

Development of Science e-Book Containing Gamelan's Local Wisdom Based on STEAM-POE to Facilitate Students' Love of Local Culture

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Abstract: Science learning is still not integrated with the surrounding environment so that students tend not to be able to recognize the local wisdom of their area. Even though science learning contains local wisdom, it can increase students' love of local culture, creating contextual and meaningful learning. To overcome this, research was carried out through the development of a science e-book containing gamelan's local wisdom based on STEAM-POE. This development research aims to (1) determine the validity of a science e-book containing gamelan's local wisdom based on STEAM-POE (2) find out student's love local culture. This study uses the Thiagarajan 4D development model (Four-D Model), which consists of four stages, namely the definition stage, the design stage, and the development stage. The dissemination stage was not carried out, this research was only limited to product feasibility testing. The research design used was the one-group posttest-only design. The sample in this study was class VIII E, totaling 32 people. The collection techniques used were questionnaires and documentation. The results of the material expert validity test showed that the science e-book containing gamelan's local wisdom based on STEAM-POE was declared very valid with an Aiken's V value of 0.992 and the validity of the teaching material expert showed that the science e-book containing gamelan's local wisdom based on STEAM-POE was declared very valid with Aiken's V score of 1.0. Students' love of local culture after using the science e-book containing local gamelan's local wisdom based on STEAM-POE shows a score of 3.266 in the very good category. Students' love of local culture also gets a variable score of 52.5 which is included in the high category.

Keywords: Development research; E-book IPA; POE; STEAM; Students' love of local culture

Introduction

The uniqueness of Indonesia's culture and nature is scattered in various regions as regional potential that can be developed in developing regions (Khaerani et al., 2020). Of course, each region has regional uniqueness, local wisdom, and culture (Khoiri et al., 2018). In the perspective of national education, the diversity of regional potentials is part of the considerations in planning educational policies and students must be able to learn from the surrounding environment, for example local wisdom found in their respective regions (Wilujeng et al., 2017).

The national education system requires curriculum formulation based on local excellence or local wisdom, as stated in article 36 of Law no. 20 of 2003 concerning the National Education System. However, currently many young people do not know the local wisdom of the area. Some of them are more likely to choose to look for work outside their area. This is a problem for the world of education in Indonesia, where science education is still not integrated with the surrounding environment so it tends not to be able to recognize local wisdom.

Learning based on local wisdom is well suited to support educational progress (Jufri et al., 2019). Learning based on local wisdom, especially in science

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lessons, can facilitate students' understanding because students are able to see for themselves based on their environment.

Learning based on local wisdom can also raise awareness in developing students' attitudes that regional potential, if properly utilized and preserved, can be very beneficial for the community to improve welfare (Deviana, 2018). However, Kurniawati's research (2017) shows that the fact that is happening now is that there is a decrease in students' interest in maximizing the local wisdom of their own region. In addition, students are also less interested in and less fond of local wisdom in their own area.

Local content as study material that forms an understanding of the potential in the area where they live is useful for providing attitudes, knowledge, and skills to students so that they know and become more familiar with their natural, social, and cultural environment (Permendikbud Number 81A, 2013). In fact, globalization and technology have significantly shifted the original local cultural values of Indonesia. In contrast to foreign cultural values which are developing rapidly in people's lives (Tresnawati, 2018). The community has the notion that learning science at school or on campus is not related to local culture in society, even farming culture. So that learning science is just a rote material that is never related to the real world. This is not in accordance with Permendikbud Number 57 of 2014 that every student is able to apply science wisely to maintain and maintain cultural preservation.

Learning by utilizing the school environment and local wisdom as learning resources provides opportunities for students to learn through direct experience and discovery of objects and phenomena that are appropriate to the learning material, and makes learning more interesting and fun (Lestari, 2019). In fact, the implementation of learning is still minimal in linking it with local wisdom (Fitriyah & Wardani, 2022). This is caused by several obstacles such as a lack of insight into local wisdom in their area, teachers do not understand how to integrate local wisdom into teaching materials, a large teaching load for teachers, student books that are too textual, and students' adaptation to learning, and facilities that have not adequate (Fitriyah & Wardani, 2022; Krissandi & Rusmawan, 2015).

The diversity of traditional arts in Indonesia shows that Indonesia is a nation rich in local wisdom values in the arts (Kristanto, 2020). Local wisdom as a form of culture is believed to have true value and bring goodness to the local area, its existence must be maintained. Local wisdom consists of 2 words, namely wisdom and local. Local means local and wisdom equals wisdom. In other words, local wisdom can be understood as ideas, values, local views that are wise,

full of wisdom, of good value, which are embedded and followed by members of the community. One example of the form of local wisdom that Indonesia has is Javanese gamelan art or music.

Gamelan is a Javanese musical game whose parts are percussion instruments made of bronze or "gangsa" (Kristanto, 2020). Gangsa comes from the word Gasa which means the ratio between tin: copper is 3 (three): 10 (*sedasa*). But there are also gamelan made of iron. The players are called "pradangga", the singers are called "waranggana". Waranggana comes from the word wara which means singer, and anggana means single. Waranggana means solo singer.

Javanese gamelan consists of the following instruments: drums, bonang, successor bonang, demung, saron, peking, kenong and kethuk, slenthem, gender, gong, xylophone, fiddle, siter, and flute (Kristanto, 2020). Gamelan as a form of local wisdom in Indonesia has an important role in the dynamics of the times because every local wisdom through traditional art in Indonesia has values that can influence a person's behavior in society, so that local wisdom needs to be preserved (conservation).

Local wisdom can be combined with technological developments to create innovative learning models and media that can improve students' thinking skills, literacy skills, and students' behavior in accordance with local wisdom values (Toharudin, 2019). However, currently the textbooks used by teachers in learning have not paid attention to the conditions of students and their environment because in general teachers only use textbooks published by the government as a guide in learning (Rohmah, 2017). Textbooks issued by the government are very general in nature because basically these books are designed for use by schools throughout Indonesia, so the content is not specific to one particular area.

The results of Arifin and Lestari's research (2020) in April 2020 in learning microbiology found the fact that students feel bored when they see teaching materials in the form of books. The first fact is that students feel bored when they see teaching materials in the form of books, the second fact is that students feel they lack microbiological knowledge. Therefore, to meet the needs of students in the learning process, it is necessary to apply science teaching materials based on flipbook makers. The intended teaching material is a flipbook maker-based science book that can be loaded on mobile phones, laptops, and computers.

Teaching materials that are integrated with technology are one of the main learning resources that support the learning process (Sari & Atmojo, 2021). The lack of innovation in the use of technology-integrated material hinders the optimization of learning outcomes

and hinders the acquisition of competence by students. Meeting the demands of 21st century education requires the adoption of digital learning, which uses technology to convey learning to increase the effectiveness of students' knowledge and skills. The educational process in the rapidly developing era of information and communication technology as it is today makes it possible to optimize science learning in the form of developing technology-based learning such as flipbooks (Riyanto et al., 2020; Rusli & Antonius, 2019).

With the development of technology, the flipbook concept has been digitally transformed into a three-dimensional e-book that can be opened to view pages like reading a book on a screen (Sari & Atmojo, 2021). E-books have hypermedia properties with animation, music and video features that make them more engaging than printed books. Digital flipbooks help address distance learning challenges and make them accessible anytime, anywhere. Flipbook-based digital books with the help of websites can improve students' logical thinking skills in science learning. One of the innovations in delivering teaching and learning materials is the use of interactive digital books called flipbooks, one of the science learning solutions (Suparno, 2017).

E-books containing local wisdom in science lessons can optimize learning. The development of flipbook-based learning modules can increase student interest in learning because of the attractive appearance of teaching materials (Kurniawati, 2017). Presentation of teaching materials is not only in the form of writing, but also presented pictures and videos that can facilitate student learning. Teaching materials containing local wisdom also make it easier for students to understand the material because the material is commonly found in the environment around students.

The development of the times requires every individual to have good abilities in various fields, especially in creative and innovative thinking. In accordance with the opinion of Anggraini et al. (2021), creativity and innovation are skills that are needed in the 21st century. This is because human development is increasingly dependent on innovation and invention. There is a learning approach that can meet the demands of 21st century abilities, namely the science, technology, engineering, art, and mathematics approaches that link the fields of science (science), technology, engineering, art, and mathematics, so that students are given a holistic understanding of the interrelationships of the fields of science through 21st century learning experiences (Haifaturrahmah & Hidayatullah, 2020).

The involvement of students in STEAM subjects aims to trigger interest and love for science and art in children from an early age (Zubaidah, 2019). STEAM

involves a creative process and no one uses just one method for the process of discovery and investigation. Relevant learning in preparing students to become innovators in an ever-evolving world is very important, not only for the future of today's students but for the future of the nation.

Analysis of several studies shows that learning Science, Technology, Engineering, Art, and Mathematics (STEAM) is the use of science to hone cognitive, manipulative, designing, utilizing technology, and knowledge application skills (Capraro et al., 2013).

Science learning is described as a system that is interconnected with one another. The science learning process consists of three stages, namely planning the learning process, implementing the learning process, and evaluating the learning process. The stages in the science learning process must be carried out systematically so that the objectives of learning science can be achieved. Science can train students to think critically. One model that is effectively used in the learning process is the POE (Predict Observe Explain) learning model (Rosidah et al., 2021).

The POE (Predict Observe Explain) learning model is a learning model that involves active students in the learning process. The POE model consists of 3 stages, namely "Prediction, observation, and explaining." The three stages must be carried out systematically. With students carrying out these three stages, students will be active in the learning process so that they will gain direct experience in the learning process. The POE model trains students to actively seek knowledge first according to their way of thinking by using existing sources (Rosidah et al., 2021).

Cultural products have become a state identity capable of representing Indonesian traditions and have been recognized as a country with a wealth and diversity of cultural products, each of which has a philosophical meaning (Nurcahyanti et al., 2020). If the entry of unfiltered foreign culture is carried out continuously, it is possible that Indonesian culture will become extinct. The shock of globalization has given rise to various kinds of crises that have damaged the nation's image and self-confidence. From a social perspective, if students are used to not caring about their surroundings from an early age, it is feared that it will impact their lives into adulthood (Rachmadyanti, 2017). Even though local wisdom is an entity that really determines human dignity in its community (Suastra & Yasmini, 2013). Character building is very important. Indonesia wants to build Indonesian people who have morals, are virtuous, love culture, and have good behavior. This nation also wants to have a superior and noble civilization. It is time to rebuild awareness of the

importance of developing the character of loving culture for Indonesian people through quality education.

Indonesian students and citizens who have full rights to culture should preserve the nation's culture instead of putting it aside for various reasons such as fear of being called outdated (Sari & Atmojo, 2021). Efforts to realize quality learning need to be designed by optimizing the potential and initial knowledge possessed by students in the hope that it can help construct their knowledge and make them active and independent students. Meaningful learning must be designed in such a way as to be able to preserve the culture of a learning that emphasizes culture.

Natural science learning with local wisdom can increase love of local culture, create contextual, and meaningful learning (Sari & Atmojo, 2021). Science learning containing gamelan's local wisdom that links learning with community culture will increase students' appreciation of the community's culture. However, in the current situation, we rarely meet young people or especially students who want to pay attention to existing traditional culture.

Given this, the solution that can be taken is to develop an science e-book containing gamelan's local wisdom based on STEAM-POE to facilitate students' love of local culture.

Based on the background that has been described, the purpose of this research is to analyze students' love of local culture through the implementation of science e-books containing gamelan's local wisdom based on STEAM-POE class VIII E on sound material.

Method

This type of research is research development or Research and Development (R&D). The development model used is the R&D model according to Thiagarajan (1974).

This research was conducted on March 20 2023 for the 2022/2023 school year. Science e-book containing gamelan's local wisdom based on STEAM-POE as a result of this development research being tested at SMP Negeri 6 Yogyakarta which is located at Jl. R.W. Monginsidi No. 1, Cokrodiningratan, Kec. Jetis, City of Yogyakarta, Special Region of Yogyakarta 55233.

The subjects in this study were 32 students in class VIII E of SMP Negeri 6 Yogyakarta to carry out the learning process with the science e-book containing gamelan's local wisdom based on STEAM-POE which was developed and to test the Science e-book containing gamelan's local wisdom based on STEAM-POE to improve students' love of local culture.

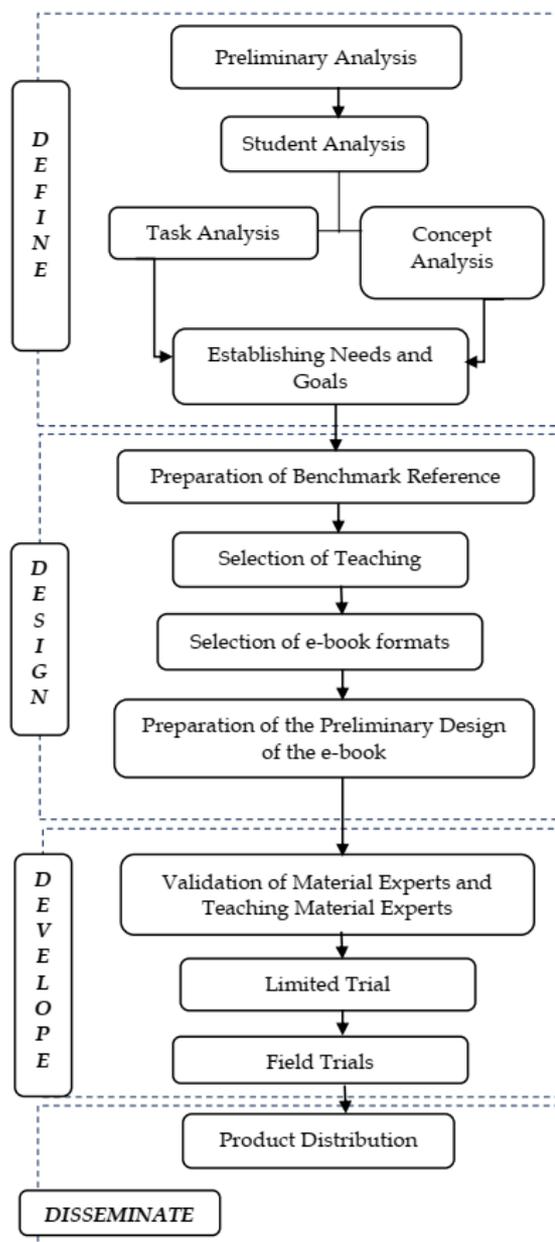


Figure 1. Research steps to develop a science e-book

The research procedure consisted of four stages, namely define, design, develop and disseminate. The define stage includes the initial stage, students, assignments, concepts, and formulation of learning objectives. The design stage includes the preparation of instruments, media selection, format selection and initial product design. The develop stage includes expert assessment and development trials. Then at the stage of disseminate (dissemination) is only done in a limited way.

The research design used was the one-group posttest-only design. This experimental design only involved one group that was given the treatment. The research subjects in this group were only given a post-test and were not given a pre-test (Saifuddin, 2020).

The validation data includes validation questionnaire data for material experts, teaching materials experts, and practicality questionnaire data for science e-book containing gamelan's local wisdom based on STEAM-POE. Data on students' love of local culture were obtained using a questionnaire. The research instrument includes a questionnaire sheet.

Expert test data analysis is carried out to assess a teaching material that has been developed is appropriate or not as a teaching material in learning. Researchers will make revisions if the experts give answers that do not agree. Product testing is carried out based on the opinion of experts in certain fields according to the expertise required on the instrument. Experts will provide a decision in the form of an application that can be used without repair or repair. The formula used for validation is the Aiken's V index. Aiken (1985) formulates the Aiken's V formula, which calculates the coefficient of content validity based on the evaluation results of the item by a group of n-person experts and the extent to which the item represents the construct being measured.

The feasibility of science e-book containing gamelan's local wisdom based on STEAM-POE was analyzed using the Aiken's V index. The implementation of learning using the STEAM model POE approach was analyzed using the Interjudge Agreement (IJA) equation (Pee, 2002). The effectiveness of science e-book containing local gamelan's wisdom based on STEAM-POE to increase students' love of local culture, was analyzed by converting scores using a scale of 4 (Mardapi, 2008).

Result and Discussion

The results of this study are science e-book containing gamelan's local wisdom based on STEAM-POE to increase students' love of local culture. The development of a science e-book containing gamelan's local wisdom based on STEAM-POE aims to produce products that assist the learning process. The science e-book developed must have a level of validity and effectiveness that meets the criteria.

The display design for the cover of the science e-book containing gamelan's local wisdom based on STEAM-POE using Javanese gamelan images as a description of the contents of the e-book. There are two covers on an e-book, namely the front cover and the back cover. The cover color is designed in full color with a brownish yellow base color for the front cover and back cover.

The design of the contents of the science e-book containing gamelan's local wisdom based on STEAM-POE with a font size of 18 pt with the theme of writing Montserrat Semi-Bold, margin size with arrangement

(width 1410 pixels and height 2250 pixels). In the science e-book containing gamelan's local wisdom based on STEAM-POE there are several pictures such as gamelan, piano, clappers, anatomy of the human ear, structure and function of parts of the ear, and several applications of vibrations and waves in technology.

The science e-book containing gamelan's local wisdom based on STEAM-POE which is arranged to contain physics material, namely sound material. This science e-book explains the relation of gamelan as a sound source that can produce sound when each blade is tapped. When the gamelan is tapped, it will produce various sounds or notes that are different from the tone notes *do re mi fa sol la si do*. This is because the size of the material used is different so it will produce a different sound. The smaller the size, the sound produced will be louder.

As with a tuning fork, the loud sound produced when vibrated is different for each of the frequencies. The greater the frequency of sound waves, the more density and stretching patterns. So the sound will sound louder (higher pitch). A tuning fork is a tool that is shaped like a fork with two teeth and resonates at a certain frequency when it is struck on an object. If two tuning forks have the same frequency, one of them is vibrated (sounded) and then brought closer to the other tuning fork, the other tuning fork will also sound. However, such an event does not occur if the frequencies of the two tuning forks are not the same. The occurrence of two tuning forks shows that a sound (vibration) can vibrate another object. This vibrating event is called resonance. Resonance events can only occur in two objects that have the same natural frequency.



Figure 2. Initial appearance of the science e-book containing gamelan's local wisdom based on STEAM-POE

We can also make musical instruments from glass cups filled with water. When a glass filled with water is tapped with a spoon, it will vibrate in the glass. The

vibrations will produce sound waves that are delivered by the water. The more water that is poured into the glass, the less vibration is generated, resulting in a low pitch of sound.



Figure 3. Display of the contents of the science e-book containing gamelan’s local wisdom based on STEAM-POE



Figure 4. Display of student activity sheets in the science e-book containing gamelan’s local wisdom based on STEAM-POE



Figure 5. Display of the back cover of the science e-book containing gamelan’s local wisdom based on STEAM-POE

The feasibility of the science e-book containing gamelan’s local wisdom based on STEAM-POE is known from the assessment of expert validators. The feasibility of the science e-book containing gamelan’s local wisdom based on STEAM-POE was obtained by the Aiken's V index of assessment between three assessors. The formula used for validation is the Aiken's V index. Aiken (1985) formulates the Aiken's V formula, which calculates the coefficient of content validity based on the evaluation results of the item by a group of n-person experts and the extent to which the item represents the construct being measured. The expert test data analysis was conducted using the Aiken-V formula as explained in equation (1) (Retnawati, 2016).

$$V = \frac{\sum s}{n(c-1)} \tag{1}$$

Information: V = Index of respondents' agreement regarding the validity of the item, s = the score set by the respondent minus the lowest score (s = r-1), r = choice category score on the respondent, n = number of respondents, c = number of choice categories filled by respondents.

Table 1. Expert Test Validity Criteria (Retnawati, 2016)

Average Score	Validity Level
0.8 < V ≤ 1.0	Very Valid
0.4 < V ≤ 0.8	Valid Enough
0 < V ≤ 0.4	Invalid

The validation of science e-book containing gamelan’s local wisdom based on STEAM-POE was obtained from validation by the validator. The science e-book material validator was carried out by two experts. Based on the results of the material assessment analysis in the Science e-book, the first validator gave an Aiken's V score of 0.984, which was included in the very valid category. The second validator gives an Aiken's V value of 1.0 which is included in the very valid category. Thus overall it is very valid with an Aiken's V value of 0.992.

Table 2. Validator Assessment Science E-book Material Contains Gamelan’s Local Wisdom Based on STEAM-POE

Validator	Aiken’s V	Category
Validator 1	0.984	Very Valid
Validator 2	1.0	Very Valid
Average	0.992	Very Valid

Table 3. Aiken's V Index on each Aspect

Aspect	Aiken’s V	Category
Content	1.0	Very Valid
Presentation	0.968	Very Valid
Language	1.0	Very Valid
Characteristics	1.0	Very Valid
Average	0.992	Very Valid

Based on table 2, the average result of the material expert validator's assessment of the science e-book containing gamelan's local wisdom based on STEAM-POE which was developed was 0.992 which is in the very valid category. These results concluded that the science e-book contains gamelan's local wisdom based on STEAM-POE can be used with a little revision.

As for some of the notes given by the validator include: there is no answer key to the evaluation questions and the learning outcomes have not been written down.

The validation of science e-book teaching materials containing gamelan's local wisdom based on STEAM-POE was obtained from validation by the validator. The science e-book material validator was carried out by one expert. Based on the results of the analysis of the assessment of teaching materials in the Science e-book, the validator gave an Aiken's V score of 1.0 which is included in the very valid category. Where the Aiken's V value is 1.0 on the graphical and characteristic aspects.

A product is said to be valid if it includes several components, namely the content eligibility component includes the suitability of SK with KD, needs, substance truth, benefits, moral values, and social values. Components of presentation, including clarity of goals to be achieved, order of presentation, provision of motivation, attractiveness, interaction (stimulus and response) and completeness of information. Linguistic components, including limitations, clarity of information, conformity with Indonesian language rules, effective and efficient use of language, then all of these components will be assessed by the validator on the validation sheet to determine the level of product validity based on validity criteria (Desmiwati, 2017).

Data on love of local culture from student questionnaires were analyzed using descriptive statistics (percentage). The percentage calculation for each indicator is calculated by dividing the total score obtained by the maximum score. Obtain the average score of each component of the assessment aspect by using the equation (2):

$$\bar{x} = \frac{\sum X}{n} \tag{2}$$

Information: \bar{x} = average score, $\sum X$ = total score of each component, N = number of validators/assessors.

Furthermore, all the data that has been obtained on each assessment item is summed up in its entirety so that it is referred to as the actual score (X). The actual score which is quantitative in nature is converted into a qualitative value based on the conversion of the score into a scale of four to find out the category of attitude of love for local culture of students after participating in

learning with the science e-book containing gamelan's local wisdom based on STEAM-POE which was developed. The reference for changing the score to a scale of four according to Mardapi (2008) can be seen in Table 4.

Table 4. Actual Score Conversion Into Four Scale Value

Interval	Score	Criteria
$X > (Mi + 1.5 \times SDi)$	A	Very good
$(Mi + 1.5 \times SDi) > X \geq Mi$	B	Good
$Mi > X \geq (Mi - 1.5 \times SDi)$	C	Not good
$X < (Mi - 1.5 \times SDi)$	D	Very less good

Information: X = Respondent score, Mi =Average/ideal mean, SDi = Ideal Standard Deviation, $Mi = \frac{1}{2} (X_{max} + X_{min})$, $SDi = \frac{1}{6} (X_{max} - X_{min})$.

Based on the four scale assessment criteria, it can be interpreted as the scale 4 assessment criteria in Table 5.

Table 5. Interpretation of Ideal Assessment Criteria with a Scale of 4 (Mardapi, 2008)

Quantitative Score Range	Category
$X > 3.25$	Very good
$3.25 > X \geq 2.5$	Good
$2.5 > X \geq 1.75$	Not good
$X < 1.75$	Very Less Good

Table 6. Questionnaire Results of Attitudes of Loving Local Culture of Students for Each Indicator

Indicator	Score	Category
Interest	3.304	Very good
Faithfulness	3.052	Good
Concern	3.406	Very good
Award	3.304	Very good
Average	3.266	Very good

Based on table 6, it can be concluded that the category of students' love of local culture obtained from the results of the students' questionnaire was very good towards the science e-book containing gamelan's local wisdom based on STEAM-POE which was developed and students interested in participating in learning activities with the help of science e-book filled with gamelan's local wisdom based on STEAM-POE. Thus, students' love of local culture with science e-books containing gamelan's local wisdom based on STEAM-POE can be said to be achieved.

The attitude of love for local culture on the interest indicator gets a score of 3.304 which is included in the very good category. That means, students know and love gamelan as one of the local wisdoms. In addition, students also appreciate traditional regional musical instruments as part of regional cultural diversity, one of which is gamelan. Students can also link the local

wisdom of gamelan with science learning, especially in the "Sound" material.

The attitude of love for local culture on the loyalty indicator gets a score of 3.052 which is included in the good category. That means, students can maintain and perpetuate gamelan as one of the local wisdoms. Students are also able to prioritize local regional culture rather than foreign culture in everyday life. Students also have insight into local culture, especially related to local gamelan wisdom.

The attitude of love for local culture in the indicator of concern gets a score of 3.406 which is included in the very good category. That means, students have concern for the development of gamelan as a traditional musical instrument.

The attitude of love for local culture in the appreciation indicator gets a score of 3.304 which is included in the very good category. Students appreciate the diversity of local culture, know the advantages of gamelan as one of the local wisdoms, and in integrating the local wisdom of gamelan development as a traditional musical instrument with science learning, especially in the material "Sound".

Students' love of local culture is classified into four criteria, namely high, high enough, low enough, and low (Azwar, 2012). Determination of criteria is arranged using the groupings presented in Table 7.

Table 7. Variable Score Criteria (Azwar, 2012)

Score Range	Category
$X > \mu + 1 \sigma$	High
$\mu < X \leq \mu + 1 \sigma$	High enough
$\mu - 1 \sigma < X \leq \mu$	Low enough
$X \leq \mu - 1 \sigma$	Low

Table 8. Interpretation of Variable Score Criteria

Score Range	Category
$X > 45$	High
$37.5 < X \leq 45$	High enough
$30 < X \leq 37.5$	Low enough
$X \leq 30$	Low

The total score obtained is 52.5. It can be concluded that the students' love of local culture obtained from the results of the students' questionnaire was high towards the science e-book containing gamelan's local wisdom based on STEAM-POE which was developed and students interested in participating in learning activities with the help of the science e-book containing gamelan's local wisdom STEAM-POE based. Thus, the achievement of students' love of local culture facilitated by the science e-book containing gamelan's local wisdom based on STEAM-POE can be said to be achieved.

Conclusion

The science e-book contains gamelan's local wisdom based on STEAM-POE on sound material that developed, which has been validated by material experts and teaching materials experts. The Aiken's V value obtained from material experts is 0.992 and is included in the very valid category. Then, the Aiken's V score obtained from the teaching materials expert is 1.0 and is included in the very valid category. Students' love of local culture after using the science e-book containing gamelan's local wisdom based on STEAM-POE shows a score of 3.266 in the very good category. Students' love of the local culture also gets a variable score of 52.5 which is included in the high category.

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Author Contributions

The author of this article has a significant contribution to this research. First, the authors conducted in-depth research to collect the necessary data and information. The author also played a role in designing and making the instruments used in this study, thereby ensuring the accuracy and validity of the data obtained. In addition, the author also plays a role in making teaching materials in the form of science e-books which contain local gamelan wisdom, using the STEAM-POE approach. This teaching material provides students with a deeper understanding of the relationship between science, technology, art, mathematics, and local gamelan wisdom. Lastly, the author is also a modeling teacher in the research process, providing guidance and direction to students in carrying out experiments and interpreting data. The author's extensive contributions were instrumental in the success of this study.

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Conflicts of Interest

Conflicts of interest may arise between researchers and the institutions in which they work. For example, if the researcher has an academic obligation or pressure to produce many or prestigious publications, this can influence the selection of research subjects or the interpretation of data to achieve the desired results. Such conflicts can compromise the integrity of research and can negatively impact the reliability and validity of findings reported in journals.

References

- Anggraini, C. E., & Nurita, T. (2021). Analisis buku ajar SMP terkait komponen STEM (Science, Technology, Engineering, Mathematics) pada materi tekanan zat. *Pensa E-Jurnal: Pendidikan Sains*, 9(3), 282–288. Retrieved from <https://ejournal.unesa.ac.id/index.php/pensa>
- Arifin, A. S., & Lestari, E. S. (2020). Analisis kebutuhan pengembangan bahan ajar mikrobiologi berbasis flipbook maker di IKIP Budi Utomo Malang 2020. *Prosiding Seminar Nasional IKIP Budi Utomo*, 709–716. <https://doi.org/10.33503/prosiding.v1i01.972>
- Azwar. (2012). *Reliabilitas dan Validitas*. Pustaka Pelajar.
- Capraro, R., Capraro, M., & Morgan, J. R. (2013). *STEM Project-Based Learning*. Rotterdam.
- Desmiwati, R., & Y. (2017). Validitas lkpD fisika SMA menggunakan model problem based learning berbasis teknologi digital. *Jurnal Eksakta Pendidikan (JEP)*, 1(1). <https://doi.org/10.24036/jep/vol1-iss1/31>
- Deviana, T. (2018). Analisis kebutuhan pengembangan modul pembelajaran berbasis kearifan lokal kabupaten tulungagung untuk kelas V SD tema bangga sebagai bangsa Indonesia. *Jurnal Pemikiran Dan Pengembangan SD*, 6(1), 47–56. <https://doi.org/10.22219/jp2sd.v6i1.5902>
- Fitriyah, C. Z., & Wardani, R. P. (2022). Analisis kebutuhan pengembangan LKPD berbasis kearifan lokal daerah Banyuwangi di Sekolah Dasar. *Jurnal Pemikiran Dan Pengembangan Sekolah Dasar*, 10(1), 62–73. <https://doi.org/10.22219/jp2sd.v10i1.20396>
- Haifaturrahmah, & Hidayatullah, R. (2020). Pengembangan lembar kerja siswa berbasis STEAM untuk siswa sekolah dasar. *Jurnal Kependidikan: Jurnal Hasil Penelitian Dan Kajian Kepustakaan Di Bidang Pendidikan, Pengajaran Dan Pembelajaran*, 6(2), 310. <https://doi.org/10.33394/jk.v6i2.2604>
- Jufrida, J., Basuki, F. R., & Pratiwi, D. R. (2019). The Potential of Local Wisdom on Traditional Fishing (Tangkal) Gear in Lake Sipin Jambi City as a Science Learning Source. *Scientiae Educatia*, 7(2), 146. <https://doi.org/10.24235/sc.educatia.v7i2.2858>
- Khaerani, S. H., Utami, S. D., & Mursali, S. (2020). Pengembangan perangkat pembelajaran IPA berbasis kearifan lokal untuk meningkatkan hasil belajar kognitif siswa. *Journal of Banua Science Education E*, 1(1). <https://doi.org/10.20527/jbse.v1i1.2>
- Khoiri, A., Syifa, A., & Mubin, N. (2018). Potential local physics based learning of Jepara district to improve science process skills and students entrepreneurship. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, 8(1). <https://doi.org/10.30998/formatif.v8i1.2365>
- Krissandi, & Rusmawan. (2015). Kendala guru sekolah dasar dalam implementasi kurikulum 2013. *Jurnal Cakrawala Pendidikan*, 3(3). Retrieved from <https://core.ac.uk/download/pdf/191021332.pdf>
- Kristanto, A. (2020). Urgensi kearifan lokal melalui musik gamelan dalam konteks pendidikan seni di era 4.0. *Musikolastika: Jurnal Pertunjukan & Pendidikan Musik*, 2(1), 51–58. <https://doi.org/10.7592/musikolastika.v2i1.37>
- Kurniawati, A. P. (2017). Keefektifan perangkat pembelajaran berbasis domain IPA terintegrasi potensi lokal untuk meningkatkan keterampilan proses IPA dan sikap ilmiah peserta didik. Pascasarjana UNY.
- Lestari, W. P. (2019). Studi Pendahuluan: Pembelajaran Berbasis Local Wisdom disertai Strategi Integrated Science untuk Melatihkan Keterampilan Berpikir Kritis IPA Siswa SMP. *ScienceEdu: Jurnal Pendidikan IPA*, 1(1), 15–23. <https://doi.org/10.19184/se.v1i1.9488>
- Mardapi, D. (2008). *Teknik Penyusunan Instrumen Tes dan Non Tes*. Mitra Cendikia.
- Nurchayanti, D., Sachari, A., & Destiarmand, A. H. (2020). Peran kearifan lokal masyarakat jawa untuk melestarikan batik tradisi di Girilayu, Karanganyar, Indonesia. *Mudra Jurnal Seni Budaya*, 35(2), 145–153. <https://doi.org/10.31091/mudra.v35i2.816>
- Permendikbud Nomor 81A. (2013). *Peraturan Menteri*

- Pendidikan dan Kebudayaan Republik Indonesia*. Retrieved from <https://luk.staff.ugm.ac.id/atur/bsnp/Permendikbud81A-2013ImplementasiK13Lengkap.pdf>
- Rachmadyanti, P. (2017). Penguatan pendidikan karakter bagi siswa sekolah dasar melalui kearifan lokal. *Jurnal Pendidikan Sekolah Dasar (JPSD)*, 3(2), 210–214. Retrieved from <https://jurnal.untirta.ac.id/index.php/jpsd/article/view/2140/2703>
- Retnawati, H. (2016). *Analisis kuantitatif instrumen penelitian*. Parama Publishing.
- Riyanto, R., Amin, M., Suwono, H., & Lestari, U. (2020). The new face of digital books in genetic learning: a preliminary development study for students' critical thinking. *International Journal Of Emerging Technologies In Learning (IJET)*, 5(10), 175–180. <https://doi.org/10.3991/ijet.v15i10.14321>
- Rohmah, D. F., H. & S. (2017). Pengembangan buku ajar IPS SD berbasis kontekstual. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, 2(5), 719–723. Retrieved from <http://journal.um.ac.id/index.php/jptpp/article/view/9200>
- Rosidah, A., Puspitasari, W. D., & Dewi, A. F. (2021, September). Pentingnya model pembelajaran POE (predict, observe, explain) dalam pembelajaran ipa. In *Prosiding Seminar Nasional Pendidikan* (Vol. 3, pp. 166-169). Retrieved from <https://prosiding.unma.ac.id/index.php/semnas/kip/article/view/579>
- Rusli, M., & Antonius, L. (2019). Meningkatkan kognitif siswa SMAN I Jambi melalui modul berbasis e-book kvisoft flipbook maker. *Jurnal Sistem Komputer dan Informatika (JSON)*. <http://dx.doi.org/10.30865/json.v1i1.1397>
- Saifuddin, A. (2020). Apakah desain eksperimen satu kelompok layak digunakan? *Literasi: Jurnal Kajian Keislaman Multi-Perspektif*, 1(1), 1–22. <https://doi.org/10.22515/literasi.v1i1.3255>
- Sari, F. F. K., & Atmojo, I. R. W. (2021). Analisis kebutuhan bahan ajar digital berbasis flipbook untuk memberdayakan keterampilan abad 21 peserta didik pada pembelajaran IPA sekolah dasar. *Jurnal Basicedu*, 5(6), 6079–6085. <https://doi.org/10.31004/basicedu.v5i6.1715>
- Suastra, W. (2013). Model pembelajaran fisika untuk mengembangkan kreativitas berpikir dan karakter bangsa berbasis kearifan lokal Bali. *JPI (Jurnal Pendidikan Indonesia)*, 2(2). Retrieved from <https://ejournal.undiksha.ac.id/index.php/JPI/article/view/2166/1882>
- Suparno. (2017). Development of ebook elektronik model to increase critical thinking of senior high school students. *Dinamika Pendidikan*, 12(2), 198–200. <https://doi.org/10.15294/dp.v12i2.13567>
- Thiagarajan, S., Semmel, D. S., & Semmel, M. L. (1974). *Instructional Development for Training Trachers of Exceptional Children*. Bloomington.
- Toharudin, U., & Kurniawan, I. S. (2019, February). Learning models based Sundanese local wisdom: Is it effective to improve student's learning outcomes? In *Journal of Physics: Conference Series* (Vol. 1157, No. 2, p. 022069). IOP Publishing. <https://doi.org/10.1088/1742-6596/1157/2/022069>
- Tresnawati, N. (2018). Pembelajaran sains berbasis kearifan lokal dalam upaya peningkatan konservasi lingkungan pada mahasiswa PGSD di batik tulis Ciwaringin Cirebon. *Al Ibtida: Jurnal Pendidikan Guru MI*, 5(1), 69–82. <https://doi.org/10.24235/al.ibtida.snj.v5i1.2603>
- Wilujeng, I., P., Z. K., & Suryadarma, I. (2017). Pengembangan perangkat pembelajaran IPA berbasis potensi lokal untuk meningkatkan capaian nature of science (NOS). Retrieved from <https://core.ac.uk/download/pdf/83146473.pdf>
- Zubaidah, S. (2019). *STEAM (Science, Technology, Engineering, Arts, and Mathematics): Pembelajaran untuk memberdayakan keterampilan abad ke-21*. Retrieved from <https://www.researchgate.net/publication/336065211>