

Development of Teaching Materials Based on Local Wisdom Using Artificial Intelligence to Introduce Madurese Culture to Elementary School Students

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Abstract: - Local wisdom is very important for students to be able to know and preserve the culture of their respective regions. In Madura, there is a lot of local wisdom that must be introduced and taught to students through interesting lessons at school. Unfortunately, teaching materials for introducing Madurese local wisdom remain limited. In fact, teaching materials grounded in local Madurese wisdom are urgently needed by students. To make the teaching materials more interesting, they will be created using artificial intelligence. Therefore, this research aims to develop teaching materials based on local wisdom using artificial intelligence to introduce Madurese culture to elementary school students. The research method employed is the Research and Development (R&D) approach based on the Borg and Gall model. The subjects of this study were second-grade elementary school students. Research data collection was carried out by observation and product trial questionnaires. The results of the study indicated that: 1) teaching materials based on Madurese local wisdom have four main themes, namely: Madurese traditional clothing, Madurese traditional house, the Art of Kerrabhân sapè, and traditional Madurese food. 2) The results of the trial showed that the quality of the teaching materials was good enough to be used in the classroom. Based on the product feasibility test involving experts, an average score of 89% was obtained, whereas the trial with students yielded an average score of 85.3%. Creating teaching materials using artificial intelligence is easier and results in more engaging content, thereby boosting students' learning motivation.

Key-Words: - Teaching materials, Local wisdom, Artificial intelligence, Learning motivation, Madurese culture, Elementary school

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1 Introduction

Local wisdom must continue to be preserved amid the changing times and the challenges of globalization today. One of the strengths and distinctive characteristics of the Indonesian nation is its

possession of local wisdom not found in other nations. Local wisdom holds a very important place in human social life, so it must be taught to students in schools [1], [2]. Local wisdom-based learning aligns with the Merdeka Curriculum [3], [4], [5]. Educational institutions are required to teach local wisdom through

local content courses, from primary school through high school. The goal is for children and the younger generation to apply and preserve local wisdom values in their daily lives.

Unfortunately, children's interest in local wisdom and its values is currently low due to changing times. Changing times and technological advancements indirectly erode the values of local wisdom [6], [7]. Therefore, local wisdom needs to be introduced to students through engaging and enjoyable learning experiences.

Local wisdom can serve as a guide for communities in addressing various issues in accordance with the unique conditions of each region [8]. Essentially, local wisdom consists of positive values rooted in local culture that have been widely embraced by the community due to their inherent merits [9]. Consequently, local wisdom should be taught to children from an early age through school-based learning activities. Various studies indicate that education based on local wisdom can serve as a means of character development for students. Local wisdom encompasses noble values, character traits, and customs that have evolved within the community, which are then integrated and applied in character education across all subjects in primary school [10], [11].

Madura, as one of the island regions in East Java, possesses a diverse array of unique forms of local wisdom. Maduran local wisdom has distinctive characteristics compared to other regions, encompassing aspects of art, culture, crafts, and language. Therefore, local content instruction must integrate Maduran local wisdom at all levels of education, including primary school.

Integrating Madura's local wisdom into the curriculum is crucial for students. Studying local wisdom is vital because it embodies the noble values of every ethnic group in a region [12]. Teaching materials based on Madurese local wisdom can enhance students' knowledge and understanding of regional culture, instill positive character traits, and equip them to face various challenges in daily life [13]. Furthermore, integrating local wisdom into the curriculum can increase student participation [14]. Through learning about Madurese local wisdom, regional culture can be introduced to students indirectly.

For the teaching of Madurese local wisdom to be effective, engaging instructional materials are needed. Such materials can help students understand the subject matter more easily. Developing teaching materials based on Madurese local wisdom is necessary to make learning more engaging. The development of such materials can serve as an

effective strategy for introducing and preserving local Madurese culture in primary schools [14]. A study shows that the development of those teaching materials consistently has a positive impact on students' affective aspects, including learning motivation, engagement in learning, and character building [15]. This means that the availability of learning materials can stimulate students' learning motivation. Unfortunately, the availability of Madurese local wisdom-based teaching materials remains limited and lacks variety. This study aims to produce teaching materials based on local wisdom to introduce Madurese culture to primary school students.

To create engaging instructional materials for students, this initiative will utilize artificial intelligence (AI). The use of AI in developing instructional materials can boost students' motivation to learn, accelerate skill acquisition, and support teachers in designing more adaptive teaching strategies [16], [17]. Various AI applications can be used to create teaching materials, such as Canva, ChatGPT, Quizizz/Wayground, and Magic School. In this study, the Canva application was selected to develop teaching materials based on local wisdom. The Canva application has many advantages compared to others, such as the availability of attractive designs and templates that can be used in creating teaching materials [18], [19]. It is hoped that the Canva application can produce engaging teaching materials based on local wisdom that meet the learning needs of primary school students.

2 Materials and Methods

To produce a teaching material product, this study employs the research and development (R&D) method. Through the research and development stages, it is hoped that high-quality teaching materials can be produced that will increase students' interest in learning about Madurese culture.

2.1 Development Procedure

This research and development procedure consisted of five stages: gathering information through various needs analyses; planning the instructional materials; creating a preliminary version of the instructional materials; conducting field trials; and revising the final product [20]. These stages were carried out sequentially to produce locally-based instructional materials suitable for teaching Madurese culture.

2.1.1 Gathering information

In this stage, information was gathered through various needs analyses. To obtain this information, the researcher conducted a review of relevant studies on local wisdom in Madura, Indonesia. Based on an analysis and review of existing literature, it has been found that many young people in Madura have forgotten the culture of their homeland. The younger generation's interest in Madurese culture is steadily declining. This situation prompted the development of teaching materials based on local wisdom to introduce Madurese culture to second-grade primary school students.

2.1.2 Planning the instructional materials

The researcher engaged in planning through various preparatory activities, including conducting an in-depth study and identifying learning materials based on local wisdom for second-grade primary school students, taking into account their developmental characteristics and various scientific literature in the field of Madurese local wisdom. These local wisdom-based materials were specifically designed for second-grade primary school students. During this planning phase, the researcher developed various instruments to assess the suitability of the local wisdom-based teaching materials for second-grade primary school students. The instruments developed include those for subject matter experts, instructional material experts, and users.

2.1.3 Product development

Teaching materials based on local wisdom were developed based on the results of a study and analysis of students' learning needs regarding the understanding of Madurese local wisdom. The developed teaching material takes the form of a picture book, titled "Teaching Materials Based on Madurese Local Wisdom." These materials were intended for learning activities for second-grade primary school students. That title was chosen so that students could easily learn about local Madurese culture. Before being pilot-tested, the local wisdom-based teaching materials were validated by experts in the fields of instructional materials and Madurese local wisdom. Expert validation is needed to obtain input on the quality of the teaching materials so they can be used in learning Madurese culture.

2.1.4 Field testing of teaching materials

Initial trials were conducted to assess the product's suitability prior to use, as well as to gather feedback for product improvements. The product testing included an alpha test and a beta test. The alpha test involved experts in instructional materials and

Maduran local wisdom. The evaluation results and various inputs from these experts served as the basis for refining the product. Meanwhile, the beta test was a trial of the local wisdom-based learning materials for second-grade primary school students. The results of initial trials can serve as direct feedback and evaluation from users regarding product quality. A beta test was conducted in the classroom, involving students in using teaching materials based on Madurese local wisdom.

2.2 Eligibility Test Design

The product trial, which involved teaching materials based on local wisdom, was carried out through a feasibility test by elementary education experts and an analysis of student responses. This trial was conducted after the instrument validators declared the testing instruments valid and the product was ready for testing.

2.2.1 Feasibility assessment by experts

The trial of this teaching material product takes the form of a feasibility assessment involving professional experts in Madurese local wisdom. This feasibility assessment aimed to ensure that the instructional materials were suitable for use. The feasibility test of the materials aimed to assess the suitability of the local wisdom-based teaching materials for primary school students' learning. The suitability test of the teaching materials aimed to assess the appropriateness of the materials' format and presentation for the age level of primary school students.

2.2.2 Student response

The local wisdom-based teaching materials deemed suitable by subject matter experts and instructional design experts are then demonstrated and implemented in the classroom. This activity is conducted to determine the readability of these local wisdom-based teaching materials when used by students. Students' feedback is crucial to ensuring the quality of the developed teaching materials continues to improve before they are widely adopted by primary school students.

2.3 Research subjects

The subjects for the feasibility assessment of these local wisdom-based teaching materials consisted of subject matter experts, teaching material experts, and second-grade primary school students. An instructional material expert was an individual with expertise in primary school education, holding at least a doctoral degree, and possessing a background in primary school education. A subject matter expert was

someone with expertise in Madurese local wisdom, holding at least a bachelor's degree and possessing a relevant educational background. Additionally, 20 second-grade primary school students were involved as participants to test the feasibility of these local wisdom-based teaching materials.

2.4 Research Data Collection

Data collection for this research employed both qualitative and quantitative techniques. Qualitative data collection was conducted through observation and interviews with students using the local wisdom-based teaching materials, while quantitative data collection involved feasibility testing of the materials with experts and users. The obtained research data were then analyzed in accordance with the research problem. Data collection for this research employed instruments consisting of observation guidelines, interview guides, and user questionnaires.

2.5 Data Analysis

The qualitative data analysis technique in this study employed the Miles and Huberman method, which included data reduction, data presentation, and concluding [21]. The quantitative data in this study were analyzed using descriptive statistics and presented as percentages. The results of the teaching material trials with users were tabulated and presented as percentages using the following formula.

Item	Overall item
P	P
$= \frac{X}{X1} \times 100\%$	$= \frac{\sum X}{\sum X1} \times 100\%$

Description:

P = percentage sought
X = answer score in one item
X1 = highest score in one item
 $\sum X$ = total score obtained
 $\sum X1$ = maximum score
100% = constant

Subsequently, the resulting percentage from the calculation is used to determine the feasibility criteria for teaching materials based on local wisdom. Product eligibility can be categorized into five criteria, namely: Highly eligible, eligible, quite eligible, less eligible, and ineligible [22]. The eligibility criteria for the teaching materials in this study are presented in Table 1.

Table 1. Eligibility criteria for teaching materials

Score	Percentage	Category
5	81% - 100 %	Highly eligible
4	61% - 80%	Eligible
3	41% - 60%	Quite eligible
2	21% - 40%	Less eligible
1	0% - 20%	Ineligible

Source: [22]

3 Results

Teaching materials based on local wisdom were developed to introduce Madurese culture to second-grade primary school students. This development was carried out with reference to the research problem formulation, namely: developing local wisdom-based teaching materials and testing the feasibility of these materials for learning in primary schools. To facilitate the creation of these teaching materials, the researcher utilized artificial intelligence (AI) in the form of the Canva application. The stages of developing the teaching materials are outlined as follows.

3.1 Developing Teaching Materials Based on Local Wisdom

The teaching materials developed in this study are based on local wisdom and are designed to introduce Madurese culture to second-grade primary school students. The development of the teaching materials involved a needs analysis, followed by the formulation of the concept and format of the materials, and culminated in the creation of teaching materials that incorporate Madurese local wisdom.

The needs analysis was conducted by reviewing previous research and relevant references, as well as gathering the necessary learning materials. The analysis took into account the primary school curriculum, local content learning outcomes, and the diversity of Madurese culture. The collected materials were then categorized and organized by theme and the requirements for the teaching resources to be developed.

The researcher developed these teaching materials by incorporating Madurese local wisdom into instruction for second-grade primary school students. The learning materials have been designed to be easy to use in primary school classrooms. These teaching materials are intended for second-grade primary school students as they are appropriate for the students' developmental level.

Additionally, the Maduran local wisdom content is presented simply so that it is easily understood by primary school students. This teaching material book was created using the Canva app. This app was chosen because it is very easy to use and has comprehensive features for creating teaching materials. The steps for

using Canva to create these local wisdom-based teaching materials include: Log in to use a personal Canva account, search for and select an available learning material template, create a cover and table of contents, insert the Madura local wisdom content into the template, add images or illustrations relevant to the theme, create a learning assessment, and finally save or print the learning materials. The workflow for using the Canva application is presented in Figure 1.

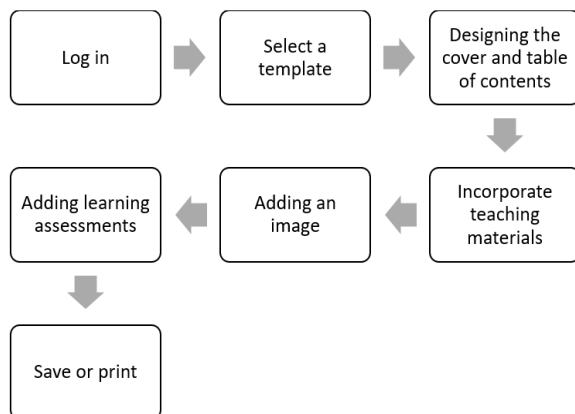


Fig. 1: Stages of creating learning materials using Canva

Source: created by the authors

By using the Canva app, the resulting learning materials appear attractive and engaging for primary school students. These materials feature many interesting images to keep students from getting bored while learning. The following is a description of learning materials based on local wisdom aimed at introducing Madurese culture to primary school students.

3.1.1 Teaching material design

The development of teaching materials in this study is titled “Local Wisdome Madurese for Learning of Primary School Student.” These materials are intended for elementary school students. The title of the teaching material has successfully sparked students' interest in learning about and becoming familiar with Madurese culture. Through these materials, it is hoped that students will cultivate a sense of love for Madura culture. The format and examples of the teaching materials are presented as shown in Figure 2.

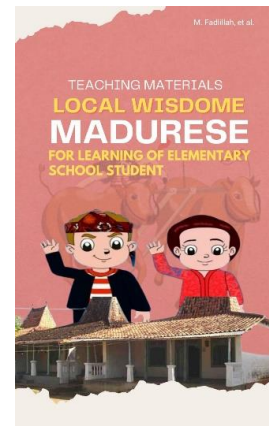


Fig. 2: Cover of Madurese local wisdom teaching materials

Source: created by the authors

The teaching materials were produced in A4 size (21 cm wide and 29.7 cm tall) with a thickness of 0.1 cm, equivalent to 11 pages. This size was considered ideal for primary school students' learning activities. In addition to using large font sizes, this teaching material also contained many images related to Madura's local wisdom that were interesting for students to study.

3.1.2 Learning theme in the teaching materials

The development of teaching materials based on Madurese local wisdom in this study encompasses four learning themes. Additionally, this book contains more illustrations showcasing Madura's local wisdom. The themes and learning content in these local wisdom-based teaching materials are generally as follows.

3.1.2.1 Traditional Madurese clothing

This theme provides information about traditional Madurese clothing, namely pesa'an and odheng. Pesa'an is a traditional Maduran garment with distinct styles for men and women. This attire is typically worn during important events in Maduran society. Men's attire consists of a red-and-white striped shirt paired with an outer jacket and black trousers. The striped pattern symbolizes the determination, courage, and hard-working spirit of the Madurese people. Additionally, this outfit is complemented by an odheng, a headband worn by men when wearing pesa'an. Meanwhile, women's attire is simpler and resembles Javanese traditional clothing, consisting of a red kebaya top and a jarik skirt. The content regarding traditional Madurese clothing can be seen in Figure 3.



Fig. 3: The Content of Madurese traditional clothing
Source: created by the authors

3.1.2.2 Traditional Madurese houses

This topic presents information on the structure of traditional Madurese houses. It explains that the traditional Madurese house is called Taneyan Lanjhang. The term Taneyan Lanjhang means “long courtyard.” Traditional Madurese houses generally feature an elongated layout consisting of a cluster of houses belonging to several families who are still related by blood. The layout of the houses, stretching from east to west, reflects the family's hierarchical order, from the oldest to the youngest. Taneyan Lanjhang consists of several components, including the main house, langgar (place of worship), animal pens, kitchen, and courtyard (taneyan). The content regarding Madurese traditional houses can be seen in Figure 4.

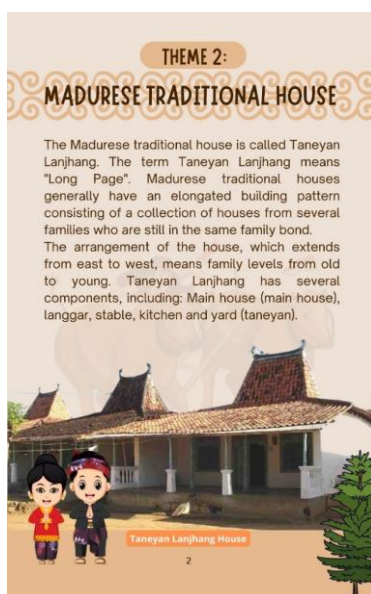


Fig. 4: The content of Madurese traditional houses
Source: created by the authors

3.1.2.3 The Art of Kerrabhân Sapè

This section presents material on the art of Kerrabhân Sapè. Kerrabhân Sapè is a highly distinctive and famous Madurese cultural tradition. Kerrabhân Sapè is a traditional Madurese art form involving a race using a pair of bamboo poles pulled by two oxen and guided by a jockey. Additionally, the history of Kerrabhân Sapè in Madura is presented. The content of Kerrabhân Sapè can be seen in Figure 5.



Fig. 5: The content of Kerrabhân Sapè
Source: created by the authors

3.1.2.4 Traditional Madurese Foods

This theme presents material on traditional Madurese foods. There are four types of traditional Madurese foods included in the local wisdom-based learning material: topak ladeh, lorjuk, nasi serbang, and tajin sobih. Topak ladeh is a traditional Madurese dish consisting of lontong, slices of meat and eggs, and coconut milk broth. This dish is typically served during Eid al-Fitr celebrations. Lorjuk is a traditional Maduran dish made from clams stir-fried with soy sauce and chili peppers. Lorjuk has an elongated shape resembling bean sprouts, with a chewy texture that feels tender when chewed. Nasi serbang is a traditional Maduran dish consisting of rice served with a variety of side dishes. This dish originates from Bangkalan Regency. The content regarding traditional Madurese food can be seen in Figure 6.



Fig. 6: The content of traditional Madurese food

Source: created by the authors

The ingredients in nasi serpong include white rice, fried rice noodles, beef jerky, stir-fried clams with chili sauce, steamed tuna in banana leaves, salted eggs, serundeng, rempeyek, and processed beef skin in a thick sauce. Tajin sobih is a traditional Madurese dish originating from Bangkalan Regency. It is made from a mixture of glutinous rice flour and wheat flour, cooked into a porridge. Tajin sobih porridge comes in three colors: pink, brown, and white.

3.2 Testing the feasibility of teaching materials based on local wisdom

Activities to assess the suitability of teaching materials based on Maduran local wisdom are currently underway. The results of this feasibility analysis cannot yet be presented in the progress report. The analysis process is still ongoing to determine the suitability of those teaching materials for primary school students.

Based on the product feasibility test involving subject matter experts and instructional material experts, it was found that instructional materials based on local wisdom are effective in introducing Madurese culture to second-grade primary school students. The evaluation score obtained from the subject matter experts was 92% out of 10 statements, while the evaluation score from the instructional material experts was 86% out of 10 statements. Thus, the average feasibility score for the local wisdom-based teaching materials reached 89%. This means that, based on the assessments by subject matter experts and instructional material experts, the developed product is highly suitable for use in second-grade primary school classrooms. The feasibility assessment results from the subject matter experts and instructional material experts are presented in Table 2 below:

Table 2. Material and instructional expert

No	Assessor	Statements	Assessment scores	Percentage	Assessment category
1	Mat. expert	10	46	92%	Highly eligible
2	Inst. expert	10	43	86%	Highly eligible
Average Percentage Assessment Score				89%	Highly eligible

Source: created by the authors

In addition, subject matter experts and instructional material experts assessed that this local wisdom-based teaching material has appropriate content and is easy for primary school students to understand and use. Teachers can utilize this local wisdom-based teaching material to introduce Madurese culture to second-grade primary school students. The development of these teaching materials is highly beneficial for students in learning about Madurese local wisdom.

Through these learning materials based on local wisdom, students can easily get to know and learn about Madurese culture. Furthermore, media experts suggested corrections to the spelling of several words that do not conform to the actual rules of the Madurese language.

Primary school students also responded positively to the local wisdom-based teaching materials. Based on a feasibility test involving 20 second-grade primary school students, the developed product proved to be highly suitable for use in the classroom. The assessment score obtained from students regarding the suitability of the local wisdom-based teaching materials reached 85.25% based on 10 statements. The results of the feasibility assessment by the users are clearly presented in Table 3 below.

Table 3. Student assessment scores

No.	User	Statement	Assess- ment.	Percen- tage	Assess. category
1	S1	10	47	94%	Highly eligible
2	S2	10	42	84%	Highly eligible
3	S3	10	42	84%	Highly eligible
4	S4	10	34	68%	Eligible
5	S5	10	45	90%	Highly eligible
6	S6	10	45	90%	Highly eligible
7	S7	10	48	96%	Highly eligible
8	S8	10	36	72%	Eligible
9	S9	10	39	78%	Eligible
10	S10	10	46	92%	Highly eligible
11	S11	10	35	70%	Eligible
12	S12	10	44	88%	Highly eligible
13	S13	10	37	74%	Eligible
14	S14	10	45	90%	Highly eligible
15	S15	10	46	92%	Highly eligible
16	S16	10	41	82%	Highly eligible
17	S17	10	45	90%	Highly eligible
18	S18	10	44	88%	Highly eligible
19	S19	10	43	86%	Highly eligible
20	S20	10	49	98%	Highly eligible
Average percentage of assessment scores			85.3%		Highly eligible

Source: created by the authors

Based on the product feasibility test involving subject matter experts, instructional material experts, and students, it can be concluded that the local wisdom-based teaching materials are highly suitable for use as a means of introducing Madurese culture to second-grade primary school students. Teachers and students can utilize these teaching materials in Madurese local content learning activities. It is hoped that the use of these local wisdom-based teaching materials can introduce and foster primary school students' interest in Madurese culture.

4 Discussion

Teaching materials based on local wisdom are crucial and can help students understand the learning

material. [23] Explain that teaching materials can foster students' understanding of the material taught by the teacher. Teaching materials can serve as a guide for achieving learning objectives [24], [25]. Teaching materials are defined as lesson plans that guide teachers in achieving learning objectives. Typically, these materials contain content and guidance for student learning in the classroom [26]. Local wisdom-based instructional materials are learning guides that contain content or themes related to regional culture.

Teaching materials based on local wisdom are highly beneficial for students. In addition to increasing engagement in learning, these materials also contribute to strengthening students' cultural identity. This fosters pride in local culture, making the learning experience more emotionally meaningful. This emotional connection plays a crucial role in boosting students' intrinsic motivation to learn [27], [28]. Through teaching materials based on local wisdom, teachers can introduce and instill a love for regional culture in students at school. Local wisdom-based learning in schools can provide deep insights into regional culture. Introducing Madurese culture to students in school can be done through classroom instruction.

Learning activities that utilize teaching materials based on local wisdom can significantly enhance students' knowledge of and appreciation for culture [29], [30]. The integration of local culture has been shown to create more authentic, relevant, and meaningful learning experiences for primary school students [15]. Learning based on local wisdom aims to introduce regional culture to students [2]. Students can preserve their respective regional cultures [7] and apply these cultural values in their daily lives [3]. By utilizing teaching materials based on local wisdom, students can effectively learn about their respective regional cultures. Students learn comfortably and meaningfully through real-life experiences from their surrounding environment.

Teaching materials based on local wisdom can be developed to incorporate Madurese culture. Examples of Madurese cultural elements that can be included in these materials include traditional clothing, local arts, regional specialties, and traditional houses. The learning materials can be designed simply, for example, by introducing the various types of Madurese clothing, food, and arts [29], [31]. Learning activities based on local wisdom are highly beneficial for students. In addition to introducing regional culture, this approach can also influence students' character. Implementing learning based on local wisdom can foster positive character traits in students [1], [6], [10], [11], [12].

Teaching materials based on local wisdom can serve as a means to explore regional culture, such as the clothing, arts, cuisine, and history of a particular region. Instruction utilizing these teaching materials can foster students' awareness of and interest in learning about regional culture. To enhance learning effectiveness, these teaching materials must be created in an engaging manner that is appropriate for the child's stage of development. Effective teaching materials align with students' learning needs and characteristics [32] and are tailored to their abilities [33].

Local wisdom-based instructional materials must also be designed in a simple and systematic manner so they can be used effectively. As previously explained, teaching materials are a systematically organized set of resources—whether in written or non-written form—designed to create an environment or atmosphere that facilitates student learning [34]. One of the topics that should be included in local wisdom-based teaching materials is an introduction to regional and national cultures [3], [4]. It is hoped that local wisdom-based teaching materials can help teachers introduce regional cultures to primary school students.

5 Conclusion

Teaching materials based on local wisdom play a crucial role as a learning resource for introducing Madurese culture to elementary school students. These materials can help students explore various aspects of Madurese culture. Therefore, teaching materials for primary school students should be designed simply and supplemented with colorful illustrations to capture students' interest during learning activities. Through these teaching materials based on local wisdom, it is hoped that primary school students will develop an interest in Madurese culture and be able to preserve it. This study has limitations regarding the number of test subjects and the measurement of the teaching materials' effectiveness. Therefore, future research should increase the number of test subjects within reasonable limits and conduct quantitative testing of the teaching materials to determine their effectiveness in the learning process.

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