The development of angklung composition teaching materials using Music Notation Software with virtual studio technology integration

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Abstract. Teaching Angklung composition by only displaying notations might not be sufficient. To learn conveniently, learners require a conception of the Angklung composition tones in addition to the notation display, especially for songs with new arrangements. This paper aims at analyzing a way in developing Angklung composition teaching materials using computer technology, which are Sibelius as a music notation software and Kontakt as a virtual studio that can play high-quality sound samples of music instruments, including Angklung. To analyze the Angklung composition creation process, the computational methods were used. The analysis includes the integration process of Sibelius and Kontakt. After creating the Angklung compositions, a sound quality test was conducted to 54 students of primary school teacher education program taking art concentration using survey technique. The results indicated that the combination of Sibelius and Kontakt produced Angklung music compositions with natural, neat, and clear notes. The majority of the students found the Angklung sound samples to sound real. The students were also interested to learn Angklung through computer. Thus, it can be concluded that the development of Angklung composition teaching materials using a combination of music notation software and sounds sample-based instruments can potentially appear interesting to learners.

1. Introduction
Developing teaching materials for education matters has been an undeniably essential requirements. As technology develops rapidly, the educators (teachers and lecturers) are demanded to follow the development of science-based technology and involved in it, both as the user and innovator. Innovations in education are of particular importance because education plays a crucial role in creating a sustainable future [1]. Innovation resembles mutation, the biological process that keeps species evolving so they can better compete for survival [1, 2]. Music education is one of the education sciences that has been affected by technology, therefore music educators are required to think creatively and innovatively, especially in utilizing various computer-based music application in making teaching materials.

For music educators, there are at least two ways of thinking that must be maintained in making teaching materials, namely to follow the development of computer technology and to participate in conserving traditional arts. Therefore, futuristics and conservative ways of thoughts could be balanced. These could help keeping and conserving endangered traditional arts. For example, in West Java
Province, Indonesia, there has been 500 kinds of traditional arts extinct because they were not conserved [3-5]. Nowadays, the sounds of traditional music instruments can be recorded and processed into sounds sample for computer music application. The sound samples are processed into Virtual Studio Technology (VST) plugins, which were announced by Steinberg for the first time in 1996. Steinberg announced the VST interface specification that allowed a new breed of software developers to recreate all those bulky effects units as VST plugins [6, 7]. VST (on Windows and Mac) and Audio Units (on Mac only) are state-of-the-art standards for high-quality instrumental sounds [8]. One of the modules to play VST plugins in the computer is Kontakt application. Its procedure on namely https://www.native-instruments.com/en/products/complete/world presents various sounds sample of traditional music instruments from various countries that have been developed into VST plugins and as marketed products, such as traditional musical instruments from India, West Africa, Cuba, and Indonesia [9]. There is also another result of the research stating that the development of Korean traditional music instruments also became a sound sample in Kontakt application [10].

This innovation can be proposed as a solution to conserve traditional arts through learning in formal education. In other words, traditional music instruments are recorded, made into samples for computer application, and taught to the students. Kontakt application could also be integrated into music notation software like Sibelius. Therefore, this paper aims at analyzing and describing an innovation of Angklung traditional instrument that is made to be a sound sample for Kontakt application and integrated with Sibelius. Hence, these two applications integration resulted in Angklung music composition that was projected to become teaching materials.

2. Methods
This research analyzed the process and result of integration between Sibelius app (Sibelius 7 First) as music notation software and Kontakt app (Kontakt 5) as VST software. The analysis was done by applying computational methods, especially in describing the way of integrating those two software. Computation allows creation of educational music tools [11-13]. After being integrated, the Angklung composition was written to be developed as teaching materials. The writing result has formed an intact Angklung composition, in which its quality of sound was examined by 54 students of Primary School Teacher Education Study Program who were taking the Deepening Arts subject. They were asked to see the notations of Angklung composition from Sibelius app and hear its sound, which was played through a laptop connected to a speaker. The Angklung composition was played three times. After that, the students were asked to fill a survey made on Google Form in three sections, namely Guttman scale, Likert, and open-ended answers. The obtained results were then analyzed and interpreted.

3. Results and discussion
There are two software used in this research, namely Sibelius and Kontakt. Sibelius app is a product of Avid Technology that was created to write notations, while Kontakt app is a product of Native Instruments that functions as a sounds sampler module that includes to VST category. Sibelius has been featured with a facility to play VST-based musical instruments. In addition, Kontakt has supported to be integrated with Sibelius. The followings are the procedures of how to integrate Sibelius and Kontakt, which were filled with the sounds of Angklung to prepare teaching materials of Angklung composition.

3.1. Installing Sibelius and Kontakt softwares
The first step was installing Sibelius First and Kontakt 5 software. This research used a laptop with Microsoft Windows 10 Home operating system (OS). It requires the specification of minimum RAM 4 GB or more recommended for 64-bit systems, 500 MB free hard disk space for Sibelius First installation (12 GB free hard disk space required for sample content), and ASIO-compatible sound card recommended [14]. Meanwhile, higher computer specification is needed to be integrated with Kontakt 5. This research utilized intel core i5 processor with RAM 8 GB. However, this specification was not
compatible enough to open the Sibelius First app integrated with Kontakt 5, since it resulted in a long buffering.

3.2. Preparing Angklung sample sound
The second step was preparing Angklung sound sample in the form of VST plugins to be played in Kontakt. There were two ways that could be conducted, namely making it manually by recording the Angklung sound one by one, editing, and saving it into file wave to be processed in Kontakt app as VST plugins, or either finding the Angklung sample sound from the provider on the internet. After browsing the internet, it was found that there is a webpage providing good sample sound of Angklung, which applies a conventional technique, not a technique for a contemporary music composition. Therefore, the latter way was chosen so that Angklung sound sample was not made from the beginning.

3.3. Integrating Sibelius and Kontakt apps
The third step was to combine Sibelius with Kontakt. In the integrating position, Sibelius functioned as a host application. Figure 1 shows the steps of integration, namely: (1) putting the folder that saved audio plugins from Kontakt through Sibelius by selecting Audio Engine Options menu; (2) making a new configuration in Playback Devices menu named Kontakt (or else), and putting it into Active devices column; (3) showing the Kontakt display by pressing ‘show’ key, putting kinds of Angklung sounds from the computer directory and showing it on Kontakt, determining the sound channel, and making a sound ID; (4) trying Angklung sounds displayed on Kontakt.

Figure 1. Steps of integrating sibelius first with kontakt 5.
After Kontakt app has successfully shown and tooted the sample sounds of Angklung, the channel adaptation in Mixer Sibelius was done after a staff was made to write its default selected instrument. All channels in Mixer could be replaced by sound channel or types of Angklung, arranged in Kontakt, because the default channel was the sounds of General Midi configuration (Standard Midi). The storage of VST plugins folder could be determined when installing Kontakt. In certain case, as experienced in this research, VST plugins folder in Kontakt needed to be saved in the same folder with VST plugins folder in Sibelius as the host application since both Sibelius and Kontakt have their own VST plugins folders. When trying to put them in different folders (default folder), and added as shown in the first step in figure 1, the folder and file audio plugins in Kontakt could not be added. In this case, the Kontakt app was reinstalled in order to move the VST plugins folder.

3.4. Making Angklung composition
The appearance of Angklung VST plugins in Kontakt app, and the Angklung sounds as the piano toots were pressed in Kontakt app, would automatically produce the sound of Angklung in each notation made in Sibelius paper. To complete the Angklung composition, other VST plugins could be added, such as bass or percussion. In this research, additional VST plugins such as gambang one hit, electric bass guitar, and a set of drum were added, which were also retrieved from the internet. Therefore, the Angklung composition’s layers became denser, which resulted in aesthetics value of Angklung sounds harmonization. This research used a song entitled Sarinande (a folk song from Maluku) as an example, arranged by Daeng Soetigna (deceased). The song has 4/4 rhythm, and 100 bpm tempo (beat per minute).

3.5. Testing the quality of Angklung composition sound
The result of quality testing of Angklung composition sound, which was obtained from seeing the notation while listening to Angklung composition as a whole through a video, then filling a survey in Google Form, is presented in the following table.

Table 1. The result of section 1 survey.

| The students’ knowledge on Angklung sound sample | Yes | No |
|-----------------------------------------------|-----|----|
| Have you heard the sound of Angklung composition made in computer application or music notation software before? | 26  | 28 |
| Have you known that the sample sound of Angklung can be made for music application for computer? | 20  | 34 |
| Have your learned about the Angklung composition through computer application or music software? | 6   | 48 |

Table 1 shows that more than a half of the students (51.9%) have never heard Angklung composition made in computer application. As much as 63% of the students did not recognize that Angklung could be made as sound sample for computer application. This survey identified the lack of the students’ knowledge about the development of music instrument in the virtual studio packaging. Considering this condition, it was not surprisingly that as much as 88.9% of the students have not studied Angklung through a computer application.

Table 2. The result of section 2 survey.

| Statements on the quality of Angklung sound | Strongly disagree | Not agree | Less agree | Agree | Strongly agree |
|--------------------------------------------|-------------------|-----------|------------|-------|---------------|
| The tone of Angklung sounds natural.       | 1                 | 11        | 19         | 23    |               |
| Melody and rhythm of Angklung composition sounds tidy and clear. | 15               | 22        | 17         |       |               |

The data in table 2 indicates that most of the students agreed that the sounds of Angklung converted into VST plugins have served natural tones. This statement resembles the result of other studies, which suggested that the biggest attraction of virtual instruments is its real sound [15]. It was even confirmed
that after the digital revolution, it is clear that selected virtual instruments take the position of real instruments [15]. Virtual instruments are a global standard and their acceptance has strengthened with time [16].

In section 3 of the survey, the students were asked, “Are you interested in studying Angklung composition through computer or music notation software?” There were 49 students (90.7%) answered ‘interested’ and five others (9.3%) said that they were not interested. One of the students who was not interested stated that, “I think that learning Angklung composition directly would be easier, face-to-face and try Angklung by myself with the mentor.” Meanwhile, one of the students who was ‘interested’ affirmed that,

*If making Angklung composition with a computer software has been learned, it would be convenient and not time consuming to learn song notation, because it could help us to sound each notation freely and fast to compare the sound, rather than using the real Angklung. We even might arrange our own composition.*

After being investigated, those students who were interested in learning Angklung by using computer showed their futuristic and creative thought. They realized the importance of using computer in this era, which was also possible to support in implementing their ideas to produce music works. It was also able to improve the students’ work in finishing their college assignments. In other words, nowadays, computer could function as a tool, in which the computer amplifies ability to finish academic tasks [17].

4. Conclusions

It can be concluded that the development of Angklung composition teaching materials using music notation software with Virtual Studio Technology integration was potential to increase the students’ knowledge about music in the packaging of computer technology. The students were interested not only in the teaching materials, but also in the use of music application in a computer. Therefore, arranging music teaching materials through the computer technology could improve the student’s motivation to learn.

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