



Utilization of the *Real Angklung* Application in Cultural Arts Education to Improve High School Student Angklung Playing Skills

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Abstract

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The low level of student skills in playing the angklung in the Cultural Arts subject shows that the traditional music practice learning process is not yet fully optimal. This condition is reflected in the learning achievement that is still below the set criteria, as well as the low level of active student involvement in practice activities. This problem requires learning innovations that can facilitate independent practice, collaboration, and systematic mentoring. This study aims to analyze the effectiveness of using the *Real Angklung* application in improving high school student' angklung playing skills. The method used is Classroom Action Research (CAR) conducted in two cycles, including the planning, implementation, observation, and reflection stages. There were 34 student participating in this study. Data were obtained through observation and practical tests, then analyzed quantitatively and descriptively using the percentage of learning completeness. The results showed an increase in mastery from 55.88% in the pre-cycle to 67.65% in Cycle I and further increased to 88.24% in Cycle II. Thus, the use of the *Real Angklung* application proved to be effective in improving student' angklung playing skills gradually and continuously.

Keywords:

Real Angklung Application, Digital Learning Media, Educational Technology, Student Skills

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INTRODUCTION

Education, as we know, is one of the fundamental human rights for all people. Education is also very essential for humans, because with education, a person's life can change. This will be realized if everyone has the same opportunity to obtain this education. Education is a fundamental right whereby every human being is entitled to education under the law without discrimination (Rahmiati, Firman, 2021). With a good education system, Indonesia can prepare a generation that is not only intellectually intelligent but also has a strong character to respond to the challenges of globalization (Kadrina, 2025).

Through an inspiring learning process, education can foster a sense of concern for the surrounding environment, teach the importance of tolerance and harmony, and hone critical and creative thinking skills (Yunizar et al., 2024). Therefore, education is a learning process, and the importance of education encourages both formal and non-formal educational institutions to be able to strive



for the best processes and results for their students, so that education can produce quality human resources (HR) in accordance with national educational objectives, one of which is through efforts to improve the quality of learning in the classroom. By encouraging educators to pay attention to appropriate models and methods, as well as being able to overcome problems in learning, they will be able to improve the quality of learning that is carried out continuously throughout life in order to improve the quality of human life (Ekawati., 2021).

The development of Science and Technology presents its own challenges for educators to create learning media that can improve the quality of education. The development of Science and Technology encourages educators to produce technology-based learning media. According to (Muyaroah, S., & Fajartia, 2017), advances in science and technology require teachers and educators to adapt and innovate. They are faced with the challenge of creating learning media that is not only effective but also capable of improving the quality of education. In addition, with the development of technology, educators are encouraged to create learning media that uses technology so that the teaching and learning process becomes more modern, interesting, interactive, and can improve student learning outcomes. This is supported by recent studies which indicate that the integration of technology-based learning media can enhance student engagement, critical thinking, and overall learning outcomes when implemented appropriately (Arisanti, 2025).

Digital technology is now being utilized in education as a learning support tool, both as a medium of information and as an aid in the teaching and learning process. Along with the development of Science and Technology, the Indonesian nation has been able to create a high-quality and qualified next generation. Therefore, the use of technology in education and training needs to be done creatively and wisely in order to have a positive impact on improving the quality of learning (Fitri Mulyani, 2021). According to Munandar (Aldy et al., 2023), creative thinking is the ability to find possible answers to a problem, emphasizing a variety of correct and different answers. This usually occurs when someone deliberately tries something.

Habits are formed through the repetition of behavior in a stable context until it becomes automatic and habitual (David et al., 2024). Education and creative thinking indicate that it is very important in education in *the era of society 5.0* to prepare students to face global challenges and complex changes of the times by utilizing technology optimally (Sa'ida Umi Mukaromah, Zuhrotun Najichah, 2025).

To develop creativity in student learning, teachers have learning strategies. Teachers need to provide a platform for each student to develop their creativity (Arifatun Ni'mah and Sukartono, 2022). Furthermore (Miyatun et al., 2021), teachers strive to improve the learning process with learning models that most enhance creative thinking and student learning outcomes, and the development of creative thinking skills needs to be carried out by every educator.

The learning referred to covers all aspects of subjects, including normative, adaptive, and productive (vocational). Arts and culture are one of the normative subjects that serve to shape students into skilled and creative individuals. The main benefits of utilizing technology in learning include broader access to learning resources, interactive learning, and increased collaboration and communication between students and teachers. In addition, technology also brings a new dimension

to learning by providing an immersive and enjoyable learning experience that allows students to understand concepts through real-world simulations (Subhan et al., 2025). This is supported by previous research which shows that the use of digital technology in education can significantly enhance student engagement, collaboration, and learning effectiveness, especially when learning is designed interactively and contextually (Nkomo et al., 2021).

Several previous studies have explored the role of digital applications and technology in music arts and skills learning. Research by Rohmah et al. (2025) shows that the use of digital angklung applications can improve students' musical skills, such as the ability to recognize tones, rhythms, and creativity in playing the angklung independently, while also providing a solution to the limitations of physical musical instruments in elementary schools. Ardipal (2020) emphasized that the use of digital media can increase student participation, creativity, and critical thinking skills in music arts learning. In addition, Pradana & Disurya (2022) showed that digital applications can create a more interesting learning atmosphere and facilitate interaction between teachers and students, thereby having a positive impact on the learning process.

In general, previous studies have discussed the use of digital technology in music education, whether through digital music applications, technology-based media, or online learning platforms such as *Google Classroom*. However, most of these studies still focus on the use of digital media in general or at the elementary school level, and have not specifically examined the contextual use of traditional instrument-based applications in arts and culture education at the high school level. In addition, previous studies have placed more emphasis on increasing motivation and learning participation, while studies that directly measure the improvement of students' practical skills through digital angklung applications are still limited.

The novelty of this research lies in its specific focus on analyzing the use of the *Real Angklung* application in arts and culture learning at the high school level as an effort to improve students' practical skills. This research does not only place technology as a supporting medium, but as a means of learning traditional instruments that can overcome the limitations of school facilities and encourage students' collaborative skills and creativity. Thus, this research enriches the study of the integration of technology and arts and culture based on local wisdom in the context of secondary education.

The importance of education encourages educational institutions, both formal and non-formal, to continuously strive for optimal learning processes and outcomes for students. This is aimed at ensuring that education can produce quality human resources that are in line with national education goals. This has encouraged SMAN 1 Rajagaluh, as a formal educational institution, to continuously improve student learning outcomes, one of which is through efforts to improve the quality of learning skills in the classroom. The entire activity of learning arts and culture, which is an application of other subjects in producing a product/work made directly by students, can make students feel the benefits of gaining aesthetic experience in their work. However, the implementation of arts and culture learning in class XII Merdeka at SMAN 1 Rajagaluh has not been able to achieve the required learning outcomes in accordance with the curriculum standards. This refers to the arts and

culture subject scores, where the percentage of students who passed the minimum competency standard is still below 50%.

Based on the author's observations, the main factor causing this problem is the low level of student involvement in the learning process. Most students tend to feel bored, making it difficult for them to fully understand the material presented. The dominant use of lecture and independent learning methods, as well as the low ability of students to collaborate and discuss, also contribute to the failure to achieve learning outcomes in accordance with the established standards. The characteristics of high school students tend to prefer learning by directly practicing what they have learned, which is believed to be able to improve their learning outcomes. In addition, many students already have *gadgets*, but these devices are not used for educational purposes, and most students use *gadgets* only as a means of entertainment.

The use of the *real angklung* application can support creativity and improve students' skills in playing musical instruments independently or in groups. The purpose of using the *Real Angklung* application is to compensate for the limited availability of musical instruments in schools, and to enable students to practice and learn independently or in groups without having to use real musical instruments. This will give them a good understanding and skills in the material presented and will have an impact on improving their learning outcomes. The problem formulation in this study is how the use of the *Real Angklung* application can improve students' practical skills in Cultural Arts learning at the high school level and become an alternative solution to the limitations of angklung musical instruments in schools. Based on this problem formulation, the research questions of this study are formulated as follows:

1. How does the use of the Real Angklung application improve students' practical skills in Cultural Arts learning at the high school level?
2. How can the Real Angklung application serve as an alternative solution to overcome the limitations of angklung musical instruments in schools?

To analyze this issue, this study uses Lev Vygotsky's Constructivism Theory as an analytical tool, which emphasizes that learning will be more meaningful when students are actively involved in constructing knowledge through direct experience and social interaction (Salsabila & Muqowim, 2024). The indicators of Vygotsky's(1978) constructivism theory used include: 1) Active student involvement in practicing playing the angklung through the application; 2) The process of *scaffolding* or gradual guidance from the teacher until students are able to play independently; 3) The occurrence of interaction and collaboration among students in group activities; 4) Improvement in students' abilities after undergoing a process of repeated practice and guidance, which indicates development in *the Zone of Proximal Development* (ZPD). With these indicators, the improvement in students' creativity and skills is understood as the result of an active, collaborative, and contextual learning process.

The objectives of this study are to analyze the effectiveness of the use of the Real Angklung application in improving students' practical skills in Cultural Arts learning at the high school level and to examine its role as an alternative solution to overcome the limitations of angklung musical instruments in schools. In addition, this study aims to explore how the integration of application-based learning media

can enhance student engagement, collaboration, and creativity through a constructivist learning approach.

METHODS

This study used Kurt Lewin's Classroom Action Research (CAR) method, which was carried out in two cycles through the stages of planning, implementation, observation, and reflection to improve students' practical skills in learning Cultural Arts through the use of the *Real Angklung* application. There are various types of research, one of which is relevant to the teaching and learning process, namely classroom action research, often abbreviated as CAR. Through CAR, teachers can identify and apply more effective strategies or activities, continue to innovate, and improve to achieve the desired learning objectives by using appropriate reflection and assessment strategies. CAR can significantly improve the quality of learning in the classroom (Gusmaningsih et al., 2023). Classroom action research is an activity carried out by teachers to assess absorption, evaluate school curricula or learning methods and techniques, and assess student learning outcomes and academic development at school. According to (Utomo et al., 2024), classroom action research provides many benefits for teachers at school, such as improving teaching competence and quality at school. Some of the benefits of PTK include:

1. Improving and enhancing teachers' teaching methods;
2. Professional development of teachers;
3. Increasing openness and self-confidence;
4. Encouraging teachers' active role in empirical research;
5. Improving teacher competence

Reiterated by (Machali, 2022) that Classroom Action Research (CAR) is an observation of learning activities in the form of actions that are deliberately brought about and occur simultaneously in a classroom. The quantitative approach is used to measure variables and test hypotheses objectively in numerical terms (Rustono Farady Marta, Ns. Kristina, Ries Yulianto, 2021).

This research was conducted through the Pre-cycle, Cycle I, and Cycle II stages with reference to Kurt Lewin's model, which has four stages, namely:

1. The action planning stage, which includes preparing the learning activities to be implemented in the teaching and learning process, preparing the resources, materials, and tools in the form of the *Real Angklung* application needed, and developing assessment instruments to measure students' mastery of the material presented. In addition, the researchers also developed lesson plans using the *Project-Based Learning* (PjBL) model.
2. The action implementation stage began with preliminary activities in the form of apperception and motivation for students. Next, students were divided into study groups consisting of five people each. Each group was then asked to collaborate and discuss in completing the tasks given during the learning process.
3. Action observation and data collection were observation activities carried out comprehensively from before to after the learning was implemented. This

observation included the learning situation during the action and the learning outcomes obtained by students.

4. Reflection is the final stage, which involves analyzing and assessing the implementation of classroom actions that have been carried out to identify strengths, weaknesses, and possible improvements for the next stage.

The success criteria of this study were established prior to the implementation of the classroom actions. The learning process was considered successful if at least 75% of students achieved the minimum mastery criterion (≥ 75) in the angklung playing skills assessment. In addition, improvements in student participation, collaboration, and independence during the learning process were used as supporting indicators of success. If these criteria were not achieved in Cycle I, the actions were revised and continued in Cycle II until the expected level of learning mastery was attained.

To measure students' practical skills, an assessment instrument was developed in the form of a performance-based rubric. The rubric consisted of four main aspects: tone accuracy, rhythm accuracy, cohesiveness, and creativity. Each aspect was assessed using a score range of 1–100 and weighted proportionally to reflect its importance in musical performance. Tone accuracy and rhythm accuracy were given the highest weight as they represent fundamental technical skills, while cohesiveness and creativity were included to assess group performance and expressive elements. The final score was calculated based on the weighted sum of all aspects.

Table 1. Assessment Rubric for Angklung Playing Skills

No	Assessment Aspect	Indicators	Score Range	Weight
1	Tone Accuracy	Ability to produce correct notes according to the musical notation	1–100	30%
2	Rhythm Accuracy	Ability to maintain tempo and play rhythms consistently	1–100	30%
3	Cohesiveness	Synchronization and coordination when playing in a group	1–100	20%
4	Creativity	Expression, dynamics, and variation in playing	1–100	20%
TOTAL			100%	

The final score of students' angklung playing skills was calculated using a weighted scoring formula based on each assessment aspect. The formula is as follows:

$$\text{Final Score} = (\text{TA} \times 0.30) + (\text{RA} \times 0.30) + (\text{CO} \times 0.20) + (\text{CR} \times 0.20)$$

Where:

TA = Tone Accuracy

RA = Rhythm Accuracy

CO = Cohesiveness

CR = Creativity

Furthermore, to ensure the quality of the instrument, validation and reliability procedures were conducted. The instrument was validated through expert judgment by two experts in music education to ensure its content validity. The validation process focused on the relevance, clarity, and appropriateness of each assessment aspect and indicator. In addition, the reliability of the instrument was ensured through consistent scoring procedures during the assessment process to maintain objectivity and stability of the results. The use of a structured rubric ensured that the assessment process was objective, systematic, and aligned with the intended learning outcomes.

The pre-cycle stage is carried out to obtain an initial picture of students' practical skills before learning actions are given. Furthermore, the stages of planning, implementation of actions, observation, and reflection are applied in Cycle I and Cycle II as part of a gradual learning improvement process. The problems that arise in Cycle II are problems that have not been resolved in Cycle I or occur if the results in Cycle I have not reached the research target. Therefore, action improvements are made in Cycle II. However, if the research results have shown optimal achievement, the research is not continued to the next cycle and the researcher focuses on processing and analyzing the data that has been obtained.

The differences in treatment between the Pre-cycle, Cycle I, and Cycle II lie in the use of learning media, the level of assistance, and the complexity of the tasks given to students. In the Pre-cycle stage, learning was carried out using methods commonly applied by teachers without the use of the *Real Angklung* application, so that student practice was still limited to conventional activities and student involvement was not yet optimal. Furthermore, in Cycle I, learning began to focus on basic practices of playing simple notes and rhythms as well as group work activities based on *Project Based Learning* (PjBL). The results of the reflection showed that some students were still not very active and had not achieved the expected learning outcomes. Therefore, in Cycle II, improvements were made in the form of a more structured introduction and demonstration of the *Real Angklung* application, increased intensity of assistance, clearer division of group roles, and individual practice before group practice was carried out. In addition, the practical tasks in Cycle II were designed to be more complex, emphasizing accuracy of tone, rhythm, cohesiveness, and creativity, so that students' skills could be improved more optimally.

RESULTS & DISCUSSION

Results of Learning Activities Using the *Real Angklung* Application

Based on the activities carried out using the Android-based *Real Angklung* application, the learning outcomes of grade XII students before the intervention showed that their practical skills were still not optimal. In the initial stage (Cycle I), learning was carried out using the conventional method of without the use of the *Real Angklung* application. At the end of the learning process (Cycle II), learning was carried out using the *Real Angklung* application, and then students were asked to practice playing the angklung musical instrument using real instruments as part of the skill assessment. The results of the practice in Cycle I were then used as initial

data to determine the students' skill level before the intervention in the form of using the *Real Angklung* application in Cycle II.

Link to the *Real Angklung* application on Google Play Store:
<https://play.google.com/store/apps/details?id=com.adi.real.angklung>

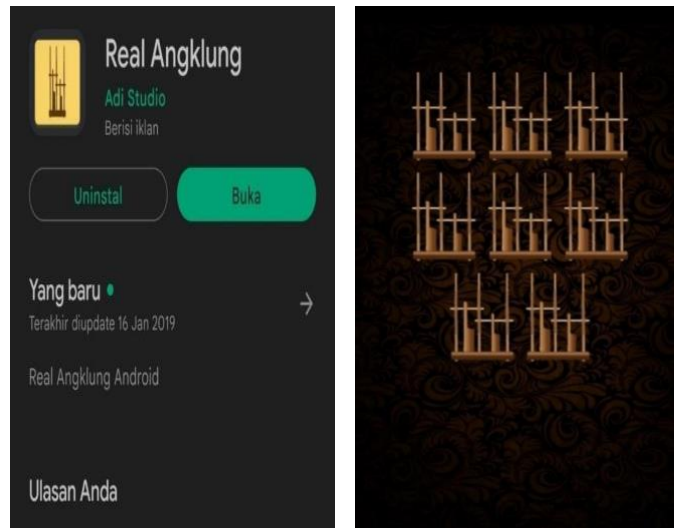


Figure 2. *Real Angklung* Application Display

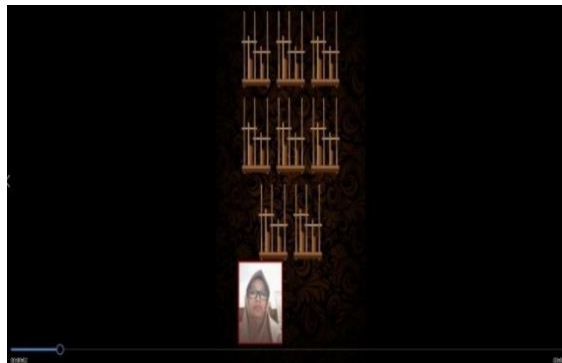


Figure 3. Example of How to Play the *Real Angklung* Application



Figure 4. Utilization of the *Real Angklung* Application in the Classroom

Based on the results of the pre-cycle practice assessment, an initial picture of the students' skill level in playing the angklung before the initial intervention (Cycle I) in the learning process was obtained. This data is important as a baseline to determine the objective condition of students' abilities and as a basis for

designing improvement actions in the next cycle. A summary of the pre-cycle practice scores is presented in Table 1 below.

Table 2. Recapitulation of Pre-Cycle Practical Assessment Scores

No	Criteria	Number of Students	Percentage
1	Completed (≥ 75)	19	55.88%
2	Not completed (< 75)	15	44.12%
Total		34	100

Based on the recapitulation of practical achievement scores in the pre-cycle stage, it can be seen that out of 34 students, only 19 students (55.88%) achieved a score of ≥ 75 , while 15 students (44.12%) were still below the minimum passing grade. This percentage shows that the classical achievement level has not met the ideal standard, which is generally set at a minimum of 75% of students passing. This condition indicates that students' practical skills in playing the angklung are still not optimal and require more innovative and participatory learning interventions. This pre-cycle data is an important basis for designing corrective actions through the use of the Real Angklung application in the next cycle.

As a follow-up to the pre-cycle findings, in Cycle I, learning activities were carried out according to the plan that had been prepared. Based on the implementation of actions in Cycle I, data was obtained on the results of student practice assessments after the implementation of the designed learning strategy. This data aims to determine the level of achievement of students' skills in playing the angklung and to evaluate the effectiveness of the initial actions. A summary of the practice score completion in Cycle I is presented in the following table as a basis for reflection for improvement in the next cycle.

Table 3. Recapitulation of Cycle I Practice Score Completion

No	Criteria	Number of Students	Percentage
1	Completed (≥ 75)	23	67.65%
2	Not yet completed (< 75)	11	32.35%
Total		34	100

Based on the recapitulation of practice score completion in Cycle I, it is known that out of 34 students, 23 students (67.65%) have achieved a score of ≥ 75 , while 11 students (32.35%) are still below the minimum passing grade. These results show an increase in the level of mastery compared to the pre-cycle condition, although classically it has not fully reached the ideal mastery standard set. Substantively, these data indicate that the learning actions applied in Cycle I have begun to have a positive impact on improving students' practical skills in playing the angklung, but improvements and refinements to the learning strategy are still needed in the next cycle so that learning outcomes can be more optimal and evenly distributed.

As a follow-up to the reflection and improvements in Cycle I, the learning activities in Cycle II were carried out with refined strategies, increased intensity of assistance, and optimized use of the *Real Angklung* application in practical activities. The implementation of these activities aimed to improve students' skills more evenly and achieve classical learning completeness. The results of the practical assessment in Cycle II were then summarized to determine the level of

student skill achievement after the improvement actions were implemented, as presented in the following table.

Table 4. Recapitulation of Cycle II Practical Achievement

No	Criteria	Number of Students	Percentage
1	Completed (≥ 75)	30	88.24%
2	Not Completed (< 75)	4	11.76%
Total		34	100

Based on the recapitulation of mastery in Cycle II, it was found that out of 34 students, 30 students (88.24%) had achieved a score of ≥ 75 , while 4 students (11.76%) had not yet achieved the minimum passing grade. These results show a significant improvement compared to Cycle I. Classically, the completion rate in Cycle II has exceeded the set completion standard, so it can be said that the learning activities carried out have been optimal. Thus, the use of the *Real Angklung* application in Cultural Arts learning has proven to be able to improve students' practical skills more evenly.

To provide a clearer overview of the improvement in students' learning mastery, the data from the pre-cycle, Cycle I, and Cycle II are presented in Figure 5.

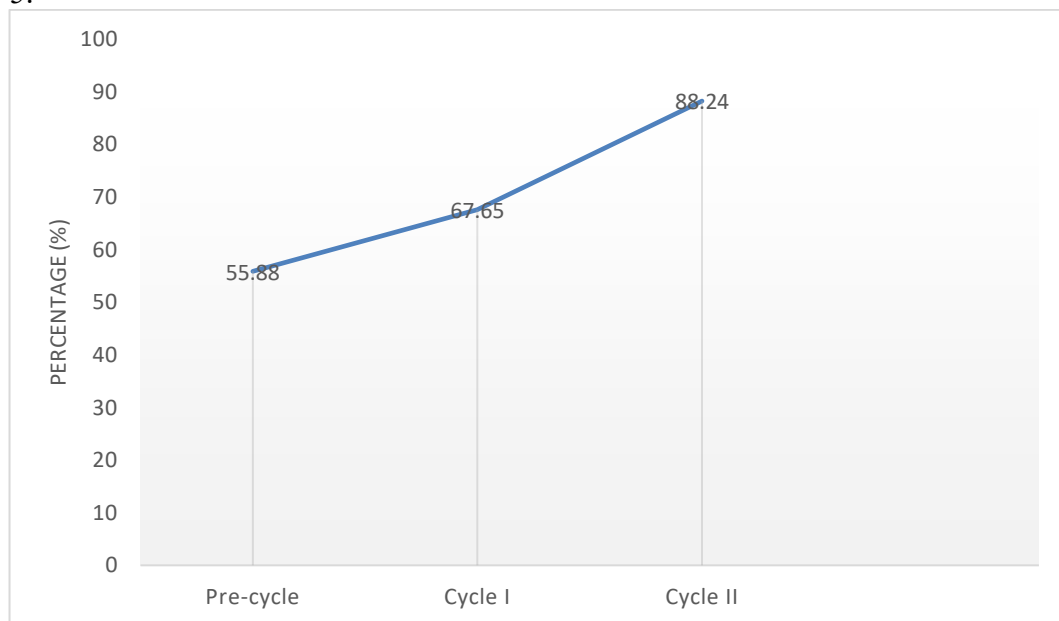


Figure 5. Improvement of Students' Learning Mastery from Pre-cycle to Cycle II

The figure shows a consistent increase in the percentage of students who achieved the minimum mastery criterion. In the pre-cycle stage, the level of mastery was 55.88%, which indicates that more than half of the students had not yet reached the expected standard. After the implementation of the initial actions in Cycle I, the percentage increased to 67.65%, showing a moderate improvement. Furthermore, in Cycle II, the percentage rose significantly to 88.24%, exceeding the predetermined success criteria. This trend indicates that the use of the *Real Angklung* application contributed positively to the gradual improvement of students' practical skills in a structured and continuous manner.

Discussion

The results of the study show a gradual increase in learning mastery from the pre-cycle to Cycle II. In the pre-cycle stage, the percentage of learning mastery only reached 55.88%. After the intervention in Cycle I, mastery increased to 67.65%, and in Cycle II, it increased significantly again to 88.24%. The increase of 32.36% from the pre-cycle to Cycle II shows that the use of the *Real Angklung* application has a real impact on students' practical skills. Interpretively, these data indicate that the use of application-based media can encourage students to be more active in the learning process, so that the learning outcomes obtained are more optimal.

This increase can be analyzed through indicators of students' active involvement in practicing playing the angklung through the application. In Cycle II, students did not only receive material passively, but directly practiced playing notes and rhythms using the application before practicing with real musical instruments. This condition shows that learning took place in a participatory and student-centered manner. From a social constructivist perspective, learning that involves direct activities allows students to build their knowledge through concrete experiences (Vygotsky, 1978). Thus, the increase in the percentage of mastery in Cycle II can be understood as a result of students' active involvement in the learning process.

In Cycle II, qualitative observations based on field notes indicated a significant improvement in student engagement and participation during the learning process. As highlighted in previous studies, the integration of digital technology in learning can enhance student engagement through interactive and student-centered activities (Alaoui et al., 2020). In this study, students were more enthusiastic in practicing angklung using the *Real Angklung* application and demonstrated increased confidence when performing both individually and in groups. Most students were actively involved in discussions, able to share roles within their groups, and provided feedback to their peers during practice sessions. In addition, several students were able to repeat musical patterns independently without direct teacher assistance, indicating a transition from guided to more autonomous learning. This finding is consistent with research showing that the integration of educational technology can significantly enhance student engagement and support more interactive and effective learning environments (Teng & Wang, 2021).

The aspect of *scaffolding* is also clearly seen in the comparison between Cycle I and Cycle II. In Cycle I, learning mastery was still at 67.65%, indicating that some students still needed further guidance. Through reflection, the teacher then provided more systematic demonstrations, intensive assistance, and a more structured division of roles within the group in Cycle II. As a result, mastery increased to 88.24%. This is in line with the concept of *scaffolding* in Vygotsky's theory, where gradual support from teachers helps students achieve a level of ability that they previously could not achieve independently (Maghfiroh & Muttaqin, 2025).

Furthermore, interaction and collaboration among students in group activities also contributed to improved learning outcomes. Group-based learning

allowed students to exchange information, provide feedback, and adjust the pace of the game to achieve cohesiveness. This type of social interaction is an important element in social constructivism, because the learning process is seen as a social activity that involves the negotiation of meaning between individuals (Vygotsky, 1978). Thus, the increase in the percentage of completion not only reflects individual success, but also the effectiveness of cooperation within the group.

The last indicator, namely the development of abilities within the *Zone of Proximal Development* (ZPD) framework, is reflected in the decrease in the number of students who did not complete the cycle from 15 in the pre-cycle to 4 in Cycle II. The decrease in the number of students who did not achieve the minimum competency standard indicates that the process of repeated practice and guidance provided successfully helped students exceed their initial abilities. In the context of ZPD, students who were initially at the potential ability stage can achieve actual ability through appropriate assistance and a supportive learning environment (Maghfiroh & Muttaqin, 2025).

However, despite the significant improvement in learning outcomes, there were still 4 students (11.76%) who had not achieved the minimum competency standard in Cycle II. This condition may be influenced by several factors, such as differences in individual learning abilities, varying levels of motivation, and limited adaptation to the use of application-based learning media. Some students may require more intensive guidance and a longer time to adjust to the integration of digital technology in the learning process. In addition, differences in prior knowledge and learning pace can also affect students' ability to achieve optimal performance. From a constructivist perspective, this indicates that not all students are able to reach the same level of development within the same time frame, as each individual progresses differently within their Zone of Proximal Development (ZPD). Therefore, more differentiated instructional strategies and personalized assistance are needed to support students who have not yet achieved learning completeness.

In addition to the constructivist perspective, the use of the Real Angklung application can also be examined through an educational technology lens using the SAMR model (Substitution, Augmentation, Modification, and Redefinition) (Sirotek et al., 2025). The implementation of this application in learning can be described as follows:

1. Substitution, where the application functions as a digital replacement for physical angklung instruments.
2. Augmentation, where the application provides additional features such as ease of access and opportunities for repeated practice without limitations of time and place.
3. Modification, where the learning process is transformed by allowing students to practice individually before engaging in collaborative group performances.
4. Redefinition, which refers to the potential use of the application to create new forms of learning activities that were previously not possible, although this level has not been fully achieved in this study.

Based on these indicators, the use of the Real Angklung application in this study primarily reached the modification level, as it not only replaced traditional instruments but also significantly transformed the learning process into a more

flexible, interactive, and student-centered activity. This transformation is also reflected in the significant increase in learning mastery from 55.88% in the pre-cycle to 88.24% in Cycle II, indicating that the integration of technology not only supported but enhanced the effectiveness of the learning process.

Despite these findings, this study has several limitations that need to be acknowledged. First, the research was conducted in only one class consisting of 34 students, which limits the generalizability of the findings to a broader population. Second, the results are closely related to the specific contextual conditions of the research setting, including the characteristics of the students, the learning environment, and the teacher's instructional approach, which may differ in other educational contexts. Third, as a Classroom Action Research (CAR), this study focuses on improving learning practices within a particular classroom rather than producing universally generalizable conclusions. Therefore, further studies involving larger sample sizes and more diverse educational settings are recommended to strengthen the external validity of the findings.

Thus, the results of this study show that the integration of the *Real Angklung* application in Cultural Arts learning is effective in improving students' practical skills through active engagement, *scaffolding*, collaboration, and development in the ZPD. These findings also reinforce the results of research by Rohmah et al. (2025), which shows that the use of digital applications in music arts learning can significantly improve the quality of student participation and learning outcomes. Thus, the use of application-based technology in traditional arts learning is not only relevant to the times but also empirically proven to support the improvement of students' practical skills.

CONCLUSION

Based on the research results, it can be concluded that the use of the *Real Angklung* application in Cultural Arts learning is effective in improving the skills of high school students. This is shown by an increase in the percentage of learning completeness from 55.88% in the pre-cycle to 67.65% in Cycle I, and a significant increase to 88.24% in Cycle II. This increase reflects that active student involvement, the application of *scaffolding* by teachers, collaborative interaction between students, and the process of repeated practice within the framework of *the Zone of Proximal Development* (ZPD) contributed positively to the gradual and structured development of students' angklung playing skills.

Based on the findings of this study, it is recommended that Cultural Arts teachers utilize the *Real Angklung* application as a supporting medium in traditional music practice learning to increase student engagement and learning outcomes. Teachers also need to apply *scaffolding* strategies consistently and optimize collaborative learning so that each student can develop according to their potential. Furthermore, future research can expand the subject and context of the study to test the effectiveness of similar applications at other levels or in other music arts subjects to obtain more comprehensive results.

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