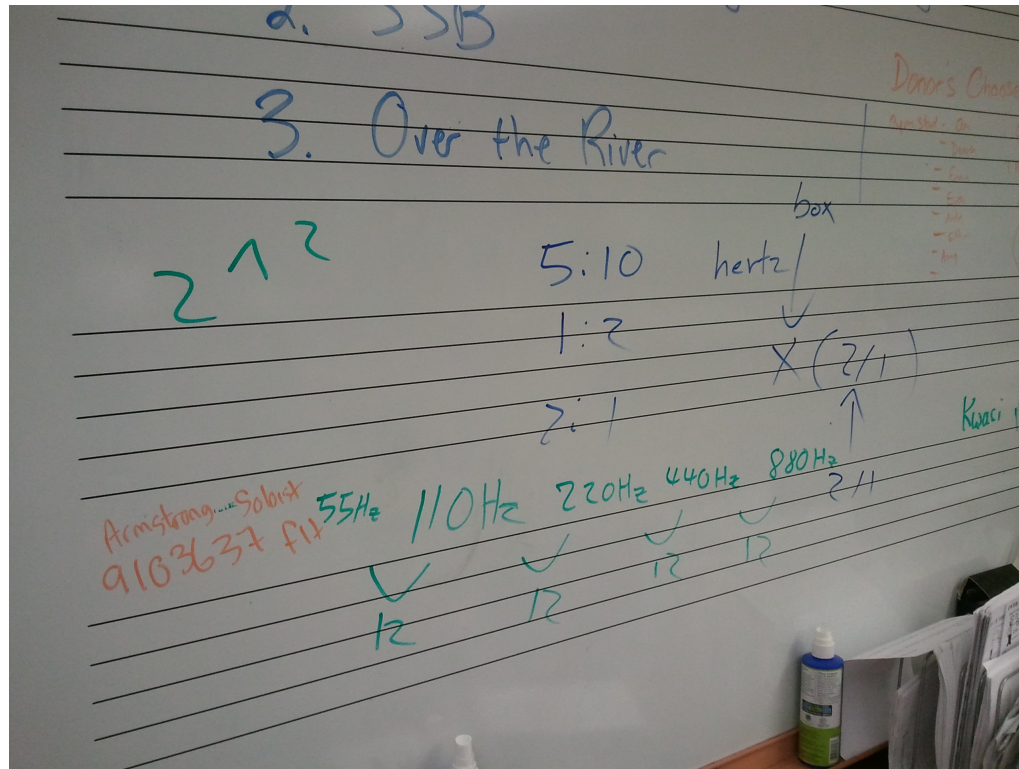


What are the “shared concepts”?

- Different forms of literacy, critical to understanding
- Mathematical concepts
- Form and structure
- Teamwork, harmony
- Work ethic (preparing presentations of one’s work)



Shared Concept: Arithmetic, Ratios

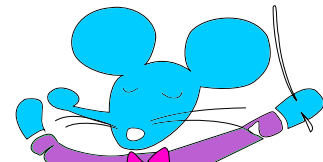


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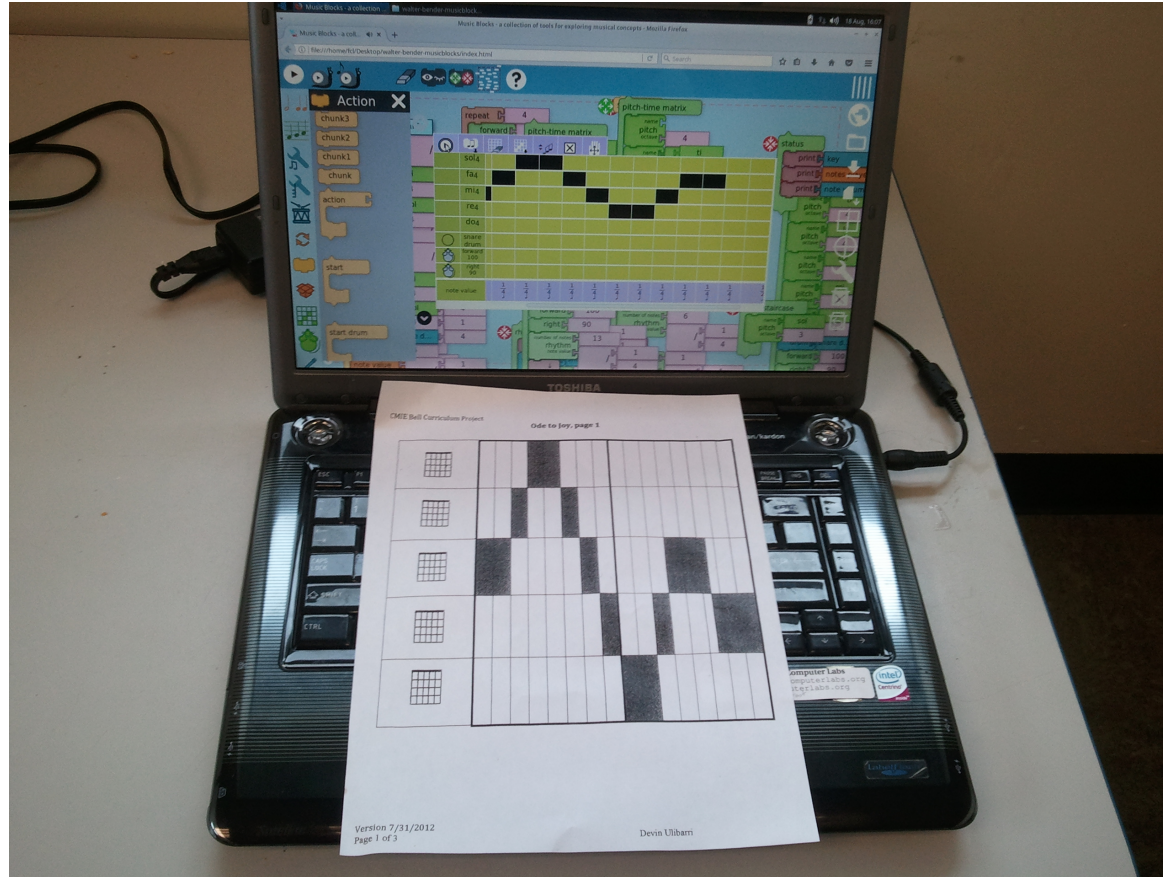


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Shared Concept: Graph Literacy

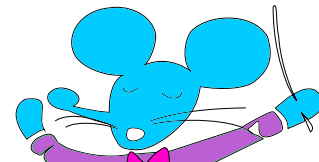


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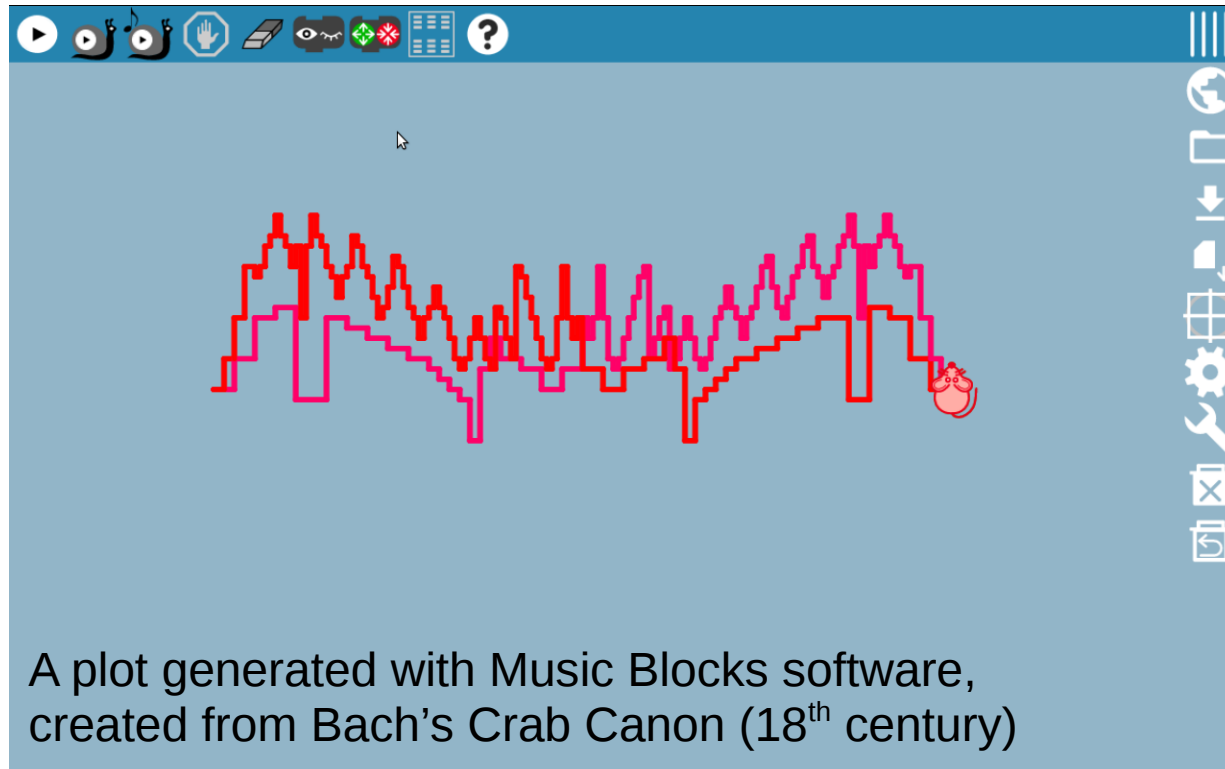


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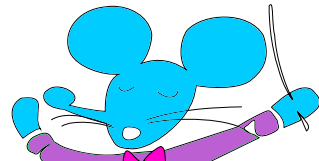
Shared Concept: Retrograde and Inversion



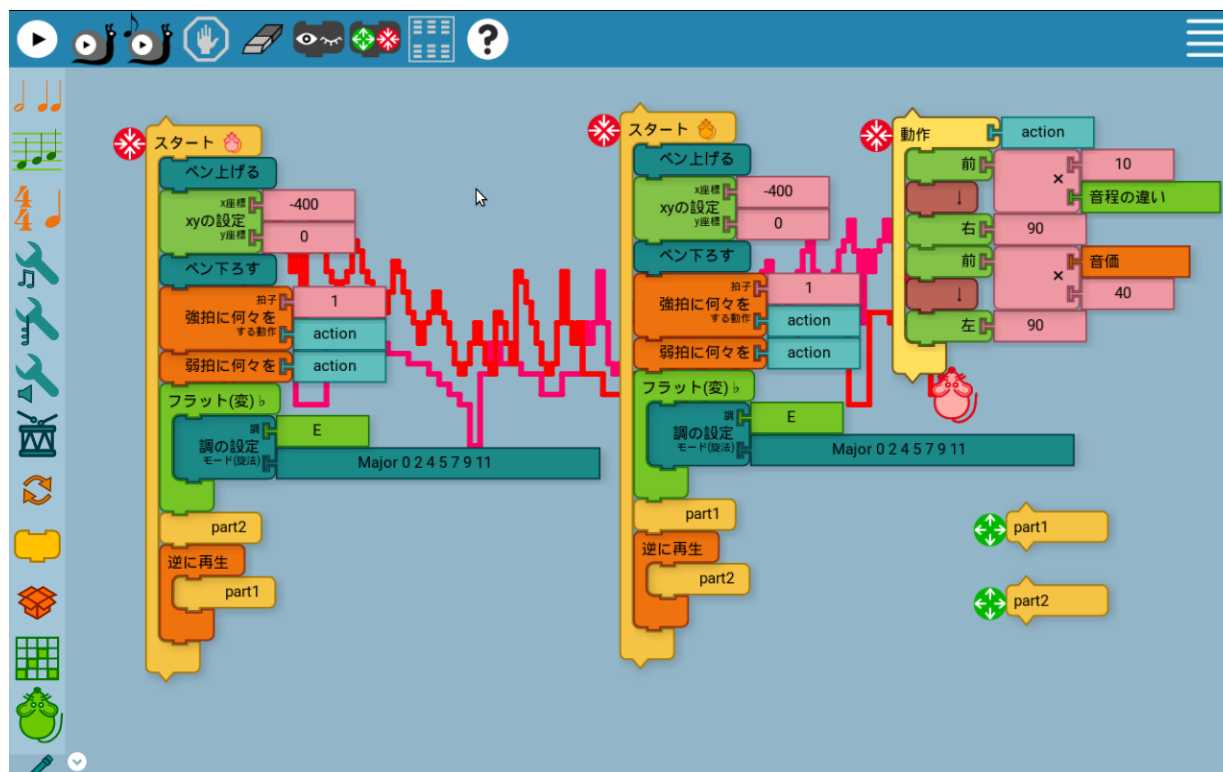
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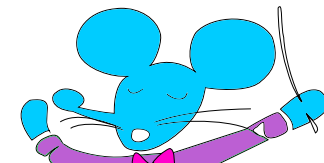
Shared Concept: Logic



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Shared Concept: History and Innovation

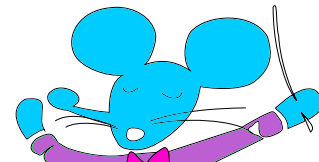


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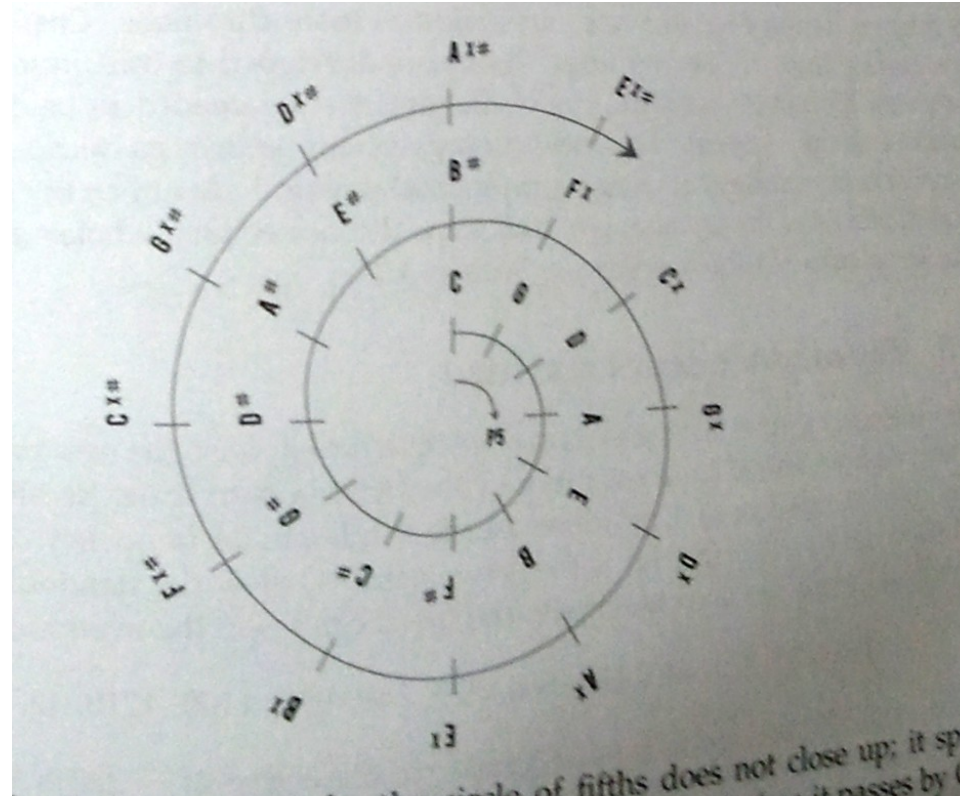


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Shared Concept: Math and Geometry

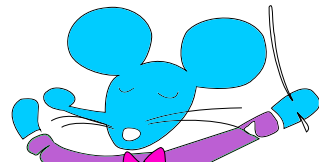


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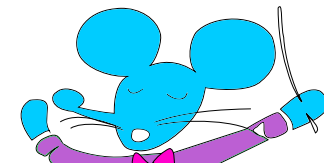
Shared Concept: Variables



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Shared Concept: Fractions

Scale Degree	Interval	Ratio
1	Perfect Unison	1
2	Major 2nd	9/8
3	Major 3rd	81/64
4	Perfect Fourth	4/3
5	Perfect Fifth	3/2
6	Major Sixth	27/16
7	Major Seventh	243/128
8 (= 1)	Perfect Octave	2/1

Just Intonation Scale Math

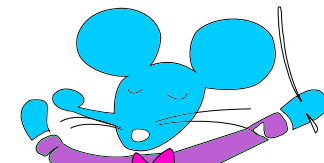


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Musical Pedagogy: A Rich History

44 RHYTHMS AND DANCES FOR ELEMENTARY SCHOOLS

THE FARMER IN THE DELL

English

The image shows a page from a music textbook with two systems of musical notation. Each system consists of a vocal line in treble clef and a piano accompaniment in bass clef. The key signature has one sharp (F#) and the time signature is 6/8. The lyrics are printed below the notes.

1. The farmer in the dell,
The farmer in the dell,
Heigh-o! the dairv-o!

3. The wife takes a child,
The wife takes a child,
Heigh-o! the dairv-o!

Image taken from an old general music textbook.

There is a long history and Cultural in music pedagogy of successfully teaching children complex concepts from a young age.

“The Farmer in the Dell”
English Children’s Song

Source: “Dance in
Elementary School
Education” – Ruth Murray

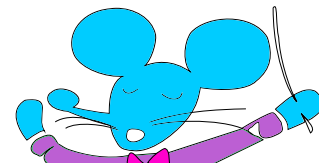


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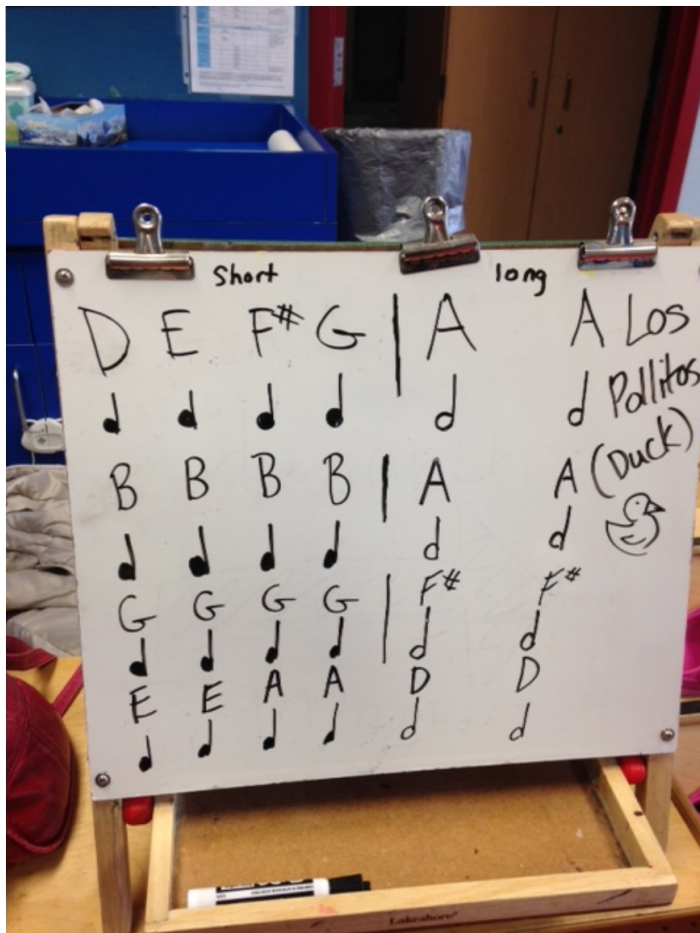


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Musical Representations from Field



Context: Elementary School Age Children (5-9)

Skills Learned:

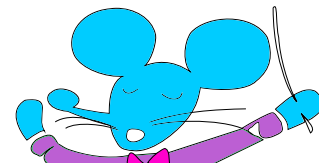
- Reading Letters
- Reading Symbols
- Pitch over time (2D graph)
- Relations, Proportions



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Lilypond Code in Primary Education

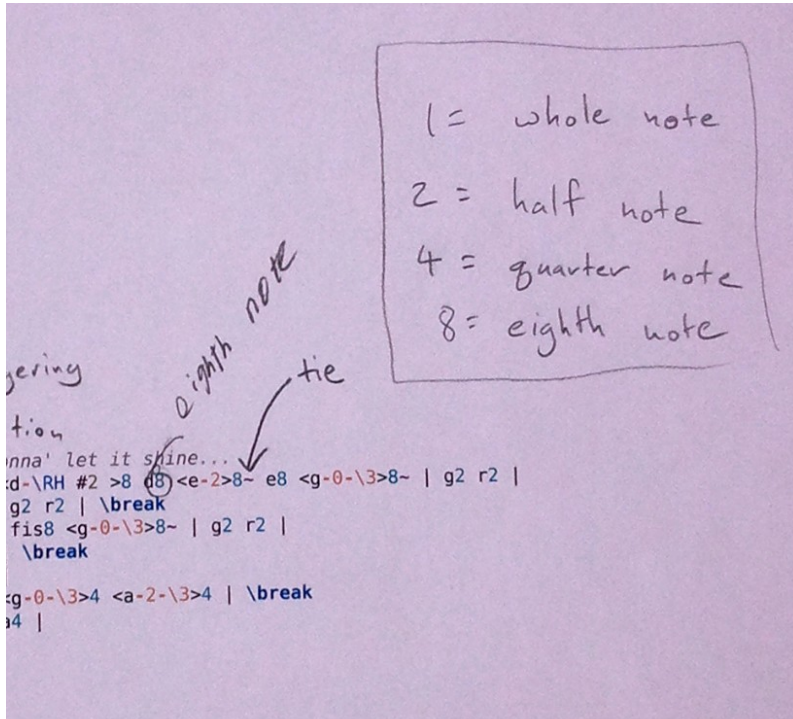


Image of Lilypond output given to elementary school children. Music Blocks exports to Lilypond.

Context: Music class with elementary school-age children

Skills Learned:

- Interpretation of abstract information
- Decoding information
- Reinforcement of learned concepts

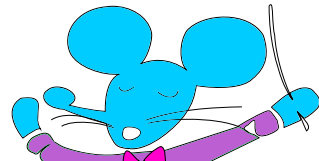


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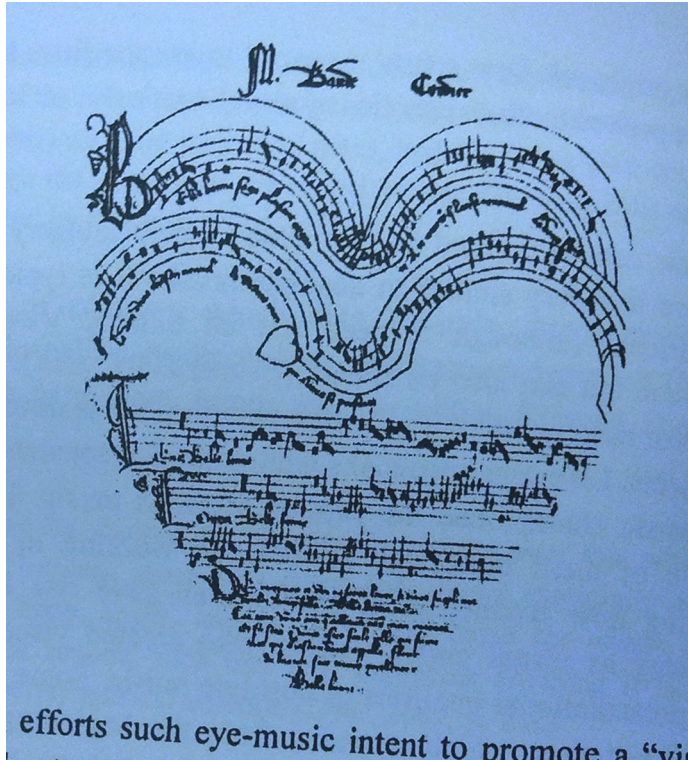


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Math and Code, Learned with Heart



- Creative activities makes learning fun.
- Music is a fun way to learn math and code.

Source: Baude Cordier, *Belle, Bonne*. Found in *Sonus* Volume 37, No. 1 Fall 2016 – Section: *Visual Music: A New Perceptual Sythesis*

efforts such eye-music intent to promote a “vi

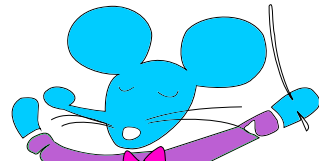


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Scaling for a National Program



Presenting
Music Blocks at
to guest
students from
China.

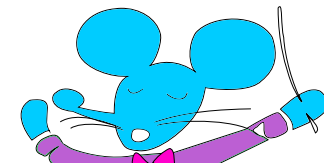


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National Program: Needs

Need	Description
Teachers	A network of teachers, primarily made up of musician-teachers, trained to teach math and code through music.
Teacher Trainers	A network of trainers prepared to work together with teachers to help them teach music in a multi-disciplinary way.
Translators	A small team to help translate unit and lesson plans as well as worksheets that would be utilized by teachers and students within the classroom.
Channels of communication at all levels	We need to communicate and coordinate our efforts to ensure that teachers are getting the support that they need in order to effectively teach, and that trainers and administrators get feedback as to what is effective

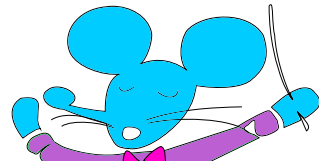


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Obstacles and Opportunities

Photo by Devin Ulibarri.
Albuquerque, NM 2016

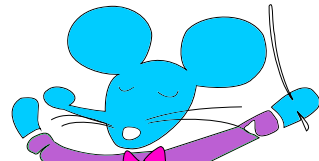


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Thank you!

Let's discuss the opportunities and challenges and
create an action plan.



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