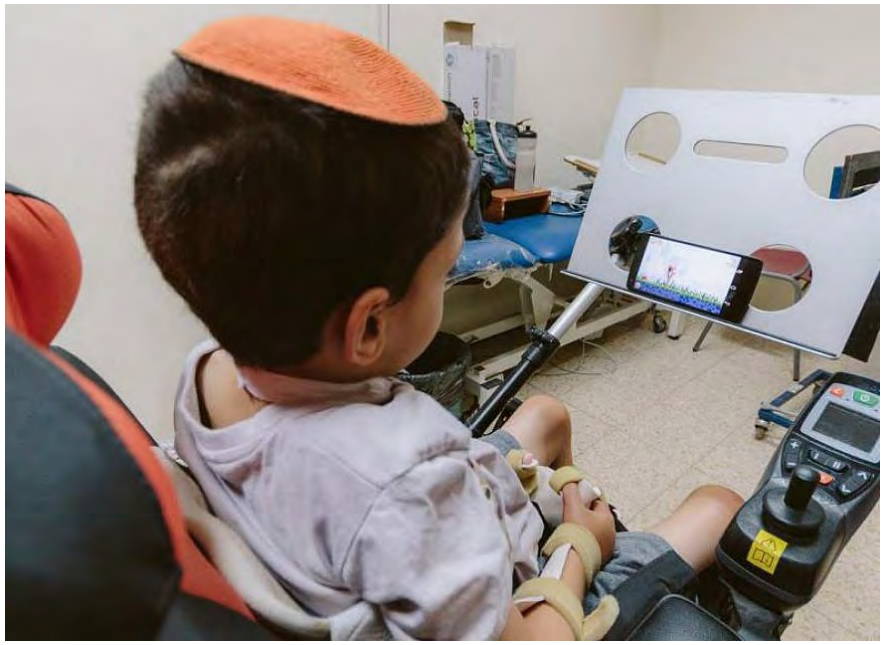


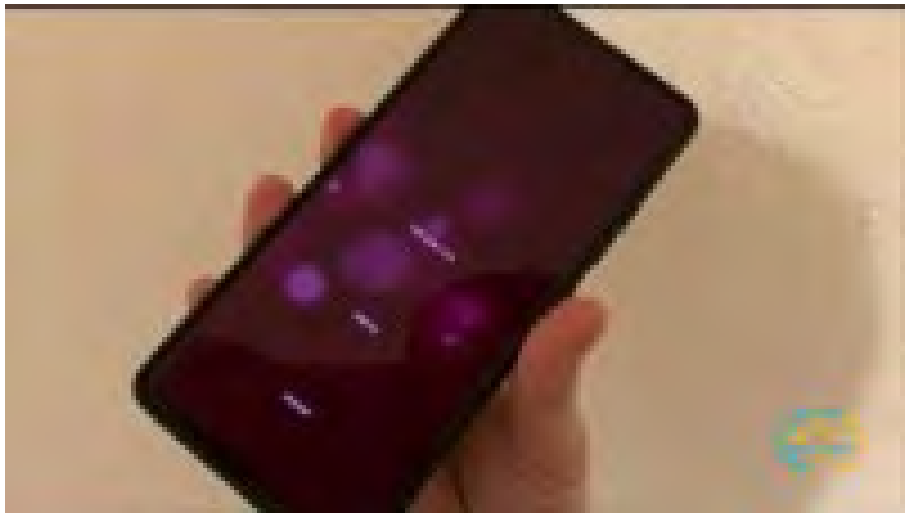
Accessibility for people with special needs

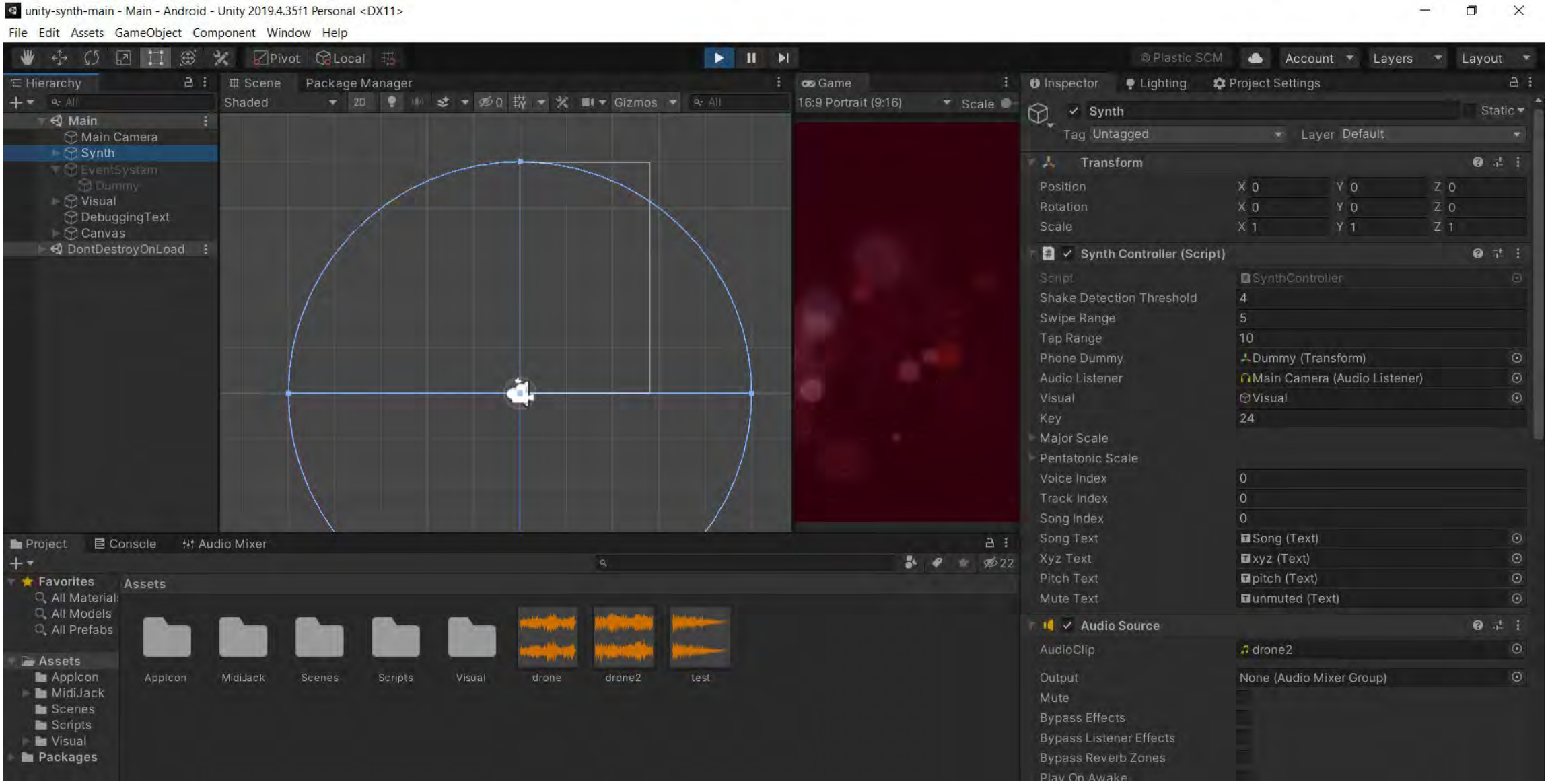
HandI

iOS

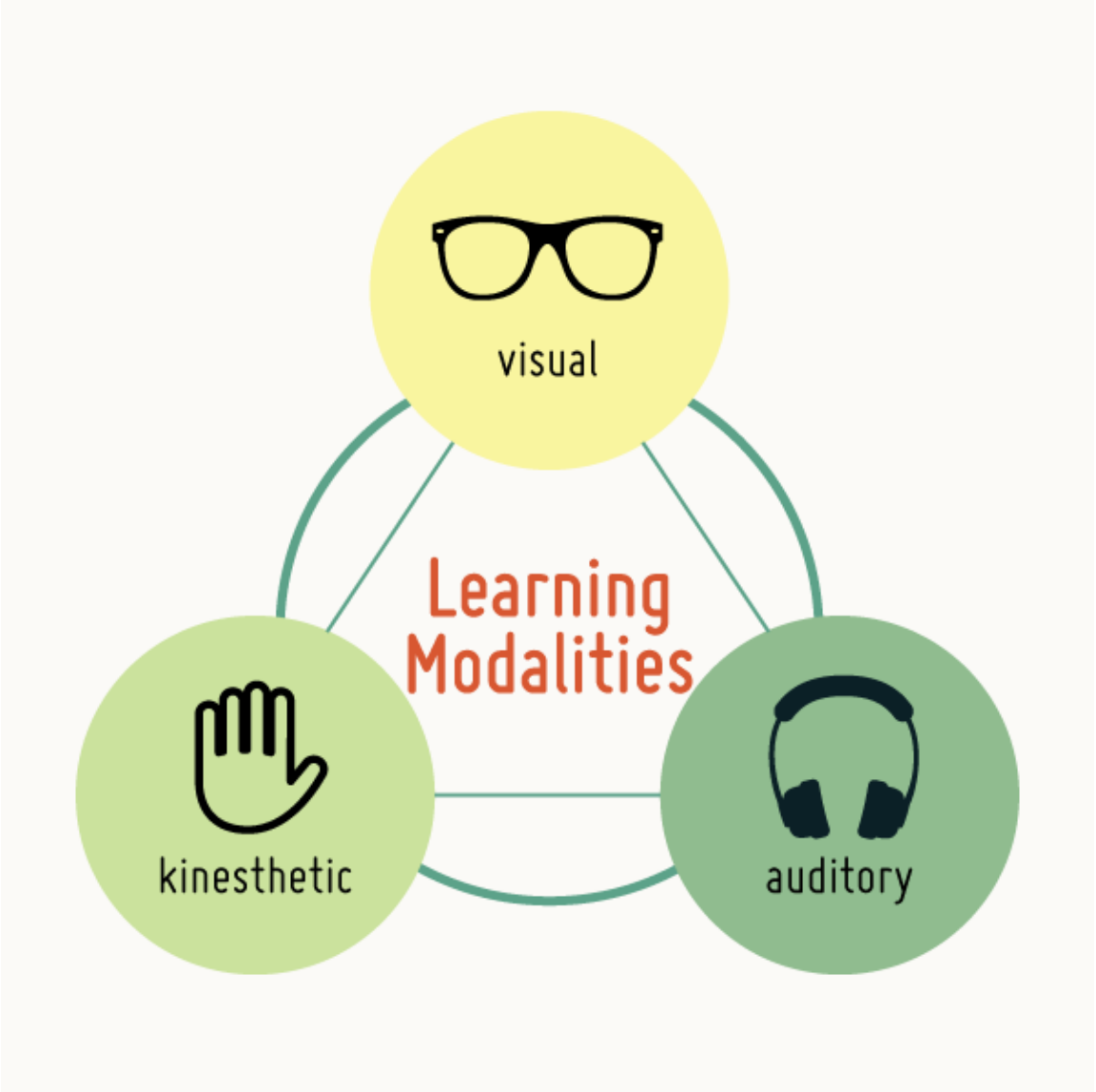
Android

- Mobile app as a digital musical instrument (DMI)
- Use of orientation of the phone to control
- Play musical notes by moving the smartphone
- For people who cannot move their fingers accurately




unity-synth-main - Main - Android - Unity 2019.4.35f1 Personal <DX11>
File Edit Assets GameObject Component Window Help
Pivot Local
Plastic SCM Account Layers Layout
Hierarchy
Main
Main Camera
Synth
EventSystem
Dummy
Visual
DebuggingText
Canvas
DontDestroyOnLoad
Scene Package Manager
Shaded 2D Gizmos
Game
16:9 Portrait (9:16) Scale
Inspector Lighting Project Settings
Synth
Static
Tag Untagged Layer Default
Transform
Position X 0 Y 0 Z 0
Rotation X 0 Y 0 Z 0
Scale X 1 Y 1 Z 1
Synth Controller (Script)
Script SynthController
Shake Detection Threshold 4
Swipe Range 5
Tap Range 10
Phone Dummy Dummy (Transform)
Audio Listener Main Camera (Audio Listener)
Visual Visual
Key 24
Major Scale
Pentatonic Scale
Voice Index 0
Track Index 0
Song Index 0
Song Text Song (Text)
Xyz Text xyz (Text)
Pitch Text pitch (Text)
Mute Text unmuted (Text)
Audio Source
AudioClip drone2
Output None (Audio Mixer Group)
Mute
Bypass Effects
Bypass Listener Effects
Bypass Reverb Zones
Play On Awake
Project Console Audio Mixer
Favorites
All Materials
All Models
All Prefabs
Assets
AppIcon
MidiJack
Scenes
Scripts
Visual
Packages
Assets
AppIcon MidiJack Scenes Scripts Visual drone drone2 test

Content of musical game sessions



MUSICKING (Small, 1988)

music is a process (verb) and not an object (noun.)

Exercises

- Seeing Music
- Listening to Music
- Playing with music (Action & Response Game)

Learning curve

- Smooth learning curve
  - *The required actions are simple and change the sound easily. The different options for instruments and scales are appealing.* (Music teacher)
- Instructions needed
  - *…[children] need to be given instructions on what the app can do and how they could use it*. (Teaching assistant)
  - *[Children] need to be able to see the cause and effect so they can be encouraged to explore and make different sounds.* (Social worker)

Context

- Musical content
  - *The app itself is a musical instrument and it does nothing other than make sound. The musical content is very important, as if a classical musician needs a score in order to play enjoy music. Involving the children to play music with this app needs content as well, no matter it is notated music scores, instructions, or steps.* (Music Teacher)

Context

- Guidance, environment, and structure
  - *You do need a facilitator to guide them. If I download it and ask them to play by themselves at home, the random movement won't be meaningful*. (Social worker)
  - *If you don't give them a structure, or a way to use the app, they might be confused and won't be able to feel the app's ambitions.* (Music teacher)
  - *I guess it is not so much about the games but to facilitate the right environment for the use of this app. They need to know that this is not a phone, but an instrument*. (Teaching assistant)

Timbre

- Special need children's hypersensitive hearing
  - *They may find some of the high-pitched sounds a bit overbearing if they are sensitive to noise*. (Parent)
  - *It might be difficult for kids who have more than one special need, and kids often come with more than one special need, if you know what I mean*. (Music therapist)
- Variety of sound
  - *They may find some of the high-pitched sounds a bit overbearing if they are sensitive to noise.* (Parent)
  - *It might be difficult for kids who have more than one special need, and kids often come with more than one special need, if you know what I mean*. (Music therapist)

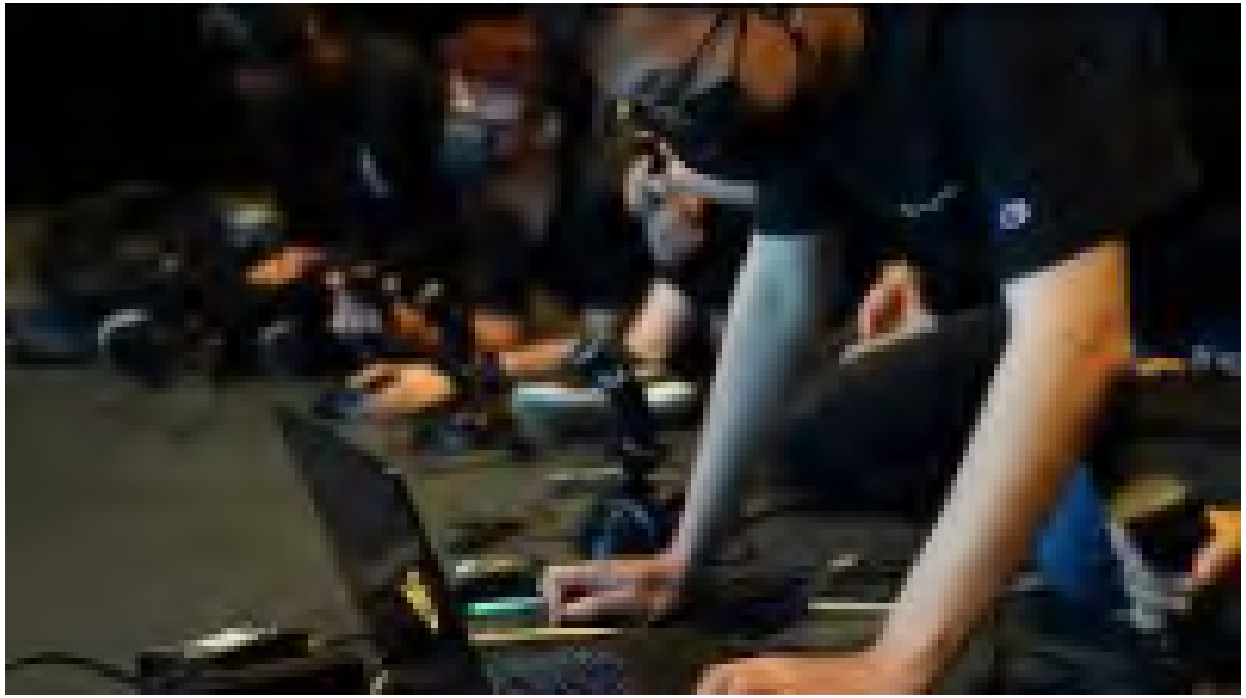
Limitations

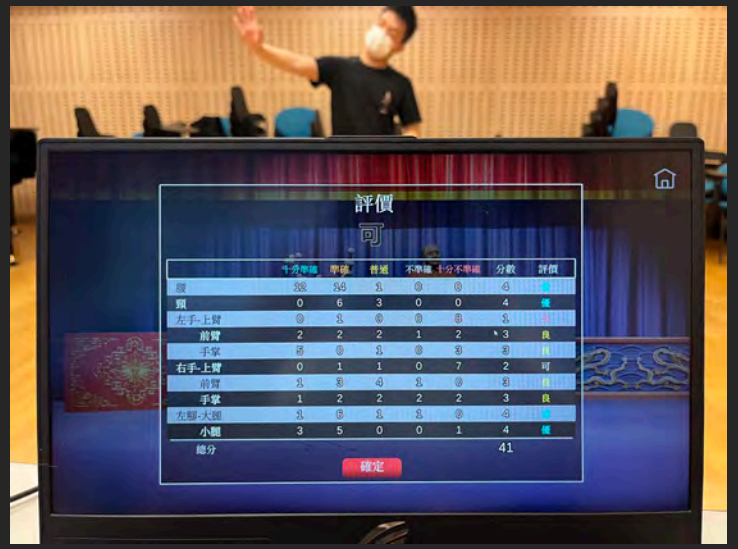
- Hardware issues
  - *I am not sure if children who have smaller hands would be able to hold the phone?* (Music therapist)
  - *Maybe you need to get a band, because some of them might not even be able to grip the phone.* (Parent)
- sound quality and loudness
  - *…I mentioned the similarity of the synthetic sounds among different musical instruments, perhaps it is because of the timbral result of the sound from the tiny speaker on the phone*. (Parent)
  - *It would be fine if you only have a few students. But if you have a bigger class, having many phones playing together could be chaotic and they might not be able to monitor their own voices.* (Teaching assistant)

Implications

- Mobile app as an adaptive technology
  - Affordances and limitations
- Motion-based human-computer interaction (HCI) for musical control and expression
  - Accessible digital musical instrument (DMI)
  - Empowerment for functional diverse children with music-making abilities
  - Inclusive music learning in the classroom environment
- Musical content and context
  - The space for the app to unleash its potential

Collaborative music-making

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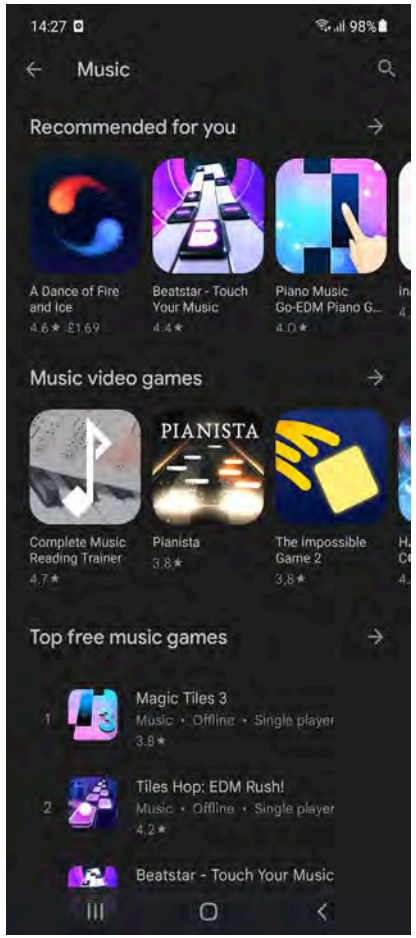
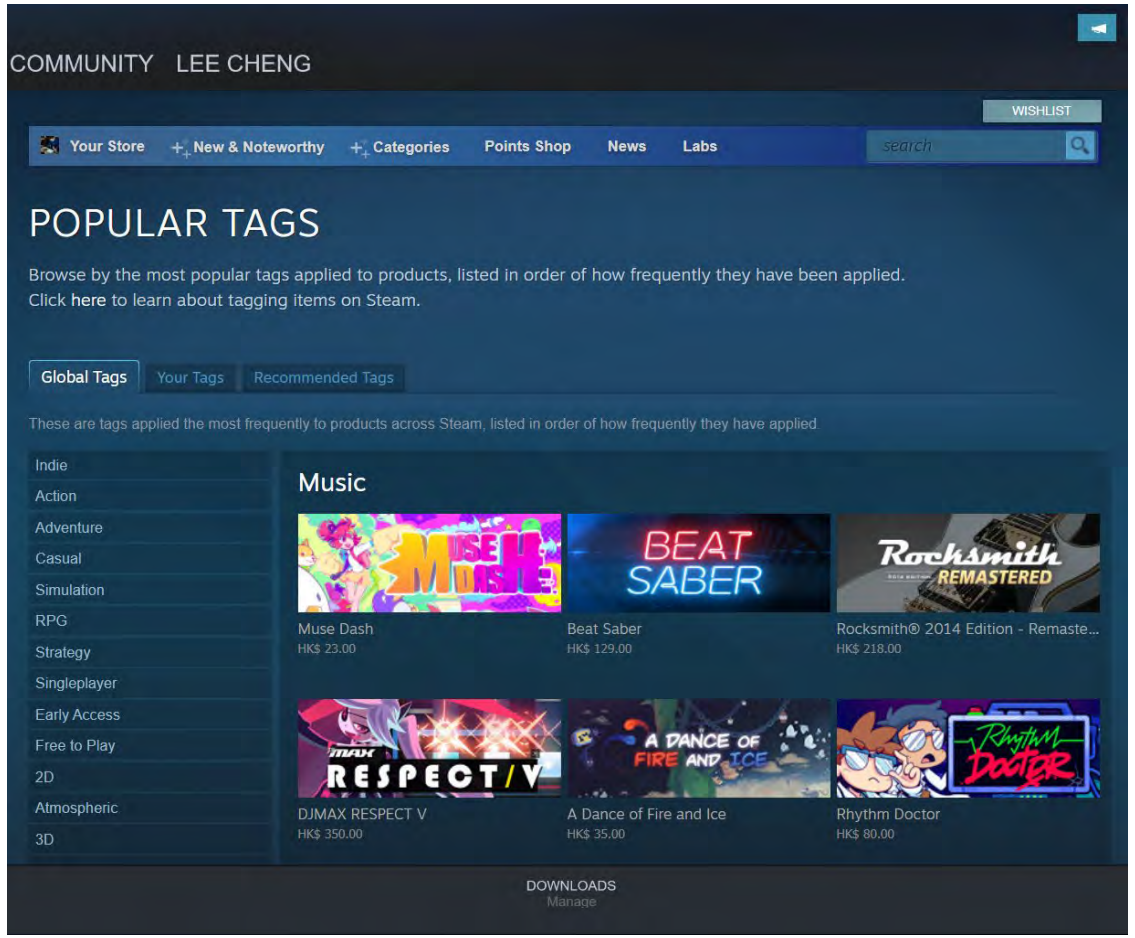
Music games from Google Play Store / Steam





Themes

- Motivation
- Teaching resources
- Autonomous learning
- Levels of learning
- Music knowledge and skills development
- Limitations

Motivation

- The desire to attain higher scores
- Drills and practise in the gaming exercises
  - Subconsciously develops players' music skills

You will find a common problem – lack of motivation – this game can help you to overcome this problem. At the end of each played song, you will be given a score for the note accuracy. You will want to play more and more; [it] makes you practice until you get 100% note accuracy. After some gaming sessions you will start to notice that your skills are getting better. (Reviewer A)

Teaching resources

- Interactivity and real-time feedback

  The Lessons portion of the software actually teaches you, in a very interactive manner, things you need to know to play guitar, as well as own them and take care of them…. It'll teach you what you need to know, and coach you with advice such as 'It sounds like you have a finger touching the G string'… 'try it again, being sure your second finger is only touching the string(s) it should be'. (Reviewer D)

Autonomous learning

- Smooth learning curves and the vast array of choices
- Players appreciated being able to control the learning pace and modify the learning experience at their will

> *You can learn at your own pace and modify the learning experience to meet any need that you have. If the song is too fast, you can slow it down; too many notes, [it] lets [you] break it down and remove a few; or if you want to really learn a groove you can put it on repeat. The song library is generous for all genres and the downloadable content is well worth its price.* (Reviewer I)

Levels of learning

- The need to supplement the games with other teaching resources for a more comprehensive learning experience

  With practice and dedication, you will be a better guitar or bass player, and after that if you still want some proper music education you can always pay for lessons or a teacher but you won't be struggling anymore with the basics and your teacher will see that you're not a beginner. (Reviewer Q)

Music knowledge and skills development

- Much of the learning context was related to drills and practice

  A cute rhythm game that doesn't hold back. It gets up there in difficulty, but you learn muscle memory over time, [and it] never gets any less fun. (Reviewer U)

- Real musical instruments to be used instead of simulating instruments with gaming controllers

  It is both a game and [a] learning tool for use with a real electric guitar or bass. You plug in your guitar to a USB port with a special cable and can play through step by step guitar lessons, learn specific songs and riffs and play a variety of arcade style games with your guitar as the controller. (Reviewer W)

Limitations

- (Lack of)authentic experience of making music with an instrument

  I am a drummer and would have to relearn drumming to play this game. Missing lots of notes that should be easily hit if it was real drums; so personally, I can't get into this game. [I] might change my recommendation if I have the time to relearn muscle memory. (Reviewer Y)

- Limitations of the technology and the gaming context do not favour the development of certain kinds of music knowledge

  It is great and fun, and will benefit [your] understanding of individual songs, but you may not understand how they were written and other fundamentals. (Reviewer Z)

Discussion

- Popular music video games equipped with a smooth learning curve can scaffold players' learnt skills and ability level
  - A balance between learning and entertainment (a.k.a. 'educatment')
- 'Bias' for a comprehensive musicianship training
  - Music games in favor of drill and practice but not theory-based learning
  - Informal learning is based on personal choices and preferences (Green, 2005)
- Music video games as a teaching aid to support formal learning
  - Make good use of the motivational effects afforded by gameplay
  - A full understanding of its strength and weakness to avoid undesirable learning outcomes

Implications

- Pedagogical approach to incorporate video games in music teaching and learning
- Music learning to become more autonomous and self-motivated
- Teachers' role to regulate and position video games in the learning context
- 'Digital turn' of music education under the 'new normal' teaching environment