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Effectiveness of Personalized Learning Model Using Digital Flipbooks with Sidoarjo Local Wisdom to Improve Multiliteracy of Elementary School Students in the Digital Era

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ABSTRACT

Objective: This study aims to examine the effectiveness of personalized learning model using digital flipbooks with Sidoarjo local wisdom in improving multiliteracy of elementary school students. **Method:** This study used quantitative with a one-group pretest-posttest design. The sample was 27 students from grade five at SDN Kedungsolo, Porong District, Sidoarjo Regency. The instruments used were a cultural literacy test and a reading interest questionnaire. Data were analyzed with two techniques: normality test and hypothesis test using SPSS for cultural literacy, and outer loading, validity, and reliability analysis for the questionnaire using SmartPLS. **Results:** The results showed that the average score of students increased significantly, from 54.07 in the pretest to 87.78 in the posttest, with Sig. (2-tailed) value < 0.05. The questionnaire also showed higher reading interest and awareness after using the digital flipbook, meaning that digital flipbooks combined with personalized learning are effective to improve students' multiliteracy, both in cultural literacy and reading interest. **Novelty:** In conclusion, learning innovation with technology that integrates local wisdom can be a good solution to improve the quality of education in the 21st century, while also keeping the value of local culture. This study uniquely integrates a Personalized Learning Model with digital flipbooks featuring Sidoarjo local wisdom to enhance students' multiliteracy, offering a contextual and innovative approach for 21st-century elementary education.

INTRODUCTION

Elementary school plays an important role in shaping the character, skills, and knowledge of students, especially in facing the challenges of the 21st century, which are marked by technological advances and massive information flows (Burbules et al., 2020; Kalyani, 2024). In this context, elementary schools become the main foundation for instilling educational values that are relevant to the times, including literacy as an important component (Ansori et al., 2024; Shabbazova et al., 2022). Literacy today goes beyond the basic ability to read and write because it includes understanding, critical thinking, and effective communication across diverse media (Buckingham, 2020; Jones-Jang et al., 2021). However, in practice, many elementary students still demonstrate weak multiliteracy skills, particularly in interpreting digital information and integrating knowledge from various sources. This condition calls for innovative learning models that are adaptive to change and utilize digital technology as part of the learning transformation.

Multiliteracies are seen as one of the answers to the demands of 21st-century competencies because they cover various kinds of literacy skills, such as digital, visual, cultural, numeracy, scientific, and civic literacy (Huot et al., 2025; Rocca, 2024). These different literacies are important so that students can think reflectively, appreciate

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diversity, and take part actively in today's complex society (Holloway, 2021; Spinelli, 2024). Even so, the condition in the field still shows that multiliteracy in elementary schools is not yet optimal (Widyaningrum et al., 2025). Many students have limited access to learning resources and are still weak in reading skills that connect with culture or technology. This situation makes it necessary to bring innovation in learning, for example by developing digital media such as flipbooks that contain local wisdom and applying a personalized learning model to face multiliteracy challenges more effectively. In this study, multiliteracy refers specifically to cultural literacy and reading interest, which are used as operational indicators to measure students' multiliteracy development.

Personalized learning is an approach in education that directs the learning process based on the needs, interests, and abilities of each student (Akyuz, 2020; Bernacki et al., 2021). In this digital era, where technology and science are changing fast and also changing the way people learn and get information, personalized learning becomes one solution that is adaptive and innovative (Kem, 2022; Whalley et al., 2021). This model gives students access to materials that are more relevant, contextual, and matched with their learning style. Interactive flipbooks, which combine text, pictures, and sound, are one example of digital media that can be used in learning. Such media not only attract students' attention but also make them more active in the learning process. At the same time, it helps them develop multiliteracy in a more integrated way (Hardianti et al., 2024; Selvakumar et al., 2025). When technology is blended with local wisdom, personalized learning can prepare students to become a generation that excels academically, has strong character, and is ready to face global challenges (Aithal, 2025; Ayu & Rahayu, 2025).

Digital flipbooks represent a form of interactive learning media that integrates text, images, audio, and video into a digital format designed to resemble printed books (Sumarmi et al., 2021). They give a flexible and interesting reading experience because students can access them anytime through laptops, tablets, or mobile phones. The main advantage of flipbooks is their ability to present materials in a visual and multimodal way, which helps to increase students' interest and makes the content easier to understand (Bacalja et al., 2024; Roemintoyo & Budiarto, 2021). IIn the context of 21st-century learning, digital flipbooks serve as an effective alternative for delivering contextual materials, including locally based content that contributes to character formation and the development of multiliteracy (Andriani et al., 2023; Juita et al., 2025). Their application is also aligned with the learning characteristics of the digital generation, who are accustomed to engaging with visual and interactive content.

This research is urgent because there are still few digital learning media that present local cultural values, especially in Sidoarjo Regency. In fact, Sidoarjo has many traditions such as nyadran, ruwah desa, reog cemandi, and the bandeng auction. These traditions have educational value and should be introduced to students from an early age. By using flipbooks with local wisdom, this study is expected to contribute to strengthening local identity while also building 21st-century skills in young people.

Several previous studies have confirmed the effectiveness of flipbooks in educational contexts. Hadi et al. (2025) demonstrated that digital flipbooks possess high levels of validity and practicality. Rahmawati and Purwati (2025) found that flipbooks with local wisdom games helped students improve their descriptive writing skills. In the same way, Daryati et al. (2024) showed that culture-based flipbooks increased

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students' creativity in the independent curriculum. Ingkavara et al. (2022) also explained that personalized learning models can improve learning results and support students to be more independent. Fadhilah et al. (2025) added that digital media with local wisdom not only improve academic understanding but also help build character and make students feel closer to their culture.

However, there is still little research that combines digital flipbooks, personalized learning, and the local wisdom of Sidoarjo to improve multiliteracy in elementary schools.. The novelty of this study is in integrating the personalized learning model with Sidoarjo cultural content into contextual and interactive digital flipbooks. The purpose is to test how effective this media is for improving multiliteracy and at the same time strengthening local identity in the middle of today's technology and information disruption.

Based on the gaps identified in previous studies, this research aims to examine the effectiveness of a personalized learning model that integrates digital flipbooks containing Sidoarjo local wisdom in improving elementary students' multiliteracy skills. Specifically, this study focuses on measuring two key multiliteracy components: cultural literacy and reading interest. By evaluating these two dimensions, this study seeks to determine how personalized and culturally contextualized digital learning media can enhance students' engagement and learning outcomes in the 21st-century educational context.

RESEARCH METHOD

This study used in this study is a quantitative approach. A quantitative approach is research that focuses on variables and the relationships between one variable and another (Duckett, 2021). This research was conducted systematically and comprehensively by controlling certain conditions. The research design is a pretest-posttest one-group design. Although this design allows for measuring changes before and after the treatment within the same group, it has limitations in controlling external variables because no control group is involved. Therefore, the findings should be interpreted with caution regarding the extent of the treatment's effectiveness.

Population and Sample

The population in this study was all students of State elementary school Kedungsolo, Porong District, Sidoarjo Regency, consisting of students in grades I to VI. From this population, the sample consisted of 27 fifth-grade students. Grade 5 was selected as the sample based on the consideration that at this level, students already have adequate basic literacy skills and have learned IPAS material relevant to local culture, especially on the theme of "My Region, My Pride." In addition, based on the results of observations, fifth-grade students showed a low level of visits to the library and limited knowledge of the local culture of Sidoarjo, making them the right group to test the effectiveness of personalized learning-based digital flipbook media containing local wisdom in improving multiliteracy skills.

Research Techniques and Instruments

The data were collected using tests and questionnaires. The instruments used aimed to measure students' multiliteracy skills, which in this context focused on two main aspects, namely cultural literacy and reading interest. The test instrument was used to determine students' understanding of the local culture of Sidoarjo after using digital

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flipbook media, while the questionnaire was used to determine students' reading interest levels before and after the treatment. The test instrument grid in Table 1 was designed to measure the extent to which students understand and appreciate local cultural values in the Sidoarjo region. The cultural literacy aspect includes understanding local culture, concern for cultural preservation, and participation in cultural activities.

Table 1. Cultural Literacy Test Instrument

Nu	Cultural Literacy Aspects	Indicators
1	Understanding of local culture	Mentioning forms of local culture in the surrounding area
2	Concern for culture	Appreciating local traditions and customs
3	Participating in cultural preservation	Involvement in cultural activities at school/in the community

Next is Table 2, which is the questionnaire instrument grid for researching students' interest in reading. This instrument aims to determine the level of enjoyment, frequency, and awareness of students regarding the benefits of reading.

Table 2. Reading Interest Questionnaire Instrument

Nu	Aspects of Reading Interest	Indicator
1	Enjoyment of reading	Enjoying reading activities
2	Reading frequency	Reading regularly
3	Awareness of the benefits of reading	Recognizing the importance of reading for knowledge

Data Analysis Techniques

The data in this study were analyzed quantitatively using two analytical approaches. First, the cultural literacy test data was analyzed using the SPSS application. The analysis was carried out through a normality test to determine the data distribution and a hypothesis test with a paired sample t-test to see the difference in scores between the pretest and posttest. Second, the reading interest questionnaire data was analyzed using the SmartPLS (Partial Least Squares) application. The analysis with SmartPLS focused on testing the validity and reliability of the instruments through outer loading, average variance extracted (AVE), composite reliability, and Cronbach's Alpha. These analysis techniques were separated so that each instrument was tested with the most appropriate method, making the research results more accurate and scientifically accountable.

RESULTS AND DISCUSSION

Results

Results of the Reading Literacy Test Analysis

Before conducting further analysis, a data normality test was first performed to determine whether the research data was normally distributed or not. The normality test is important because it determines the type of statistical test that is appropriate for data processing. If the data is normally distributed, then parametric tests can be used for analysis, whereas if the data is not normally distributed, non-parametric tests are used. In this study, normality tests were performed on the pretest and posttest data using the Kolmogorov-Smirnov and Shapiro-Wilk tests.

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Table 3. Pretest Normality Test Results

		Kolmogorov-Smirnova			Shapiro-Wilk		
	Class	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	Pretest	.198	27	.008	.936	27	.009

Based on the results of the normality test using Shapiro-Wilk on the pretest data, the statistical value is 0.936 with a p-value of 0.099. Because the p-value is greater than 0.05, it means that the pretest data is normally distributed. Thus, the pretest data does not show a significant deviation from the normal distribution, so further analysis can be done using the appropriate parametric test.

Table 4. Posttest Normality Test Results

		Kolmogorov-Smirnova			Shapiro-Wilk		
	Class	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	Pretest	.146	27	.200	.957	27	.124

Based on the results of the normality test using the posttest data, the Shapiro–Wilk statistical value is 0.957 with a p-value of 0.124. Since the p-value is greater than 0.05, the posttest data are considered normally distributed. This shows that the posttest scores do not significantly deviate from a normal distribution, so parametric analysis is appropriate for further testing.

After confirming the results of the normality test, the next step is to conduct a hypothesis test to determine whether there is a significant difference between the pretest and posttest scores. The hypothesis test in this study uses a paired sample t-test, because the research design employs a one-group pretest–posttest format. This test aims to identify whether there is an improvement in students' learning outcomes after receiving treatment in the form of a personalized learning model based on digital flipbooks containing local wisdom. If the significance value (Sig. 2-tailed) is less than 0.05, it can be concluded that there is a significant difference between the pretest and posttest scores.

Table 5. Paired Sample Statistic Test

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	54.07	27	11.184	2.152
	Posttest	87.78	27	10,127	1,949

Based on the results of the paired sample t-test analysis (comparing pretest and posttest scores in one group), the average student score on the pretest was 54.07 with a standard deviation of 11.18, while on the posttest, the average score increased to 87.78 with a standard deviation of 10.13.

Table 6. Paired Sample Correlations Test

		N	Std. Deviation	Std. Error Mean
Pair 1	Pretest & Posttest	27	.694	.000

The correlation test shows a significant relationship between the pretest and posttest scores with a correlation value of 0.694 and a significant value (p-value) found in the table showing a very small value (0.000). It can be said that the change in score is statistically significant.

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Table 7. Paired Samples Test

		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (two-tailed)
Pair 1	Pre-test-Post-test	-33.704	8.389	1.614	-37,022	-30,385	-20,877	26	.000

The average difference between the pretest and posttest is 33.704, indicating a positive change. This indicates that there is a strong and significant relationship, because the Sig. (2-tailed) value is < 0.05. The 95% confidence interval shows that the difference in scores is between -37.022 and -30.385, which does not include the number 0, indicating a significant difference. The paired t-test results show a t-value of -20.877 with a degree of freedom (df) of 26, indicating that the difference in scores between the pretest and posttest is very significant in the data. Thus, it can be concluded that there is a significant influence and improvement between the pretest and posttest scores. Therefore, this learning model is proven to be effective in improving students' multiliteracy.

Reading Interest Questionnaire Instrument Results

The questionnaire instrument was used to measure students' reading interest levels before and after the treatment. This questionnaire was measured using the SmartPLS (Partial Least Squares) application to evaluate the data from the student response questionnaire. This was done so that all indicators and variables could meet the validity and reliability criteria. The following is an image of the outer model results:

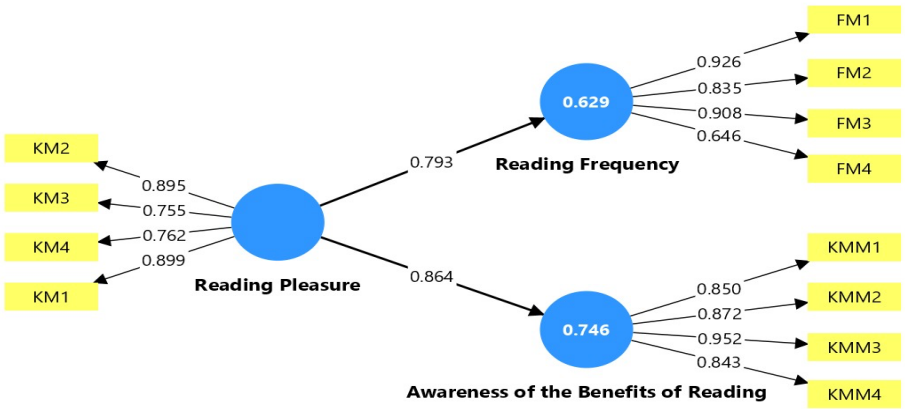

Figure 1. Student Response Results Outer Model

The validity of the questionnaire can also be seen from the outer loading results in the PLS-SEM algorithm. Results of calculations >0.70 in outer loading can be declared valid because they meet the validity requirements. The results of the outer loading calculations in this study can be seen in the table of the three research variables:

Table 8. Smart PLS Outer Loading

Variable	Indicator	Outer Loading	Description
Reading Enjoyment (KM)	KM1	0.899	Valid
	KM2	0.895	Valid
	KM3	0.755	Valid
	KM4	0.762	Valid

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Variable	Indicator	Outer Loading	Description
Frequency Reading (FM)	FM1	0.926	Valid
	FM2	0.835	Valid
	FM3	0.903	Valid
	FM4	0.646	Valid
Reading Benefit Awareness (KMM)	KMM1	0.850	Valid
	KMM2	0.872	Valid
	KMM3	0.952	Valid
	KMM4	0.843	Valid

The results of the SmartPLS analysis have been confirmed, showing that all indicators and variables in this model meet the criteria for validity and reliability. The following is a summary of the important results of the SmartPLS analysis presented in the following table:

Table 9. Average Validity and Reliability

SmartPLS Analysis Criteria	Reading Enjoyment (KM)	Reading Frequency (RF)	Awareness of the Benefits of Reading (KMM)	Description
AVE	0.690	0.699	0.775	Valid (>0.5)
Composite Reliability	0.853	0.901	0.914	Reliable (>0.7)
Cronbach's Alpha	0.847	0.854	0.902	Reliable (>0.7)

Data analysis shows that after students used digital flipbook media, there was a significant increase in reading interest questionnaire scores. This indicates that this media is not only effective in delivering cultural material, but also successful in increasing students' motivation and enjoyment of reading.

Discussion

The findings of this study demonstrate that the use of a personalized learning model based on digital flipbooks containing local wisdom from Sidoarjo effectively enhances students' multiliteracy skills. Rather than merely showing statistical improvement, these findings highlight how personalization and contextualization can create meaningful learning experiences for students. This aligns with the principles of student-centered learning, which emphasize learner autonomy, engagement, and reflection as key factors for success **(**Makhambetova et al., 2021; Bhardwaj et al., 2025).

Personalized learning and student-centered learning share the same pedagogical foundation both place students at the core of the learning process. In this study, students' multiliteracy improved because the learning process allowed them to interact with materials that matched their interests, needs, and cultural backgrounds. This result is consistent with Lin et al., (2017) and Zou et al., (2025), who found that the integration of digital technology in education promotes interactive and adaptive learning environments. However, this study extends previous findings by showing that embedding local wisdom in digital media enhances not only digital and reading literacy but also cultural literacy, which is a crucial aspect of multiliteracy in diverse societies.

The increase in students' reading interest after using digital flipbooks also supports the idea that multimodal and interactive materials can stimulate curiosity and intrinsic motivation. This aligns with Yulianto (2024) and Anas & Hasibuan (2023)**,** who

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found that culturally relevant and interactive materials encourage active participation and sustained engagement. In this sense, the learning process becomes more than the delivery of content it transforms into a medium for developing 21st-century skills such as communication, collaboration, and cultural awareness.

The integration of local wisdom in digital flipbooks has also been proven to play an important role in strengthening students' cultural literacy. Learning materials compiled based on local traditions and culture make it easier for students to understand the learning content because it is close to their daily reality. This is in line with the opinions of Holloway & Gouthro (2020) and Kahn & Kellner (2023), who emphasize that multiliteracy not only includes reading and writing skills but also includes cultural literacy, digital literacy, and social literacy. Thus, the application of flipbooks containing local wisdom not only improves students' multiliteracy skills but also strengthens their cultural identity and character.

In line with previous research, the use of digital technology in learning has been proven to support literacy strengthening. For example, research by Shieh & Nasongkhla (2024) shows that the use of interactive digital media improves students' digital literacy skills and learning motivation. Similarly, Ahmad & Setiawan (2025) found that digital flipbooks can significantly improve elementary school students' conceptual understanding and learning outcomes. Another international study by Lakapu et al. (2023) also emphasizes that the integration of digital media in personalized learning has a positive impact on the development of 21st-century skills, including critical thinking, communication, and collaboration skills.

Overall, the findings of this study reinforce the theory that digital media-based personalized learning not only improves cognitive learning outcomes but also influences students' affective aspects, such as reading interest and cultural awareness. By presenting local Sidoarjo content in digital flipbooks, students not only gain academic knowledge but are also trained to recognize, appreciate, and preserve local culture. This is in line with the views of Mustoip & Fadhlullah (2025), who emphasize the importance of local culture-based education in building national identity and facing the challenges of globalization. Thus, it can be concluded that the combination of personalized learning and digital flipbooks containing local wisdom is a relevant, effective, and contextual innovation to improve the multiliteracy of elementary school students in today's digital era.

CONCLUSION

Fundamental Finding: This study demonstrates that the implementation of a personalized learning model using digital flipbooks integrating Sidoarjo local wisdom significantly enhances elementary school students' multiliteracy. The integration of this model resulted in a highly significant improvement in students' cultural literacy, reading interest, and engagement with digital learning. These findings underscore the importance of contextual and technology-enhanced learning innovations in addressing the challenges of 21st-century education. **Implication:** The implications of this study suggest that teachers and schools can adopt digital flipbook-based personalized learning as an effective strategy to enhance students' multiliteracy while simultaneously reinforcing local cultural identity. The integration of technology with local wisdom provides richer learning experiences, promotes active student engagement, and connects character building with academic achievement. **Limitation:**

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This research is limited to a single elementary school with a sample of 27 students, which restricts the generalizability of the results. Moreover, the one-group pretest-posttest design does not include a control group, making it difficult to fully rule out the influence of external variables. **Future Research:** Future studies are recommended to include larger and more diverse samples across multiple schools, employ experimental designs with control groups, and conduct longitudinal analyses to examine the sustainability of the effects. Additionally, further research may explore the impact of digital flipbooks on other multiliteracy dimensions, such as numeracy, scientific literacy, and digital literacy, for a more comprehensive understanding. Although the normality assumption was met in this study, the reliance on a single-group pretest–posttest design still limits the robustness of the causal inference, and future research is encouraged to replicate these findings using larger samples and experimental designs with control groups.

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