Making media for learning musical instruments using the Scratch application

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Abstract. The challenge for music educators in distance learning is the inability to practice teaching musical instruments directly to students. This article aims to bridge music educators so that they can still teach musical instruments to students and the students can continue to learn music even though they are learning from home. The solution offered is learning music using the Scratch application on a laptop or desktop computer as the controller. There are five steps to make music learning media using the Scratch application: (1) downloading and installing the Scratch Desktop application, (2) making designs or icons for each music scale, (3) recording or inputting sound musical instruments, (4) setting the buttons for each musical scale, and (5) playing the musical compositions. The Scratch application was effective in making learning media for learning musical instruments, learning to recognize the sounds of musical instruments, and learning to memorize song melodies. In conclusion, the Scratch application can be a solution for creating computer-based learning media for musical instruments.

1. Introduction

In the current pandemic, music educators are required to act creatively and imaginatively so that music learning that focuses on the introduction of tones and the processing of musical sensitivity remains. Introducing tone and processing musical flavours should ideally be done face-to-face. But in fact, in recent months, schools in Indonesia have had difficulty in organizing face-to-face learning. Most of the learning in form of practices of playing musical instruments stalled [1]. One solution that can be done to minimize the stagnant music learning process is to create simple music learning media digitally so that students can learn anywhere, and teachers can also teach music online [2], especially for teachers and students who have been facilitated with supporting technology such as computers/laptops/tablets. To create music learning media by utilizing technology, you can use Scratch Application, an application that creates animations, games, and interactive media [3,4].

Previous research utilizing Scratch App to learn music has been conducted by researchers in creating controllers for touch instruments in Indonesia [5]. Scratch applications have also been reviewed by interdisciplinary researchers to develop musical live coding concepts that utilize Scratch as a transition from a web-based environment using JavaScript and HTML [6]. The researchers also tried to intervene for the pre-professional development of teachers by utilizing computational thinking...
and programming as instructional tools in subject areas such as music, language, mathematics, and science [7].

Various studies have shown that scratch applications have the potential to assist teachers in creating learning media and carrying out instructional to learners based on computational thinking. This condition is different in Indonesia that music teachers, especially in elementary schools, are very minimal to develop technology-assisted music learning media due to the condition of the teachers who are generally still technologically illiterate. This paper aims to provide an example for music educators in elementary schools that scratch applications are simple enough to be used and utilized to create a variety of musical teaching materials.

2. Methods
This study employed a qualitative approach with the following steps. (1) downloading and installing the Scratch Desktop application, (2) making designs or icons for each music scale, (3) recording or inputting sound musical instruments, (4) setting the buttons for each musical scale, and (5) playing the musical compositions. The main application used is the Scratch desktop app version 3.15.0 which can be obtained for free in https://scratch.mit.edu/.

3. Results and discussion
Scratch application is already widely used by researchers as an application that can help to produce a variety of animation products, games, learning media, and others with a simple coding process [8, 9]. The following presented simple steps used to create music learning media for elementary school students. We exemplify angklung instrument as its learning media and at the same time as one of the traditional musical instruments in Indonesia that should be introduced to students.

3.1. Downloading and installing the Scratch Desktop application
At an early stage is setting up the Scratch app to download and install into your computer or laptop. The developer of this app is MIT Media Lab. provides Scratch for free. Scratch can be downloaded via webpage https://scratch.mit.edu/download/. This app can be installed for both Windows and MacOS versions. Based on our experience, older computers or operating systems are more supportive for previous scratch versions as well, and vice versa, the new computer or operating system is very supportive for the latest Scratch version as also seen in Figure 1.

![Figure 1. Scratch app download page.](image-url)
3.2. Making designs or icons for each music scale

The second stage after the application installed, is to prepare a design for the musical instrument that will be used as a learning media from the Costumes menu. There are several ways to prepare an image design. It can be drawn directly, taken from images provided in the app, or uploaded the images. Here we search for free angklung images from the internet and use them as images for music learning media by uploading it through the Upload Costume feature. Figure 2 shows an image of an angklung instrument that has been uploaded into Scratch and comes with text as a tone sequence marker.

![Figure 2. Upload images that are the subject of music learning.](image)

At this stage, the angklung image which is also referred to as Sprite in this application, is then duplicated by copy-paste according to the needs or number of tones contained in the series of angklung tones. Sprite sizes can also be changed or adjusted to the space available on Scratch. Figure 3 shows a Sprite that has been duplicated and resized. There can also be an image or backdrop colour.

![Figure 3. Doubling angklung according to teaching needs.](image)

3.3. Recording or inputting sound musical instruments

The third stage is to give or input sound to each Sprite or angklung according to the order of the tones that have been arranged through the Sounds menu. There are various ways to give a tone i.e., it can be
by recording directly or uploading samples of tones that we have prepared. We have prepared the angklung tones in the computer in the form of MP3s, which have also been sorted and named on each file according to the order of tone that is also listed on each Sprite so that there is no error in inputting the tone. All tones are uploaded on each Sprite. Figure 4 shows you how to input tones through the Upload Sound feature.

3.4. Setting the buttons for each musical scale

In the fourth stage is to give the command to each Sprite or angklung to sound when we press the keyboard on the laptop or click the mouse. Setting this command is done through the Code menu. There are many command options here such as Motion, Looks, Sounds, Events, and others. We use the Events and Sounds feature for the need to teach musical materials or angklung tones. The tones are set to sound sequentially from low to high tones when pressed keys on the computer keyboard starting from Q-W-E-R-T-Y onwards. Figure 5 shows how to give commands by using the Event feature (yellow), and the Sound feature by shifting commands from the left column to the right column.
3.5. Playing the musical compositions
The last stage is to play angklung tones or a series of angklung song melodies through a computer keyboard (Figure 6). The angklung display can be enlarged by pressing the full-screen button. The music learning process can be done through this view. Teachers can demonstrate performing songs, introducing tones, and other musical elements. Similarly, students can be given scratch files and sample tones so that they can be opened on their computers, or students can also be taught to create them. Thus, both teachers and students can improve their technology literacy to deal with current learning conditions that demand a touch of technology [10-12].

![Figure 6. Playing a series of angklung melodies.](image)

4. Conclusions
Based on this study, it can be concluded that scratch application can be employed to create simple music learning media. The operation of this app is quite simple so that it allows music educators in elementary schools, in particular, to make music learning media rapidly. Angklung instruments not only can be used as a media of learning, but it can also penetrate other traditional musical instruments in order to still be introduced to students through the support of technology.

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