

Development of a Minangkabau Culture-based e-LKPD to Enhance Cultural and Civic Literacy: An ADDIE Approach in Social Science Study at Elementary School

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Abstract

The purpose of this study was to develop teaching materials in the form of e-LKPD for Natural and Social Science (IPAS) subjects containing Minangkabau culture through project-based learning for cultural and citizenship literacy that is valid, practical and effective. The research was conducted at Khaira Ummah Islamic Elementary School, Padang. The subjects in this study were 3 validators, one teacher and 28 fourth-grade students. This study applied research and development with an ADDIE model. The instruments used were validity and practicality questionnaires and effectiveness test questions. The results of the study showed that the validity was very high with a score of 92%, with a material feasibility percentage of 93%, language feasibility of 91% and media feasibility of 92%. The product practicality test was 84% in the very practical category. Meanwhile, the effectiveness test was in the effective state with an average score of 70.17% medium category. In educational practice, the developed e-LKPD can serve as a model for integrating local culture into learning materials to support the achievement of SDG 4 (Quality Education) and to promote character education based on cultural values. Teachers can utilize the e-LKPD as a learning innovation that bridges local cultural wisdom with modern learning approaches, particularly project-based learning.

Keywords: E-LKPD, Minangkabau Culture, PjBL, Cultural and Civic Literacy

Abstrak

Tujuan penelitian ini adalah untuk mengembangkan bahan ajar berupa e-LKPD untuk mata pelajaran Ilmu Pengetahuan Alam dan Sosial (IPAS) berbasis budaya Minangkabau melalui pembelajaran berbasis proyek untuk literasi budaya dan kewarganegaraan yang valid, praktis, dan efektif. Penelitian ini dilakukan di Sekolah Dasar Islam Khaira Ummah, Padang. Subjek penelitian ini adalah 3 validator, satu guru, dan 28 siswa kelas empat. Metode penelitian ini yaitu penelitian dan pengembangan dengan model ADDIE. Instrumen yang digunakan adalah kuesioner validitas dan kepraktisan serta pertanyaan uji efektivitas. Hasil penelitian menunjukkan bahwa validitas sangat tinggi dengan skor 92%, dengan persentase kelayakan materi 93%, kelayakan bahasa 91%, dan kelayakan media 92%. Uji kepraktisan produk adalah 84% dalam kategori sangat praktis. Sementara itu, uji efektivitas berada dalam kondisi efektif dengan skor rata-rata 70,17% kategori sedang. Dalam praktik pendidikan, e-LKPD yang dikembangkan dapat berfungsi sebagai model untuk mengintegrasikan budaya lokal ke dalam materi pembelajaran guna mendukung pencapaian SDG 4 (Pendidikan Berkualitas) dan mempromosikan pendidikan karakter berdasarkan nilai-nilai

budaya. Guru dapat memanfaatkan e-LKPD sebagai inovasi pembelajaran yang menjembatani kearifan budaya lokal dengan pendekatan pembelajaran modern, khususnya pembelajaran berbasis proyek.

Kata Kunci : *E-LKPD, Budaya Minangkabau, PjBL, Literasi Budaya dan Kewarganegaraan*

INTRODUCTION

Literacy is one of the aspects that is booming in the world of education today. Literacy (Indrayati, 2023) is the ability to identify, understand, interpret, create, communicate, calculate and use written materials related to various contexts (Cahyani, Hutagalung and Harahap, 2024). Literacy or quality of literacy within a person is an ability to read, write and also recognize and understand ideas visually. Basic literacy as approved by the World Economic Forum in 2015 contains important aspects for parents and society, including students, one of which is cultural and civic literacy (Dafit, Agustini, Rohmah, Fitri and Rafikin, 2023). Cultural literacy adopts the theory of James P. Gee that viewed literacy as a social practice rather than just reading and writing and involving participation (Gee, 2023). The ability to recognize and comprehend Indonesian culture as a form of national identity and to comprehend citizens' rights and obligations is a sign of superior cultural and civic literacy (Widiastuti, Alwasi, Dewi and Hayat, 2024). Cultural and Civic Literacy Indicators are: 1) Understanding the complexity of culture, 2) Understanding the complexity of citizenship, 3) Knowing one's own culture, 4) Knowing the obligations of citizenship, and 5) Concerning for culture (Lestari, et al., 2022).

Indonesian students are expected to have the ability to become citizens who are aware of their own culture, high-achieving and productive in the 21st century. This is caused by the diversity of nations, languages and customs, which is starting to be disrupted by individuals or groups who do not desire differences and wish to exploit the cultural richness of this nation (Safitri and Ramadan, 2022). However, in reality, cultural and civic literacy is still poorly mastered by students (O. S. Putri, Afriani and Azhari, 2023). This is due to the low achievement scores of students in schools and the lack of knowledge possessed by teachers in the effective application of literacy. Based on observations conducted specifically at Islamic Elementary School Khaira Ummah, Padang, the low level of cultural and civic literacy was due to the lack of cultural and civic introduction activities in the learning process. Other problems included: educators rarely use learning media, the ineffectiveness of the learning models applied, and the mismatch between the application of models and teaching materials when the process of providing knowledge to students takes place.

Based on the above issues, for pupils in elementary school, civic and cultural literacy is essential (Ahsani, 2021; Marlina, 2022; Wigiyati, 2024). Students who possess civic and cultural literacy are more likely to be interested in and tolerant of variety, particularly in Minangkabau culture (Suhada, 2022). Civic and cultural literacy of elementary school students is a crucial building block for creating a generation of morally upright individuals with a multicultural perspective founded on tolerance and respect for diversity (Kabari, Hayati, Ningsih, Dafara and Dafit, 2023). Sociocultural theory confirms that integrating Minangkabau values into the Electronic Student Worksheet (e-LKPD) utilizes culture as a medium for the formation of civic literacy (Jeong, 2022). This study focuses on the Development of Digital Student Worksheet (LKPD) based on Riau Malay Ethnoscience in Elementary School Science Content (Fitriyeni, 2023; Sari, 2024; and Khoerunisa, 2024). This framework supports the interpretation of why cultural context influences the learning process. Literacy skills are a crucial ability that students must master in an applicable manner to navigate the era of disruption, serving as a key competency to manage the peak of the 21st century digital transformation and address cultural diversity (Harahap, Nasution, Nst, & Sormin, 2022; and Haryanti, 2023).

One effort to overcome the problem of cultural literacy and citizenship of students in learning is through Electronic Student Worksheet (e-LKPD) with PJBL model (Mandasari, 2021). e-LKPD is a learning medium because it can be used simultaneously with other learning resources or learning media (Apreasta, Darniyanti and Sapira, 2023). Project-based learning is suitable to be integrated (Arikunto, 2021) with e-LKPD because this model uses an innovative learning approach and emphasizes contextual learning through complex activities (Kasman, 2024). The use of e-LKPD with PJBL model can provide opportunities for students to be active in designing a project in learning activities (Wulandari and Nawangsari, 2024). This PJBL model will train students' knowledge more broadly and train students' abilities in terms of culture and technology used (N. L. P. D. Putri and Astawan, 2022).

This study has been conducted by previous researchers but they are not entirely similar. The results of the study on the application of learning media containing local wisdom based on PJBL (Niman 2022; Arsana, 2021; and Nurani, 2022) indicated that PJBL-based learning containing local wisdom can improve critical thinking skills (Hamzah, 2025; and Wahyuni, 2021). The similarity of the study lies in the use of the PJBL model, while the difference is in the use of methods and e-LKPD. Furthermore, the results of the development of the Student Worksheets (LKPD) based on Project Based Learning in Science Content showed : very high content with a percentage of 92%, and learning design of 93% (Arsana and Sujan, 2021). The similarity in these studies lies on the development of Student Worksheets (LKPD) through PJBL in Science subject. The difference is that the LKPD developed is not electronically based and is based on Minangkabau local wisdom.

Subsequent research focuses on the development of e-LKPD was designed to foster high-order thinking skills (HOTS) for thematic subjects in grade IV of elementary school. The results of the study included several parts: a) The developed e-LKPD is very valid both from the aspect of material with a score of 4.69 and learning media of 4.78, b) The e-LKPD is categorized as very practical with a score of 4.51, c) The developed e-LKPD is effective, producing an average score of 83.67 with 90% completeness (Wahyuni, Candias, & Wibawa, 2021). The similarity of this study lies in the use of e-LKPD with a development research method, while the differences are in the dependent variable and the integration of local cultural elements, particularly Minangkabau context.

Despite the contributions of these previous studies, a number of research gaps remained evident and form the rationale for this study. First, there was no statistical data nor national report describing the decline in cultural knowledge and awareness among the younger generation, especially in the context of local cultural heritage. Second, there was a lack of empirical evidence and quantitative data regarding science learning that integrates local cultural elements, leading to limited understanding of how cultural-based science instruction affects students' literacy and identity formation. Third, few studies have connected these issues to broader global frameworks, even through international reports, such as UNESCO (2023) on Culture and Education that emphasizes the importance of integrating local cultural values into modern curricula to foster identity, inclusivity and sustainability.

Based on the above explanation, there is an urgent need to stimulate students' cultural and civic literacy through innovative learning materials that combine cultural context, digital technology and project-based learning. The development of e-LKPD using PJBL model based on Minangkabau culture, therefore, represents the novelty of this research. It provides an integrated approach to learning that supports Pancasila Student Profile and contributes to achieving SDG 4 (Quality Education). Teachers may find digital LKPD easier to implement in social and science learning contexts, thereby enhancing students' engagement, cultural identity and civic awareness. Previous studies only discussed the use of LKPD or PJBL separately without linking them to the development of cultural and civic literacy. Therefore, this research aimed to develop an e-LKPD for the science subject based on Minangkabau cultural context using the ADDIE development model.

METHOD

The type of research used in this study was Research and Development (R&D). Research and development is used to produce specific products, so it requires a development model that is appropriate to the education system. This study applies the ADDIE model (Tegeh, 2014; Latip, 2022; Dwitiyanti, 2020; and Sariani, 2022). The ADDIE model has development stages, namely: the analysis stage, the initial product design stage, the product development stage, the product implementation stage, and the product evaluation stage (Spatioti et al., 2022).

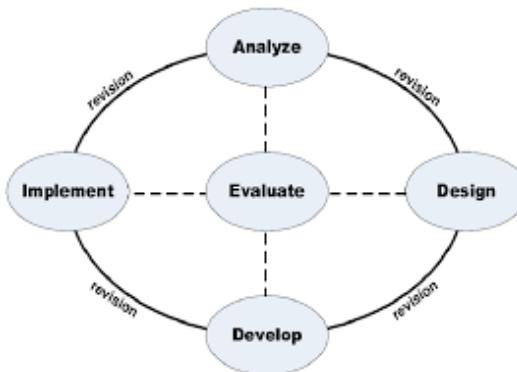


Figure 1. ADDIE Development Model Stages

The first stage involved analyzing the learning needs and contextual factors related to the IPAS (Science and Social Study) subject and Minangkabau cultural content. Curriculum analysis was conducted by reviewing Merdeka Curriculum to identify core competencies, learning outcomes and topics that could be integrated with Minangkabau culture and civic values. Learner analysis was conducted by identifying students' prior knowledge, digital literacy level and local cultural familiarity. Context and Resource Analysis was conducted by examining available learning media, technological facilities and cultural resources from the local community. Problem Identification was conducted by determining the gap between existing learning materials and the need of culturally integrated, project-based digital worksheets. This stage established the foundation for developing a culturally responsive and literacy-oriented e-LKPD aligned with SDG 4 (Quality Education) and Pancasila Student Profile goals.

During the design stage, the framework and structure of the e-LKPD were planned, which included formulating Learning Objective aligned with cognitive (science), affective (civic) and cultural domains. Content Mapping involved the careful selection of relevant Minangkabau cultural elements, such as the values of musyawarah (consensus-seeking discussion) and gotong royong (mutual cooperation), as well as local ecological knowledge, to align with the IPAS curriculum. The Storyboard and Interface Design phase involved creating a digital layout that strategically integrates text, images, hyperlinks and interactive components to support project-based learning activities. Assessment Design was developed through pre-test, post-test and project rubrics to measure cultural and civic literacy. Expert Consultation was conducted by engaging cultural experts and instructional design validators to ensure relevance and cultural authenticity. The output of this stage was an initial blueprint or prototype of e-LKPD design.

The subjects of this study were 28 students of class IV of Islamic Elementary School Khaira Ummah, Padang. The object of this study was the teaching material in the form of e-LKPD on the topic of my region and its natural resources. The types of data used were qualitative and quantitative. Qualitative data were in the form of suggestions or input from the validator and the results of interviews, while quantitative data were in the form of scores obtained from the distribution of validity questionnaires, practicality from educators and students and data of the effectiveness of student test results on LKPD based on Minangkabau local wisdom.

The data collection techniques used were through observation, interviews, questionnaires and questions. The data collection instruments were: instrument of validation, validation on aspects

(material, language and media), practicality instruments and effectiveness instruments with test questions. The data analysis techniques used by the researcher were validation of e-LKPD through 3 validators, practicality of e-LKPD from questionnaires given to one teacher and 28 students, and processing product effectiveness data through test questions. The validation results from the experts, as well as the responses from educators and students, were calculated for validity using the following formula:

$$\text{Percentage Result} = \frac{\text{Score achieved}}{\text{Maximum score}} \times 100\%$$

The next step is to interpret the total score from the percentage results qualitatively to assess the product's validity and feasibility. The interpretation can be seen in the following table:

Table 1. Interpretation of Validity and Practicality Scores

Mark	Valid Criteria	Practical Criteria
81% - 100%	Very Valid	Very Practical
61% - 80%	Valid	Practical
41% - 60%	Quite Valid	Quite Practical
21% - 40%	Less Valid	Less practical
0% - 20%	Invalid	Impractical

The product is said to be a valid and practical criterion if it is in the range of 61 – 80 percent and very valid if it is in the range of 81 – 100 percent. Quantitative data collection was obtained from the results of the pre-test and post-test of product use, then analyzed using the N-Gain Test, with the following categories (Christman, 2024):

Table 2. Instrument Effectiveness Category

Mark	Criteria
81% - 100%	Very Effective
61% - 80%	Effective
41% - 60%	Quite Effective
21% - 40%	Less Effective
0% - 20%	Ineffective

The product is categorized as having acceptable effectiveness if its score falls within the range of 61–80%, and it is categorized as very valid if the score is in the range of 81–100%.

RESULT AND DISCUSSION

The ADDIE model was used in the development of e-LKPD. The research results are organized based on the stages in the development model as follows:

Analysis Stage

The steps taken in the analysis stage are: student needs analysis, curriculum analysis and student characteristics analysis. In student needs analysis stage, the interview results showed that several students from lower to higher grades felt bored with learning that only listened to the teacher's explanation in front of the class and evaluated students only with questions in the textbook. Then, in the curriculum analysis aspect, based on an interview conducted by the researcher with Mrs. Ulva Rahmatika, S.Pd. as the teacher at Islamic Elementary School Khaira Ummah, Padang, it was found that this elementary school used the 2013 Curriculum and Merdeka Belajar Curriculum in teaching and learning activities. The use of the 2013 curriculum was implemented in grades III and VI while

the Merdeka curriculum has been implemented in grades I, II, IV and V. In this study, the researcher chose grade IV which applies Merdeka Belajar curriculum. This grade was chosen so that the approach could be adapted by using an e-LKPD that incorporates Minangkabau culture through PjBL. This method is designed to promote enjoyable learning and increase students' cultural literacy and citizenship.

In terms of the analysis of students' characteristics, the results showed that, at this stage, high-grade students are already able to read with comprehensive understanding. Therefore, these students already have the ability to increase cultural and civic literacy through reading. In addition, students who are the subjects of this research are at a stage that can understand reading logically and broadly. Furthermore, in terms of teaching materials, high-grade students need teaching materials that contain concrete stimuli equipped with writing, images and videos that can attract attention and are able to increase student literacy. Based on the analysis results—which showed that students like practical and technological approaches—the researcher designed e-LKPD teaching materials that incorporate Minangkabau culture through PjBL to improve student literacy.

Design Stage

The design of the Electronic Student Worksheets (e-LKPD) represents the researcher's effort to revamp the fourth-grade social studies learning by utilizing increasingly advanced information and communication technology. This e-LKPD utilizes a combination of text, images and videos, allowing for learning anywhere and anytime. Several stages were implemented in the design of this e-LKPD, including the selection of teaching materials and the initial product design.

In the teaching materials selection stage, the e-LKPD was designed using Canva, combined with various attractive fonts. The designed e-LKPD was then uploaded using the LiveWorksheet website. This website was chosen because it has adequate features for creating teaching materials/media. This teaching material contains material explained in the e-LKPD, namely about Natural Resources. Then, in the initial product design stage, the e-LKPD that was developed had four characteristics. First, the LKPD was arranged according to the intellectual intelligence level of fourth-grade students. Second, the LKPD emphasized scientific-based learning activities so as to facilitate HOTS. Third, using digital applications that could make the e-LKPD display attractive. Fourth, the practice questions used were interactive and HOTS-compliant.

Development Stage

The development phase aims to produce a valid and practical e-LKPD on 'My Region and Its Natural Resources' by incorporating revisions from experts and practitioners. Here are some examples of e-LKPDs containing Minangkabau culture using the PjBL model:

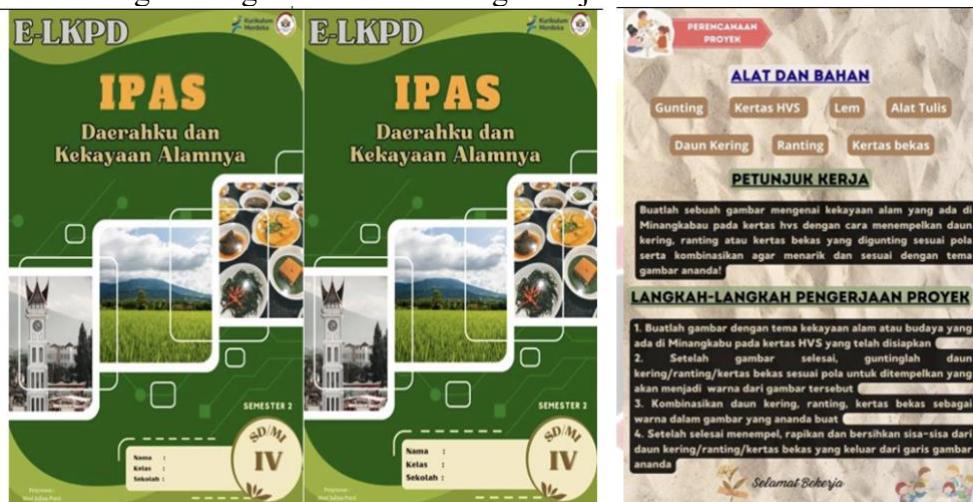


Figure 2. E-LKPD Cover Display & PjBL Display on E-LKPD

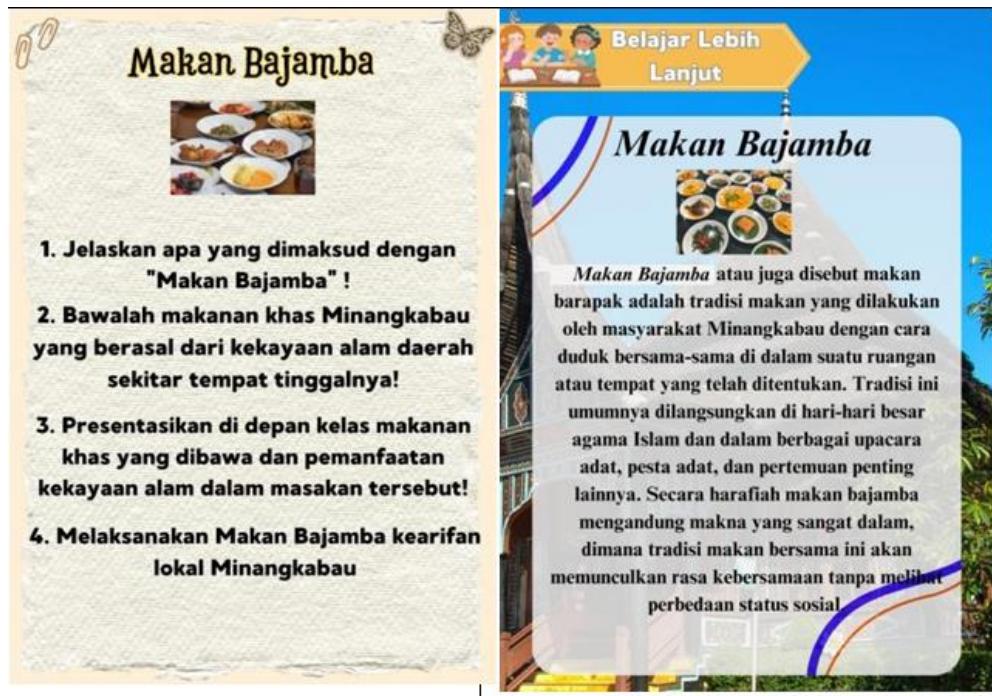


Figure 3. Minangkabau Cultural Literacy Display on E-LKPD

The picture above is an e-LKPD design which includes cover, tools and materials, work instructions and project work steps, materials and work questions. The validation of the e-LKPD on the topic of "My Region and Its Natural Resources" was carried out by three experts, consisting of one educator as a material expert, one lecturer as a media expert and one lecturer as a language expert. The validation results from the experts determined the feasibility of the e-LKPD developed by the researchers on the topic of "My Region and Its Natural Resources". In the validation of the material, the e-LKPD material indicators consisted of 11 statements.

The developed e-LKPD must have appropriate content that is in accordance with the indicators and learning objectives expected by the curriculum as well as suitability with the structural requirements of a teaching material (Bujuri et al., 2024). The lowest score for each statement was 1 and the highest score was 5. For more details, see the following graph:

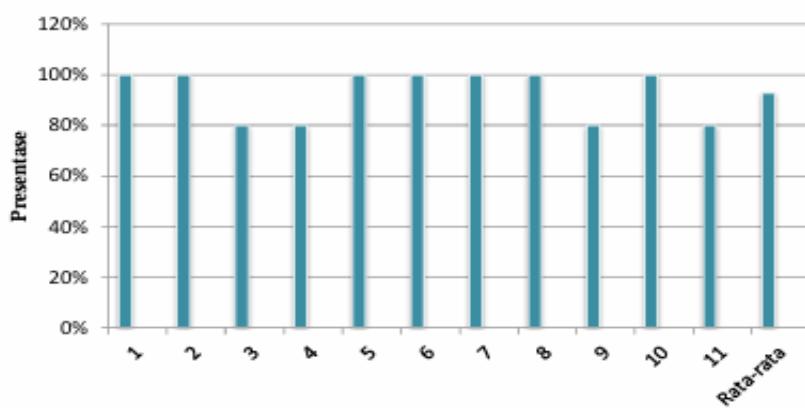


Figure 4. Results of the Material Validity Test

Figure 4 showed the validator's assessment in terms of content or material which includes: a) completeness of the material, b) breadth of the material, c) depth of the material, d) facts or data, e) accuracy of information with conclusions, f) accuracy of questions with cultural and civic literacy, g) suitability with the development of the revolution, and h) enrichment. In graph 1 above, the results of the material analysis obtained 93% with a very valid category.

Furthermore, on media validity, the e-LKPD media indicator consists of 15 statements divided into three aspects, namely the didactic aspect, the construction aspect and the technical aspect. The didactic aspect is found in statements number 1 to 6 which can be seen in the description. Meanwhile, the construction aspect is found in statements number 7 to 11. While the technical aspect is found in numbers 12 to statement number 15. The value can be seen with the lowest score of 1 and the highest score of 5. Experts stated that this product meets the required components for student worksheets (LKPD). This can be seen in the following graph:

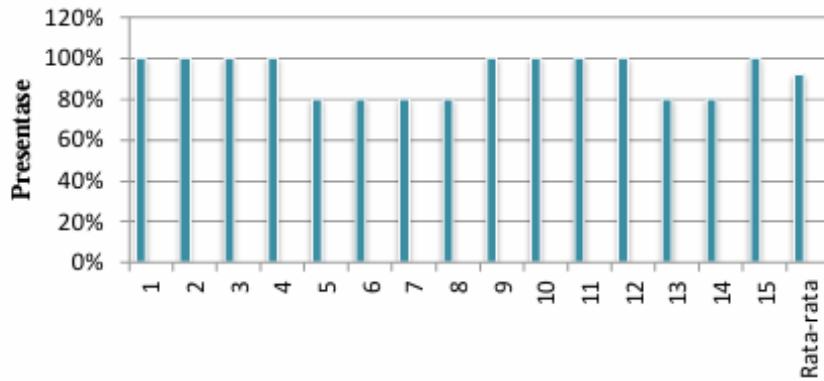


Figure 5. Media Validation Test Results

Figure 5 showed the validator's assessment in terms of construction or media which includes: a) question preparation strategy, b) student worksheet (LKPD) components (title, identity, objectives, activity steps, data presentation location, questions), c) didactic requirements, d) student worksheet (LKPD) construction requirements, e) student worksheet (LKPD) technical requirements, and f) structure and preparation. The e-LKPD components were complete and the tools were in accordance with the strategy for preparing cultural and civic literacy questions. In graph 2 above, the results of the media analysis by PGMI lecturers obtained 92% categorized as very valid. This showed that the e-LKPD is in accordance with the components and the e-LKPD steps were complete and appropriate.

Regarding language validity, the e-LKPD language aspect statement indicator consists of seven statements. The lowest score for the language aspect is 1 and the highest score is 5. These statements can be seen in the following graph:

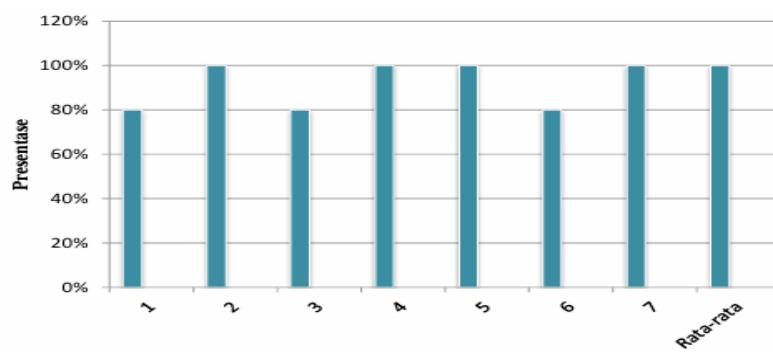


Figure 6. Language Validation Test Results

Figure 6 showed that the developed e-LKPD must also have feasibility in terms of language which includes a) language suitability with improved spelling, b) simple and easy to understand language, c) communicative, d) language suitability with students' intellectual, e) language suitability with students' social and emotional, f) punctuation and symbol used, and g) coherence and accuracy of language between paragraphs (Simamora and Asri, 2024). The validity of language suitability by experts in graph 3 above obtained a result of 91% categorized as very valid.

This suggests that the content, design and cultural integration are consistent with curriculum standards and scientific accuracy. Experts confirmed that the material presented in the e-LKPD effectively integrates local wisdom values (Minangkabau proverbs, customs and environmental knowledge) into science concepts, such as living things, energy and environmental balance. These results validated the relevance and alignment of the product with the theoretical foundations of culturally responsive pedagogy, ensuring that students can relate science learning to their socio-cultural environment.

After validation, the product was put through a feasibility test by language, media and material experts. The product underwent a practicality test. The results of the e-LKPD practicality test were divided into two categories: the practicality test by educators and 28 students. The practicality test for educators consisted of one statement. Each statement received a score from 1 to 5. The score for each statement was converted into a score, with 1 being the lowest score and 5 being the highest. The following graph displays the data from the educators' practicality test:

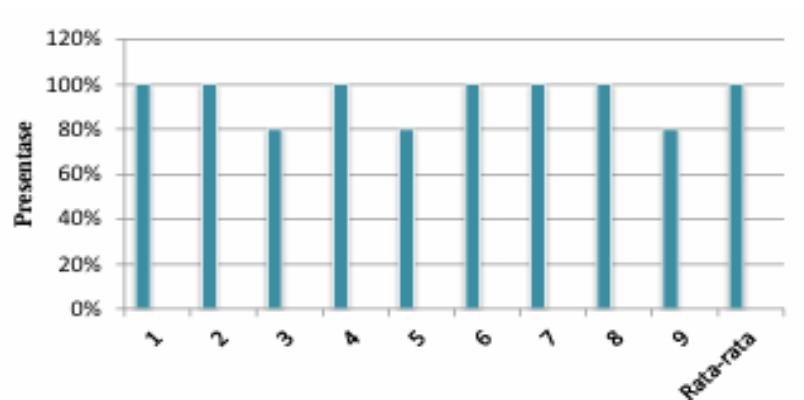


Figure 7. Educator Practicality

Figure 7 above showed an average score of 93% for the educator's practicality questionnaire. This indicates that users or practitioners believe that the product is highly practical in terms of ease of use. Furthermore, students were asked to respond to a questionnaire regarding the e-LKPD they had used. Twenty-nine students from class IV of Islamic Elementary School Khaira Ummah, Padang, completed the questionnaire. Quantitative data from the students' practicality test can be seen in Graph 5 below:

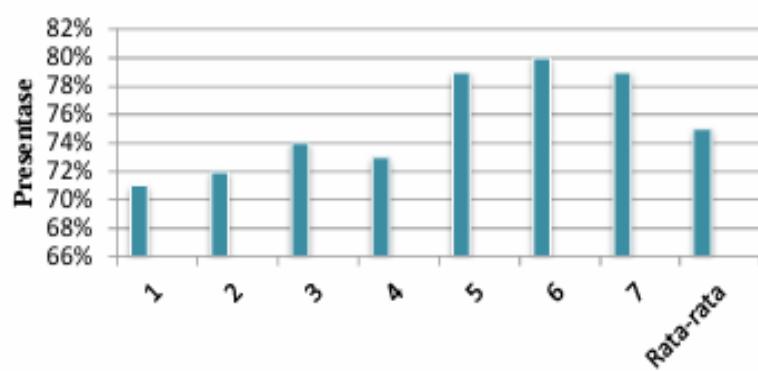


Figure 8. Student Practicality

Figure 8 showed that the results of the practicality questionnaire for students, filled out by 28 students with different levels of ability, obtained an average result of 75%, so that users said that this product was practical in its ease of use.

Teachers reported that the e-LKPD was easy to implement in learning contexts and helped

link project with civic values. Students found the digital format interactive, visually engaging and relatable because the learning activities were grounded in familiar Minangkabau contexts (e.g. local flora, traditional technology and social norms). The practicality findings indicated that the product not only supports the ADDIE development phase of implementation but also encourages teachers to adopt context-based and value-oriented learning. These results align with culturally responsive learning models that promote learning engagement through cultural relevance and technological integration.

Implementation Stage

The e-LKPD effectiveness trial was conducted with 28 students of class IV Islamic Elementary School Khaira Ummah, Padang. The test questions consisted of 5 questions about my region and its natural resources. At this stage, students completed the validated test questions and provided feedback on the e-LKPD. This was done to obtain data regarding the effectiveness of the e-LKPD in improving the cultural and civic literacy of fourth-grade students at Islamic Elementary School Khaira Ummah, Padang. In the implementation of the effectiveness test, students had followed the learning material "My Region and Its Natural Resources" and had worked on the questions in the e-LKPD and on the project. The following are the results of the e-LKPD effectiveness test questions:

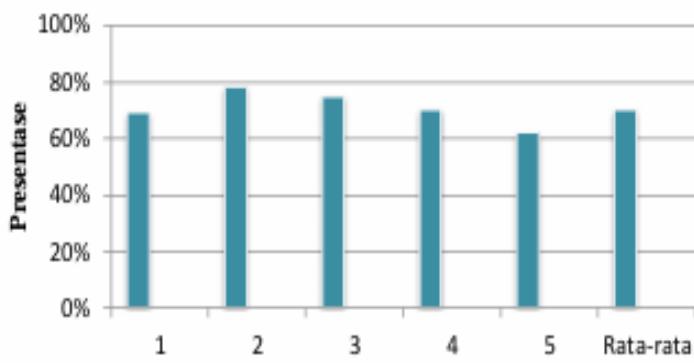


Figure 9. Results of Student Effectiveness Test

Based on Figure 9 above, the achievement percentages for the cultural literacy indicators are as follows: Indicator 1 (68.96%), Indicator 2 (78.16%), Indicator 3 (75%), Indicator 4 (70.34%) and Indicator 5 (62.06%). A test that was conducted revealed the efficacy of e-LKPD. An assessment of 28 students yielded an average score of 70.17%, which falls within the 'Effective' category. Therefore, e-LKPD containing Minangkabau cultural wisdom through the PjBL model can be said to be effective and can be used as teaching materials.

Students demonstrated better understanding of science concepts while simultaneously showing enhanced cultural awareness, respect for diversity and environmental responsibility—the key indicators of civic literacy. This improvement demonstrates that the Minangkabau-based context provided meaningful learning experiences, allowing students to bridge the gap between abstract science concepts and real-life cultural applications. This supports the theory that contextualized digital learning media that not only improve academic outcomes but also nurture character education and social values within the science curriculum.

Evaluation Stage

This stage demonstrated that educators and students responded positively to the Minangkabau culture-based e-LKPD through the PjBL model. The practicality data for this medium was 93%, categorized as very practical. Furthermore, student responses to this medium were 75%, categorized as practical.

Based on the five stages that have been explained in this study, it can be said that: first, based

on the validity criteria and the mean score of 92%, the Minangkabau-based PjBL e-LKPD was categorized as highly valid and suitable for further testing at the practicality stage.

Second, in Merdeka curriculum, advances in scientific technology have been fully integrated into the learning process. Therefore, educators need to integrate ICT into learning activities. One form of the effort is related to local cultural elements. By supporting the implementation of the Pancasila student profile strengthening project (P5), the curriculum seeks to enhance students' abilities and personalities (Rusliani, et.al., 2023). Indirectly, the development of e-LKPD can increase students' cultural literacy and citizenship. Based on practical standards and percentages obtained by practitioners (educators and students) through a questionnaire, the e-LKPD for the Natural Science subject containing Minangkabau cultural wisdom has produced very practical results. Therefore, this stage can be continued to the next stage.

Third, e-LKPD containing Minangkabau cultural wisdom through project-based learning can be said to be effective and can be used as a learning resource. Based on research by Friska, Nanda and Husna (2022) regarding the development of e-LKPD, it is designed to produce effective, reasonable and interesting standards. e-LKPD is applied to effective learning processes in schools. It can be concluded that the enthusiasm, concentration and interest of students can improve learning outcomes. In alignment with previous development research, these findings demonstrated that the Minangkabau-based PjBL e-LKPD effectively enhances cultural literacy and citizenship. Consequently, it is recommended to be used as a valuable instructional tool for school environments.

The impact of e-LKPD development on cultural and civic literacy has been highlighted in recent research (Hoytt, 2020; Nuraedah, 2024). Specifically, Project-Based Learning (PjBL) supports cultural acquisition through three interlocking mechanisms: (1) authentic cultural tasks requiring the production of local-based artifacts, (2) community engagement providing access to cultural mentors, and (3) structured reflection that links project outcomes to civic values. This approach aligns with the principles of culturally responsive pedagogy (Caingcoy, 2023; Ulbricht, 2024). In this study, these mechanisms were operationalized through: (a) project briefs requiring the application of Minangkabau practices, (b) opportunities for students to consult local cultural resources, and (c) guided reflection prompts within the e-LKPD. Future research should more explicitly report process indicators—such as project artifacts, community interactions, and reflection excerpts—to further substantiate claims regarding cultural learning (Lyna, 2024).

To position our findings within the context of prior research, we compare four analytic dimensions: (1) research design and sample characteristics, (2) intervention format (electronic versus paper-based LKPD), (3) measured outcomes (cultural and civic literacy versus HOTS and critical thinking), and (4) process fidelity (the extent of community engagement and teacher training). Take for example, Friska, et al. (2022) reported the effectiveness of e-LKPD designed for problem-solving but used different outcome measures and limited community integration; this likely explains the similarity in 'effectiveness' but differences in the nature of learning gains. Conversely, Rusliani, et al. (2023) focused on P5 implementation at a policy-linked level, which aligns with our claims about Pancasila student profile but differs in unit of analysis. By systematically contrasting these dimensions, we clarify the unique contribution of a Minangkabau-based electronic PjBL instrument to cultural and civic literacy research.

CONCLUSION

The development of the Minangkabau-based e-LKPD through the PjBL model proved effective in enhancing cultural and civic literacy, achieving a score of 70.17%. The validation process yielded high scores across all areas: material experts rated the tool at 93%, media experts at 92% and language experts at 91%. All results fall within the 'very valid' category. From the three validations carried out, the overall score was 92% and this product was declared very valid. Then, in terms of

practicality tests for educators and students, a score of 93% was obtained in the very practical category and 75% in the practical category.

The use of e-LKPD is essential to support diversity in learning activities. This is because a variety of learning activities is essential to increase students' motivation in learning. The features contained in e-LKPD, such as audio-visual, images and so on, can stimulate students kinesthetically and facilitate students in learning a material. Furthermore, using e-LKPD through project-based learning can encourage students' creativity in their work. The e-LKPD containing Minangkabau cultural wisdom can broaden students' insight into the culture that exists in the surrounding area, namely Minangkabau culture. Students can learn independently without the help of a mentor.

The development of the Minangkabau-based e-LKPD for Cultural and Civic Literacy carries important implications for education, society and future research. This study demonstrates that integrating local culture into digital learning media is not merely an instructional innovation, but a strategic effort to strengthen national identity and civic values among young learners. This research was limited to cultural literacy and citizenship with Minangkabau cultural elements in science and social learning. Recommendations for future researchers include developing more creative e-LKPDs with cultural elements other than Minangkabau and integrating them with other learning models. They also include using a broader sample size. This research deserves public attention because it bridges education, culture and civic development. By reading and understanding this study, the community can recognize how local cultural wisdom, when integrated with digital learning, becomes a transformative force for education reform. It invites educators, parents and policymakers to care, participate and replicate such culturally grounded innovations—ensuring that education in Indonesia remains both globally competitive and locally rooted.

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