



The Development of Gamelan Learning Media for Android Operating System

Nisa Puspaningtyas Yudana,^{1✉} Sugeng Bayu Wahyono²

^{1,2}Postgraduate Program of Universitas Negeri Yogyakarta, special region of Yogyakarta, Indonesia

DOI: <https://doi.org/10.15294/ijcets.v7i2.29443>

Article History

Received : March 2019
Accepted : September 2019
Published : November 2019

Keywords

Android Operating System;
gamelan; learning media;
traditional music

Abstrak

Gamelan merupakan salah satu instrumen musik tradisional yang paling penting dari budaya Jawa, tetapi terlalu mahal bagi sekolah untuk memilikinya. Untuk meningkatkan kesadaran siswa, rasa memiliki dan keterampilan bermain Gamelan, penelitian ini mencoba mengembangkan media pembelajaran untuk sistem operasi Android. Dengan menggunakan pendekatan penelitian dan pengembangan (R&D) proses pengembangan penelitian ini mengacu pada metode yang dikembangkan oleh Alessi & Trollip (2001). Berikutnya, Adobe Flash telah digunakan sebagai dasar pengembangan media dan setelah beberapa proses (perencanaan, desain, dan pengembangan) media pembelajaran ini siap untuk digunakan, hal itu karena hasil post-test menunjukkan peningkatan skor siswa pada pemahaman dan keterampilan mereka sebagai pemain pemula dalam memainkan Gamelan. Setidaknya, media pembelajaran ini menjadi cara alternatif untuk mempelajari alat musik tradisional Gamelan dengan menggunakan Android.

Abstract

Gamelan is one of the most important traditional music instruments of Javanese culture, but it is too expensive for schools to have it. In order to enhance student awareness, sense of belonging and skills on playing Gamelan, this research tried to develop a learning media for Android operating system. By employing research and development (R & D) approach the development process of this research refers to Alessi & Trollip (2001). Adobe flash has been used as a basis of the media development and after several process (planning, design, and development) the learning media is ready to use, because the post-test indicated an increased student score on their understanding and beginner skills on playing Gamelan. At least, this learning media become an alternative way to learn Gamelan traditional music instrument by using Android.

INTRODUCTION

Indonesia has a diverse art and culture. Almost every region has a distinctive culture which is included in the education curriculum at various levels. Learning about arts and culture has now become a subject. In this subject, students learn about the arts of their respective regions whether it's fine art, music, dance, or theater. A lot of materials must be studied by students in arts and culture; thus, schools should also be able to provide facilities for the learning activities (i.e. Solikhudin, Martadi, & Mutmainah, 2016).

Research by Al Huda (2014) revealed that difficulties in learning arts and culture arise due to the school's lack of tools. This fact then becomes the problem and the main reason to support the availability for traditional musical instruments. In another study, an attempt to try out arts and culture learning with the help of gamelan turned out to enhance students' learning outcomes compared to when the gamelan was not used (Rini & Subrata, 2018). This indicates that learning arts and culture, especially music will be much more successful by using instruments, or appropriate musical instruments.

However, not all schools can afford to buy and maintain the tools needed to learn arts and culture, because they are relatively expensive and require special care ("Jalan Panjang dan Mahal," 2016). Besides, local musical instruments have diverse ways of playing. Unlike western music that is played with diatonic scales, local musical instruments have different scales in different places. Hence, teachers have got to master special skills to be able to master the instruments.

Both of these problems, resulting in non-applicative learning which stops only on the theory instead of practices. Some teachers address the problems by making simple learning media with Powerpoint. Nonetheless, this kind of media is less interactive and has not been able to facilitate students to learn to play tools virtually (i.e. Agustin, Sudarman, & Putra, 2017). Further, research that has been done by Kurniawanto is very comprehensive in discussing the Javanese gamelan application, but it can only be run on iOS (Kurniawanto, Sulistijono, & Kusuma, 2011).

On the other hand, people who use iOS-based devices usually come from the upper-middle class. This means that the school will have difficulty in providing these devices. Some of the results of the study made clear the need for the

development of interactive, inexpensive gamelan learning media in its procurement costs so that students and schools could use them easily.

Furthermore, the arts and culture syllabus, especially on the music topic, states that there are four basic competencies required by students to be able to play traditional musical instruments individually or in groups. In these competency standards, students are asked to listen and identify techniques, sound characters, and parts of traditional musical instruments that are played individually, explain the conclusions obtained about the technique of playing one traditional musical instrument individually, practice playing one of the traditional musical instruments, display traditional musical instrument games individually, and assess friends' performances in playing traditional musical instruments as a group (Ministry of Education and Culture, 2016).

After going through the learning process, students are expected to play the instruments. Then what about the student's learning opportunities? Do they have to skip it? Here, teachers need learning media that can be used as a means of learning local musical instruments, especially gamelan. This learning media contain materials about gamelan, starting from the introduction of forms and how to play gamelan to the role of instruments in the gamelan orchestra. The idea of developing the arts and culture learning media is outlined in this article.

To the extent, learning media have succeeded in overcoming the lack of facilities and infrastructure (see ie Admadja & Marpanaji, 2016; Ampa, Rasyid, Rahman, Haryanto, & D, 2013; Leontidis, Halatsis, & Grigoriadou, 2011; Najikhah, Budiyo, & Wardi, 2016; Saselah, Amir M, & Qadar, 2017). Thus, the development of applications and learning media could provide convenience for teachers while teaching the subject. During this time, many developers are establishing applications or gamelan software yet they mostly only focus on the manufacture of applications. As a result, users could play gamelan, but not teach how to play gamelan properly. To fulfill the competencies contained in the syllabus of arts and culture, students need to understand the types of musical instruments in the gamelan, as well as the role of each instrument.

Gamelan consists of percussion, wind and string instruments that are classified according to their respective functions, namely melody, tempo, and structure (Ishida, 2008). The ability

needed to play gamelan is almost the same as the skill to play a musical instrument in general, namely by showing body movements and gestures (Vuoskoski, Thompson, Spence, & Clarke, 2016) which are called psychomotor skills, in addition to cognitive skills.

When studying psychomotor skills, students go through several phases namely cognitive, associative, and autonomous (Smith & Ragan, 2005). They can get through these phases well if the teacher also applies an appropriate psychomotor learning strategy. One strategy that can be used is to explain what is learned, then invite students to practice. From there, give students constructive feedback. Through the application developed in this research, students will be able to know how to play each percussion instrument in the gamelan and play it individually or in groups. Group games must be led by the teacher or group leader to create a harmonious gamelan play. Hopefully, this application will be an effective alternative for learning both inside and outside the classroom.

The purpose of this development is to create a learning media design that can accommodate the needs of students who will learn the technique of playing gamelan from the very beginning. The product is designed by putting forward the interface-friendliness for middle school-age users. However, the developer-focused on performing percussion instruments. This product has also been declared eligible and categorized as 'Good' after going through the Alpha and Beta test. Thus, the development of instructional media in this article contributes to the field of Educational technology, especially in creating appropriate teaching technological resources (see Januszewski & Molenda, 2008).

METHOD

This study is included as a Research and Development (R&D), which is used to generate a certain product, namely to develop learning media for playing gamelan techniques. The development of instructional media follows the development procedures proposed by Alessi and Trollip (2001). In their book, three things must be considered and implemented in the development process to make good products, namely standard, evaluation (ongoing evaluation) and project management (Alessi & Trollip, 2001).

The development procedure has 15 stages which are divided into 3 parts, namely Planning,

Design, and Development. The researchers decided to choose the procedure as it comprises more complete and detailed steps compared to other developmental procedures. Moreover, Alessi and Trollip also developed this procedure following the needs of developing multimedia learning.

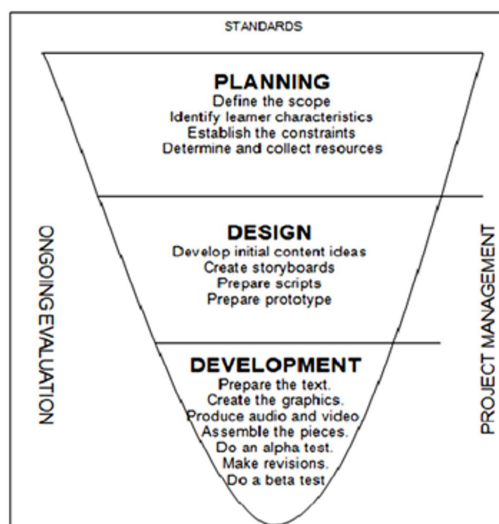


Figure 1 The flow of media development based on the Alessi and Trollip procedure (2001)

The development process was carried out from January 2018 to July 2018 then tested to media experts and material experts in August 2018. The final product results were given to students to be tested at the end of August. The research subjects included VII graders of VIII SMP N 1 Pengadegan. Also, there were two feasibility tests performed.

First, the data were derived from the feasibility test of media experts, material experts, and students. Second, the data were obtained from product trials to junior high school students in the form of a multiple-choice test for the pre and post-test. The feasibility test employing the Likert scale was conducted by the experts for validation (alpha test). Next, the Likert scale addressed to the students as well as pre and post-test done by them to obtain the final data as a final-stage evaluation (beta test) of the product.

Each indicator submitted to the experts was adjusted to the expert's ability. The material experts focused on the feasibility of the substance of the materials regarding the learning process and gamelan. Diversely, the media experts assessed the technical matters of the learning media. This is related to the appearance, smoothness of the application, and ease of use.

Furthermore, the instruments for the feasibility test or student responses to the learning media were arranged based on Alessi and Trollip's (2001) indicators. The statements were developed and adjusted for the students' age to enhance the understandability. After distributing instruments and collecting data, they were then recapitulated. The data obtained from the alpha and beta tests were in the form of a Likert scale and multiple-choice test scores. Further, the data were analyzed in two stages, they are (1) analyzing scores from the Likert scale and (2) analyzing multiple-choice test scores from the pre-test and post-test.

RESULT AND DISCUSSION

The researcher split this section into two parts; the development process and discussion.

A. The Development Process

The followings are the results and discussion of the gamelan learning media development. Following Alessi and Trollip, the explanation of the development results is divided into 3 parts, namely planning, design, and development.

The planning has several phases including defining the scope, identifying learner characters, determining constraints, and gathering the needed resources. The first phase defines the scope of the materials contained in the media. The materials are adjusted to the syllabus of arts and culture which requires the students to (1) listen and identify techniques, sound characters, and parts of traditional instruments played individually; (2) describe the conclusions obtained about the techniques of playing one of the traditional instruments individually; (3) practice playing one of the traditional musical instruments; (4) display traditional instruments individually; and (5) assess friends' performances in playing traditional musical instruments as a group.

VII grades are between 12-14 years old or at the early teen stage. Their knowledge of gamelan is very basic and they barely play or even touch it. Yet some of the students coming from elementary schools equipped with gamelan had a more favorable interaction to gamelan than the others. Learners at these ages need stimulation to boost their intention in learning new things. In this study, the developer chose the Adobe Flash software as it has many features to develop the desired learning media.

Adobe Flash enables the developer to in-

sert various types of media, such as audio, video, images, text, as well as simulations and games. Using Adobe Flash is also easy, with the adjustable results for use on a variety of devices like computers (.exe, .swf file format), Android (.apk file format), iOS, even for web needs. The outputs of the Adobe Flash can also be operated both online and offline.

The developed learning media contain information/knowledge about the techniques of playing percussion (parts of gamelan), namely gong, kenong, kempul, bonang, saron, demung, and peking. The instruments were chosen because each of them has different playing techniques with each other. Then, based on the predetermined constraints, it can be concluded that 2 main things must be prepared in developing this media, namely the audio and visual aspects. For that, the developer prepared the sound/recording of gamelan in pelog scales, as well as the recording of songs for music video background.

From a visual perspective, the developer prepared the design of the screen display, supporting images in the video, as well as images of each gamelan instrument that will be included in the media. Besides, the developer must also prepare text to provide information to students about the knowledge to be delivered, for example, video scripts, instructions, and learning materials.

Second, the design stage. This stage has several things to note. The developer began to describe how the media were made through storyboards, scripts, and prototypes. Broadly speaking, the media are divided into 3 parts, namely videos containing basic knowledge, gamelan simulation, and independent training.

Each section is then arranged in a flowchart showing the direction of each menu and button, then drawn to form a storyboard. In the storyboard, there were navigation, images, and text to be entered. Then there is also a description of the audio on each page. From this storyboard, a prototype was established as an initial description of the developed application

The third phase is development, which is the realization of the previous phase where all components needed in learning media were arranged. Starting from making buttons, videos, texts, audios, formulas in Adobe Flash. After completion, the media were handed out to the material experts, media experts, and students for testing. The following is the elaboration of the

feasibility test and the development results.

1. Early Design

After the development process, the outcomes are as follows



Figure 2 Starting page

This page contains several important buttons to start learning. For example, the start button, instruments, instructions, exit button, and developer profile. The start button, if clicked, will take the user to the second page, which contains the opening video. After completing the opening video, the user can access the menu to select the instruments to be studied. Then, the user will go directly to the instrument page.



Figure 3 Instrument selection page

This menu is available for in-group gamelan play. One user chooses an instrument and then plays a song with a friend who plays another instrument.



Figure 4 Instruments

The independent exercise menu allows

users to practice their knowledge on how to play gamelan guided by simple feedback available on the media. This feedback will show true or false when the users press the button. They only need to follow the notation provided then press the continue button to move to the next exercise. By knowing feedback from instructional media, the students can observe the learning progress in the psychomotor domain, which is the techniques of playing gamelan.

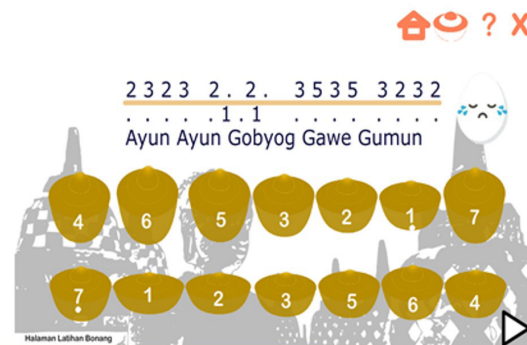


Figure 5 Exercise with feedback

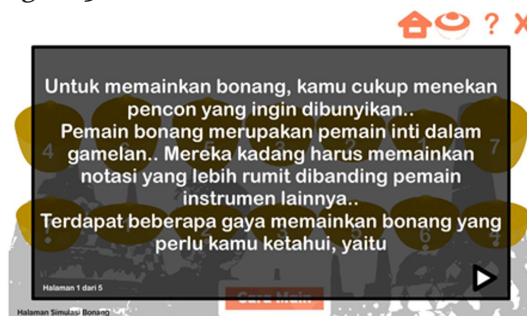


Figure 6 Guide to playing the instrument

The page shows a text that explains the details to play the gamelan. Another menu, the glossary, contains foreign words and important terms contained in the media for the users to understand the explanation given. Following is a screenshot of the glossary page.

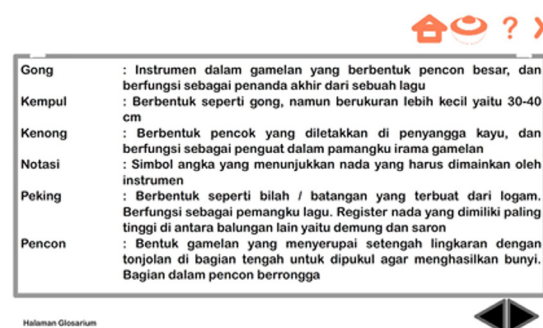


Figure 7 Glossary

In the bibliography menu, there are sources of information and images used in the media. The following is the screenshot page.



Figure 8 Bibliography

In addition to the main menu, there are other complementary menus, such as the instructions and the developer profile. Figures 9 and 10 are screenshots of the page.

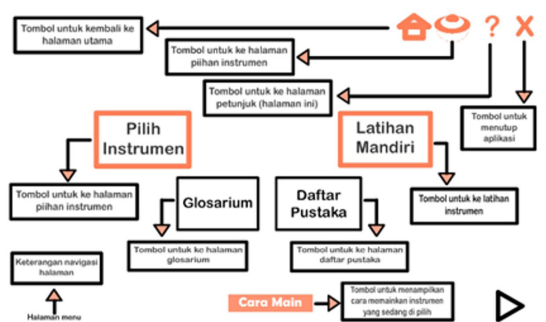


Figure 9 Instructions

This page serves to help users, especially beginners. Although children are already adept at using Android, there are many children of the rural who have not been able to use it properly. Hence, they need this kind of guide page. The page design equipped with the direct button and information under the principles of multimedia learning by Mayer who advocates putting the information close to the picture.

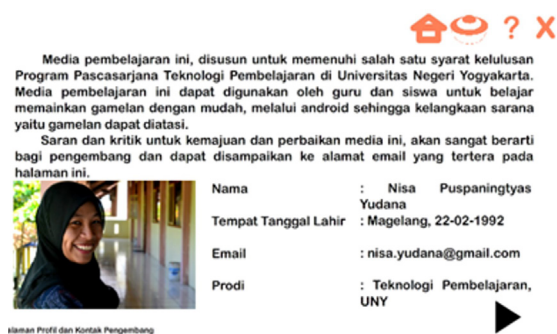


Figure 10 Developer Profile

The developer profile page allows users to contact the developer for criticisms or suggestions. This page is also a form of accountability for the errors or disturbances in the learning media that might happen.

2. The Alpha Test Results

Referring to the material experts, the contents have been declared feasible (with revision) to be tested to the students. A validation score obtained was 4.65 out of 5 which means that the product is categorized as very good. Nonetheless, the experts suggested that the developer insert lyrics on the independent exercise for the learners to follow the given song notation as some students find it difficult to follow the song tempo and are better at following the lyrics. The value obtained from the validation by media experts was 80, and have got an average of 4.21 out of 5; thus, it is classified as very good.

3. Revision

According to the media experts, the developer's name and affiliation should be displayed on the main/title page, and the revision was carried out after conducting the alpha test. Figure 11 indicates that the main page has been revised as suggested by the media experts.



Figure 11 The main page

Then, there is a different volume of the gong instrument with other instruments; thus, the gong's volume had to be increased. This improvement was done by editing the gong audio file.

4. The Beta Test Results

The responses of 29 students resulted in an average of 3.89 out of 5 and categorized as good. Moreover, the students also commented and suggested to the product, which was summarized in several points; (1) animation should be improved to make it more interesting; (2) colors are less attractive; (3) more musical instruments should be added up.

Furthermore, based on the analysis conducted by the developer, it was found that before using the established learning media, the students only mastered the basic knowledge of gamelan including the scale, the name, and the

form of instruments. After using the learning media, they achieved an average post-test score of 9.52 with a high n-gain category. The following Table 6 shows the details of pre and post-test scores that have been done by the VIII graders of SMP N 1 Pengadegan.

Tabel 3 The pre- and post-test results

No	Pre Test	Post Test	N-gain	Cateroy
1	7	10	1	High
2	6	10	1	High
3	6	8	0,5	Medium
4	5	9	0,8	High
5	6	10	1	High
6	7	10	1	High
7	5	8	0,6	Medium
8	6	9	0,75	High
9	8	10	1	High
10	6	10	1	High
11	6	10	1	High
12	6	10	1	High
13	7	10	1	High
14	6	10	1	High
15	7	9	0,67	Medium
16	5	10	1	High
17	4	10	1	High
18	6	10	1	High
19	7	10	1	High
20	6	10	1	High
21	5	7	0,4	Medium
22	6	10	1	High
23	9	10	1	High
24	4	9	0,8	High
25	9	10	1	High
26	6	10	1	High
27	5	10	1	High
28	9	7	-2	Low
29	7	10	1	High
30	6,28	9,52	0,82	High

B. Discussion

The product developed in this research and development follows the principles of multimedia learning formulated by Mayer (2017), and aspects conveyed by Alessi and Trollip (2001). Based on the study of the students' needs, teachers, and previous research, the learning me-

dia provides complete information to students and can be used as a means to practice playing the gamelan, amidst the absence of gamelan at school.

This media has also been proven to have a positive impact on the students. Adobe Flash as the main software used by the developer has been able to attract the students' interests by facilitating learning activities through simulation features, which can be accessed by the students easily and through Android-based phones. The media has been proven to have a better impact than leaning without media (based on the beta test and student responses) (see i.e. Admadja & Marpanaji, 2016; Hanum & Abdul Huda, 2018; Saselah et al., 2017).

This product can be better developed in the future by adding an evaluation menu so that the students can truly learn independently. This evaluation menu will help the students to develop their ability to play gamelan, for example, by using a drill to master the techniques of playing the instrument. Another feature like a vibration effect, higher dimension as well as more realize pictures may be inserted to make the students easier to learn.

CONCLUSION

The developed learning media for playing gamelan used the Adobe Flash CS 6 in its production and then was converted into an .apk extension for Android device-friendly. The learning media have been arranged according to the basic competencies of VII grade junior high school associated with gamelan, with the main menu of videos containing basic knowledge of gamelan, gamelan simulation, independent practice, and glossary.

According to the material experts, the product is classified as Very Good, with an average score of 4.65. Meanwhile, the media experts also declared the media as Very Good, with an average score of 4.21. Furthermore, based on the student responses, the product is categorized Good with an average score of 3.89. The learning media provide an increase in cognitive learning outcomes for the students. Psychomotorically, the students can find out their learning progress from feedback on the independent practice menu in the media.

ACKNOWLEDGMENT

Thank you to Universitas Negeri Yogyakarta for providing a forum and opportunity for

the author to complete this development.

REFERENCES

- Admadja, I. P., & Marpanaji, E. (2016). Pengembangan Multimedia Pembelajaran Praktik Individu Instrumen Pokok Dasar Siswa SMK di Bidang Keahlian Karawitan. *Jurnal Pendidikan Vokasi*, 6(2), 173-183. <https://doi.org/10.21831/jpv.v6i2.8107>
- Agustin, R., Sudarman, Y., & Putra, I. E. D. (2017). Penggunaan Media PowerPoint dalam Pembelajaran Seni Budaya (Musik) di Kelas VIII SMP N 31 Padang. *E-Jurnal Sendratasik*, 6(1), 54-61.
- Al Huda, U. (2014). *Identifikasi Kesulitan Pembelajaran Seni Budaya di SMP N 11 Purworejo* (Universitas Negeri Yogyakarta). Retrieved from <https://eprints.uny.ac.id/19590/>
- Alessi, S. M., & Trollip, S. R. (2001). *Multimedia for Learning: Methods and Development* (3rd ed.). Allyn & Bacon.
- Ampa, A. T., Rasyid, M. A., Rahman, M. A., Haryanto, & D. M. B. (2013). The Implementation of Multimedia Learning Materials in Teaching English Speaking Skills. *International Journal of English Language Education*, 1(3), 293-304. <https://doi.org/10.5296/ijele.v1i3.4153>
- Hanum, N. L., & Abdul Huda, A. K. (2018). Development of Instructional Video Media in Increasing Sex Education Knowledge for Students with Hearing Impairment. *Jurnal Penelitian Dan Pengembangan Pendidikan Luar Biasa*, 5(1), 62-66.
- Ishida, N. (2008). The textures of Central Javanese gamelan music: Pre-notation and its discontents. *Bijdragen Tot de Taal-, Land- En Volkenkunde*, 164(4), 475-499. <https://doi.org/10.1163/22134379-90003652>
- Jalan Panjang dan Mahal Membuat Gamelan. (2016). Retrieved January 16, 2019, from CNN Indonesia website: <https://www.cnnindonesia.com/hiburan/20160820085155-241-152619/jalan-panjang-dan-mahal-membuat-gamelan>
- Januszewski, A., & Molenda, M. (Eds.). (2008). *Educational Technology: A Definition with Commentary*. New York: Taylor & Francis Group.
- Kurniawanto, A., Sulistijono, I. A., & Kusuma, C. (2011). Belajar Gamelan Jawa Menggunakan Platform iOS. *The 13th Industrial Electronics Seminar*, 409-413. Retrieved from <http://repo.pens.ac.id/id/eprint/1064>
- Leontidis, M., Halatsis, C., & Grigoriadou, M. (2011). Using an affective multimedia learning framework for distance learning to motivate the learner effectively. *International Journal of Learning Technology*, 6(3), 223-250. <https://doi.org/10.1504/ijlt.2011.043578>
- Mayer, R. E. (2017). Using multimedia for e-learning. *Journal of Computer Assisted Learning*, 33(5), 403-423. <https://doi.org/10.1111/jcal.12197>
- Ministry of Education and Culture. (2016). *Ministry of Education and Culture No. 24 of 2016 on the Core Competence and Basic Competence of Curriculum 2013 on Elementary and Secondary Education*. Jakarta, Indonesia: Ministry of Education and Culture.
- Najikhah, F., Budiyo, & Wardi. (2016). Keefektifan MPI Game Edukasi Terhadap Hasil Belajar IPA di Kelas 1 Sekolah Dasar. *Indonesian Journal of Curriculum and Educational Technology Studies*, 4(2), 58-65. <https://doi.org/10.15294/ijcets.v4i2.14307>
- Rini, D. M. P., & Subrata, H. (2018). Penggunaan Media Gamelan Sederhana dalam Pembelajaran Tembang Dolanan di Kelas IV SDN Sumur Welut 1 Surabaya. *Jurnal Penelitian Pendidikan Guru Sekolah Dasar*, 6(9), 1599-1609.
- Saselah, Y. R., Amir M, M., & Qadar, R. (2017). Interactive Multimedia Development Based on Adobe Flash CS6 Profesional on Learning of Chemical Equilibrium. *JPKP (Jurnal Kimia Dan Pendidikan Kimia)*, 2(2), 80-89. <https://doi.org/10.20961/jkpk.v2i2.11978>
- Smith, P. L., & Ragan, T. J. (2005). *Instructional Design* (3rd ed.). Wiley & Sons.
- Solikhudin, F., Martadi, & Mutmainah, S. (2016). Pelaksanaan Pembelajaran Seni Budaya Berdasarkan Kurikulum Tingkat Satuan Pendidikan Di SMP Wachid Hasjim 9 Sedati Sidoarjo. *Jurnal Pendidikan Seni Rupa*, 4(1), 129-135.
- Vuoskoski, J. K., Thompson, M. R., Spence, C., & Clarke, E. F. (2016). Interaction of sight and sound in the perception and experience of musical performance. *Music Perception*, 33(4), 457-471. <https://doi.org/10.1525/MP.2016.33.4.457>