

Combating Ethnic Xenophobia through Digital Pedagogy: The Development of a TIDAYU Local Wisdom-Based Interactive E-Book in Multiethnic Schools

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Abstract: This study aims to develop and evaluate an interactive e-book based on the local wisdom of Tionghoa, Dayak, and Malay (TIDAYU) as a learning medium to enhance cultural literacy and reduce ethnic xenophobia among elementary school students in Singkawang City. The study is expected to produce a pedagogical model that integrates digital media and cultural values to promote inclusive and tolerant learning and serve as a potential solution for multicultural education grounded in local wisdom. The research employed a Research and Development (R&D) approach, using a modified Borg and Gall model comprising six stages: needs analysis, design, development, validation, implementation, and evaluation. The participants were 75 fifth-grade students from three elementary schools representing the major ethnic groups and regions of Singkawang (North, Central, and West Singkawang). Data were collected through expert validation sheets, teacher and student response questionnaires, and pre-test and post-test instruments on cultural literacy and tendencies toward xenophobia. Data analysis was carried out using non-parametric descriptive and inferential statistics (Friedman test and *pairwise comparisons*). The validation results showed that e-books were rated “very valid” (average 81%) and “very practical” (average 84%). Learning implementation is also high, averaging 85%. The Friedman test showed a significant difference ($p < 0.001$) between pre- and post-test scores across regions, indicating an increase in cultural literacy and a decrease in xenophobia following e-book use. The post-test results across schools showed consistent effectiveness. It can be concluded that TIDAYU interactive e-book has successfully integrated local wisdom into digital learning, fostering cross-cultural understanding, empathy, and tolerance in a multiethnic environment. This product contributes theoretically to the development of multicultural learning media based on local culture, as well as providing practical guidance for teachers in realizing inclusive basic education rooted in regional culture.

Keywords: interactive e-book, cultural literacy, TIDAYU, local wisdom, xenophobia, multicultural learning.

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■ INTRODUCTION

The phenomenon of conflict accompanied by racism in Indonesia requires a deep understanding of its patterns of dissemination and dynamics (Aspinall & Berger, 2001; Bertrand, 2004). Global studies show that xenophobia often stems from low cultural literacy and limited

cross-group interactions (Berry, 2019; Stephan & Stephan, 2022; Oberste-Berghaus et al., 2024). Ethnic adaptation can be achieved by building an educational foundation that strengthens inter-ethnic relations (Banks, 2009; Nieto, 2010; Gay, 2018). Singkawang City is one of West Kalimantan's cities with distinctive ethnic diversity,

particularly among the Chinese, Dayak, and Malay (TIDAYU) communities.

According to the Central Statistics Agency of Singkawang (2021), approximately 42% of its population is of Chinese ethnicity, 28% Malay, and 24% Dayak, with the remainder from various other ethnicities. This diversity creates a unique cultural richness, but also raises the potential for social segregation and ethnic stereotyping (William, 2025). Studies by Birtel et al. (2020) and Wilson et al. (2020) also show that in the context of multiethnic schools, student interactions tend to be limited to their own group. This has the potential to reinforce xenophobia, namely, fear or prejudice against other groups (Nyblade et al., 2019). However, Nieto (2010) states that behind this diversity lie social challenges, such as segregation and potential xenophobia, that can hinder intergroup integration. Xenophobia, or fear of other groups, can occur due to a lack of understanding of each other's cultures and traditions. Research by Birtel et al. (2020) and Hewstone et al. (2014) shows that tendencies toward social segregation by ethnicity persist, with students from certain ethnic groups more inclined to interact with their own group. A condition of intolerance also occurred in one educational institution in Singkawang City (William, 2025). This is exacerbated by the lack of formal education curriculum materials that comprehensively discuss TIDAYU's local wisdom and culture. This lack of understanding contributes to the emergence of prejudice and social tension between ethnic groups.

This situation is exacerbated by the lack of integration of local wisdom values into the basic education curriculum (Marhayani et al., 2025). Available learning materials are still delivered conventionally, are not contextualized, and do not foster cross-cultural appreciation (Marfuah, 2016; William, 2025). However, cultural literacy, which encompasses knowledge, cross-perspective thinking skills, and an appreciative

attitude toward diversity, is an essential competency in multicultural education (Deardorff, 2020; Byram, 2021).

One effort to increase cultural understanding and strengthen social cohesion is through cultural literacy. Conceptually, cultural literacy can be understood as an individual's ability to access, understand, evaluate, and reflectively practice cultural values in social life (Deardorff, 2020; Byram, 2021). Meanwhile, xenophobia refers to a form of fear or rejection of social groups perceived as different (Nyblade et al., 2019; Mark et al., 2021). Several studies have shown that increasing cultural literacy is negatively associated with xenophobic attitudes because it encourages empathy and cross-cultural understanding (Berry, 2019). Therefore, strengthening cultural literacy through learning media can be an effective strategy for fostering tolerance in multiethnic societies.

The development of digital technology now opens new opportunities for creating more interactive, contextually relevant multicultural learning media (Clark, 2008; Prabhakar et al., 2025). Interactive e-books allow for the presentation of text, images, animations, and reflective quizzes that encourage students' cognitive and affective engagement (Depita, 2024; Chen & Tsai et al., 2025). However, there are still few studies examining how local wisdom-based e-books can empirically improve cultural literacy and reduce xenophobic attitudes at the elementary school level, particularly in a multiethnic society like Singkawang. This research gap is the primary focus of this study.

The development of digital technology offers solutions to enhance cultural literacy (Supriatna & Atikah, 2024) through interactive, engaging media. One medium that can be developed is an interactive e-book that integrates local wisdom content with digital technology. Interactive e-books have the advantage of presenting multimedia content that can increase student

engagement in learning (Depita, 2024). This study aims to answer the following questions: 1) How is the process of developing an interactive e-book based on TIDAYU local wisdom that suits the characteristics of multiethnic elementary school students in Singkawang City?; and 2) How effective is the e-book in improving cultural literacy and reducing the potential for interethnic xenophobia among students? It is hoped that this research will contribute to the development of innovative, locally relevant learning media.

■ METHOD

Participant

The research subjects were 75 fifth-grade students from three areas in Singkawang City, namely North Singkawang, Central Singkawang, and West Singkawang, who geographically and socially represent the ethnic diversity of the local community. The schools were selected using a purposive sampling technique because they represented the main ethnic distribution of TIDAYU and had basic ICT infrastructure to support the implementation of interactive e-books. Furthermore, all participants obtained written permission from their schools and parents to participate in the study (Creswell, 2014; Fraenkel, Wallen, & Hyun, 1990). Of the 75 students, 25 were from North Singkawang, 25 from Central Singkawang, and 25 from West Singkawang. The study population included all fifth-grade students in the three areas, while the sample was selected based on location accessibility and teacher readiness to participate in the media trial.

Research Design and Procedure

This interactive e-book features various local cultural stories from the Chinese, Dayak, and Malay communities in Singkawang City. For example, the Cap Go Meh celebration, which depicts Chinese ethnic traditions through the ritual of tatung; Naik Dango, a traditional Dayak

ceremony to welcome the rice harvest season; Zapin dance and music, which are characteristic of Malay culture; and Malay pantun, which is full of local wisdom values. All of these cultural stories are presented not only in text but also reinforced with simple visual, audio, and animation illustrations to make them more engaging and easier for students to understand. To support active learning, this e-book also comes with interactive quizzes, practice questions, and multicultural reflection activities. Interactive quizzes are designed with models of rearranging the order of traditions, drawing and coloring traditional houses, completing rhymes, or answering short questions about the culture you have just learned. Practice questions function to strengthen students' understanding while integrating critical thinking skills. Meanwhile, multicultural reflection activities provide space for students to compare, appreciate, and reflect on the values of each culture, fostering tolerance, mutual respect, and pride in the diversity of cultures in their environment.

This research is a type of Research and Development (R&D), which is research applied to produce products and test their effectiveness (Johnson & Christensen, 2024). The products to be developed in this study are: TIDAYU Local Wisdom E-Book: A Solution to Cultural Literacy and Ethnic Xenophobia in Singkawang City. The design in this study uses a development model. This research uses a Research and Development (R&D) approach by adapting the development model from Borg and Gall (2007) which has been modified into six main stages, namely: need analysis; design (e-book design); development (product development and manufacturing); validation (expert validation); implementation (limited and extensive trials), and evaluation (revision and improvement of products). The simplification of the Borg and Gall model from 10 stages to 6 was carried out to align the research procedures with the specific needs of the study

while balancing efficiency in terms of time and resources. In this research context, several of the original stages proposed by Borg and Gall overlap, and these can be consolidated into a more concise yet still systematic sequence. This adaptation also enables the researcher to focus on the stages most relevant to the product development goals, such as needs analysis, expert validation, and limited trials, ensuring that the research process remains structured, accountable, and feasible within existing operational constraints. Thus, the modified model retains the fundamental principles of Research and Development (R&D) while offering a more practical and context-appropriate framework for educational research. The research design used is a pre-experimental, One-Group Pretest-Posttest Design.

Instrument

The instruments used include structured interview questions for an initial needs analysis, expert validation sheets (Content Suitability with TIDAYU Local Wisdom, Scientific Quality and Academic Feasibility, Structure and Coherence of Material, Language and Presentation Style), student response questionnaires, and cultural literacy pre-test and post-test. Validation was conducted by 3 material experts and 3 media experts. The validators consisted of 3 lecturers and 3 5th-grade teachers. The validation results showed that the product achieved a very high validity, with an average of 81%. In detail, Validator 1 gave a score of 77% (a valid category with moderate revision), Validator 2 gave a score of 89% (a very valid category with a light revision), and Validator 3 gave a score of 75% (a valid category with moderate revision). The difference in scores between validators shows that there are variations in assessments, especially in the aspect of content validity and the emphasis on character values, which still need to be strengthened through the addition of academic references, the involvement of traditional leaders,

and real examples of the implementation of cultural values in daily life. In addition to being validated by the lecturer element validator, the practicality of the ebook was also assessed by 3 5th-grade teachers in 3 research areas who used ebooks; the three teachers gave a score of 84%.

This study aims to measure cultural literacy to reduce the risk of ethnic xenophobia using multiple-choice tests. The test is given to students at two different time points: before the treatment (Pre-test) and after the treatment (Post-test). The test consists of 10 questions, each of which serves as an indicator of multicultural literacy. The details of this question are adapted from Zakiyyudin Baidhawiy (2005) and further validated by linguists and content experts in the TIDAYU context. The purpose of this multiple-choice test was to evaluate the effectiveness of the Interactive E-Book based on local wisdom as a solution to cultural literacy and ethnic Xenophobia in the context of IPAS learning in elementary schools.

This research instrument used a ten-item multiple-choice test designed to measure cultural literacy and ethnic xenophobia through two separate subscales. Cultural literacy was operationalized as students' cognitive ability to understand diversity, TIDAYU local cultural values, and the multicultural social context. Meanwhile, ethnic xenophobia was defined as a tendency to have negative attitudes toward other ethnic groups, as measured through situational judgment items that asked respondents to choose the most appropriate action in inter-ethnic situations. Of the ten items, six measured cultural literacy in the C2–C4 cognitive domains, while the other four measured xenophobic tendencies through responses that reflected inclusive or exclusive attitudes. Scoring was different for each subscale: a correct answer in cultural literacy was scored 1. In contrast, the xenophobia score was determined by the choice of an inclusive (score 1) or exclusive (score 0) response. Both scores were analyzed separately to examine

improvements in cultural understanding and decreases in xenophobic tendencies. This instrument has been validated by three experts and empirically tested, with a correlation coefficient of 0.69. This means that, when interpreted based on the correlation coefficient criteria, it has moderate validity, allowing all items to be used in research instruments. Its reliability was also reported as good, with coefficients of 0.78 for the cultural literacy subscale and 0.74 for ethnic xenophobia, indicating that the instrument is suitable for research.

Data Analysis

In this study, data were analyzed using nonparametric descriptive and inferential statistics with the Statistical Package for the Social Sciences (SPSS) version 30. The profiles of cultural literacy and ethnic xenophobia were

examined through descriptive analysis. A comparison of the average pretest and posttest scores was conducted to assess differences in cultural literacy and ethnic xenophobia across regional groups. Friedman's nonparametric test was used to determine the significance of differences between cultural literacy and ethnic xenophobia across all selected areas in North, Central, and West Singkawang. The reason for using the Friedman test is that this study was conducted across three regions and time points. Preliminary tests were performed before the Friedman nonparametric test to assess data normality ($p > .05$). Table 1 shows that the data are not normally distributed. In addition, Pairwise Comparisons was used to evaluate the effectiveness of TIDAYU's local wisdom-based interactive e-book as a solution to cultural literacy and ethnic xenophobia in this study.

Table 1. Data normality test results

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistics	Df	Sig. ^a	Statistics	Df	Sig.
Pre-test center	.295	25	<.001	.766	25	<.001
Post-test middle	.288	25	<.001	.847	25	.002
Pre-test North	.276	25	<.001	.781	25	<.001
Post North test	.311	25	<.001	.805	25	<.001
Western pre-test	.272	25	<.001	.800	25	<.001
Western post tests	.238	25	<.001	.874	25	.005

a. Lilliefors Significance Correction

Based on the results of the normality tests with the Kolmogorov-Smirnov and Shapiro-Wilk, the significance value (Sig.) for all pre-test and post-test data in the Central, Northern, and Western regions was less than 0.05 ($p < 0.05$). This can be seen in the Shapiro-Wilk test, where the significance value for the Central region pre-test is 0.000, with a post-test value of 0.002; then the Northern region pre-test is 0.000, with a post-test value of 0.000; while the Western region pre-test SDN 23 is 0.000, and the post-

test value is 0.005. Thus, it can be concluded that the pre-test and post-test data across the three schools are not normally distributed.

The analysis showed that the pre-test and post-test data across the three schools did not meet the assumption of normality, as the overall significance value was less than 0.05. This condition indicates that the data do not follow a normal distribution.

According to Ghasemi & Zahediasl (2012), the Shapiro-Wilk test is more suitable

for small samples (<50) because it is more sensitive to deviations from normality than the Kolmogorov-Smirnov test. The Shapiro-Wilk test results in this study consistently show p-values < 0.05, indicating that the data are not normally distributed.

Consequently, subsequent data analysis should use non-parametric tests. For example, to test the difference in pre-test and post-test learning outcomes, the Friedman Test can be used as an alternative to the Paired t-test (Sheskin, 2020). This is also in line with previous research, which emphasized that statistical tests should be tailored to the data's characteristics. When the data are abnormal, the use of parametric tests can yield biased results (Razali & Wah, 2011; Sheskin, 2020).

■ RESULT AND DISCUSSION

Results of the Initial Needs Analysis Stage

First, the researcher conducted observations and interviews in three areas of Singkawang City (North, Central, and West). These observations and interviews were conducted to identify the actual conditions of local cultural teaching in elementary schools. Data collection included classroom observations, an inventory of local cultural reading materials in school libraries, and interviews with fifth-grade teachers and school principals. Data triangulation results showed that the availability of teaching materials featuring local culture was relatively limited and not adequately integrated into daily learning processes; this is consistent with findings from other studies reporting the limited availability of local wisdom-based reading materials in elementary schools, which, in turn, impacts students' low cultural literacy (Asia, 2025).

Based on the needs analysis from the three schools, similarities and differences emerge in perceptions of the urgency of developing an interactive e-book based on the local wisdom of the Chinese, Dayak, and Malay (TIDAYU)

communities. From an interview with a teacher at North Singkawang, it was revealed that current learning materials are still very limited in containing local cultural content. According to the teacher, it is important to introduce students to traditions, customary ceremonies, typical foods, traditional games, and social values such as cooperation and tolerance. The teacher emphasized that Dayak culture, for example, the *Basamsam* or *Nyangahat* traditions, has never appeared in the thematic textbooks used. In terms of format, the teacher stated that students prefer a combination of illustrated stories, simple animations, and interactive quizzes. The teacher also stressed the importance of a structured learning flow: from exploration, to discussion, to evaluation, as well as a colorful visual display featuring distinctive local cultural motifs. The main obstacle was the limited number of devices and unstable internet connections, so the use of the e-book needed to be adapted to these conditions.

Meanwhile, an interview with a teacher at West Singkawang showed that the school has begun efforts to incorporate local wisdom into learning, but its implementation has not been consistent. According to this teacher, cultural aspects important to introduce through the e-book include folklore, traditional arts and music, and the values contained in local wisdom. The teacher observed an imbalance in the representation of local culture in textbooks, which tend to highlight national or international narratives. Regarding media, the teacher at West Singkawang emphasized that fifth-grade students prefer illustrated stories and animations that are easy to understand. Features considered effective for increasing student engagement included video interviews with traditional leaders and interactive cultural maps, which could provide a more authentic, locally contextual learning experience. The hope is that the TIDAYU interactive e-book can present more inclusive cultural content, such as Chinese oral traditions, Dayak dances, or

Malay carving art, making learning more relevant and meaningful.

The interview with a teacher at Central Singkawang revealed a more critical situation. The teacher assessed that the representation of local culture in current learning is very minimal; even local content (Mulok) subjects are more directed towards English under the pretext of supporting tourism, so local languages and cultures are given less space. According to this teacher, the following cultural aspects are very important to introduce through the e-book: regional languages, customary ceremonies, traditional arts and crafts, folklore, traditional clothing, typical foods, and architectural heritage. The teacher also highlighted the dominance of the majority culture in national textbooks, which marginalizes local culture. In terms of format, students at this school prefer interactive quizzes because they offer a fun, game-like learning experience and animations that visualize abstract concepts. The teacher emphasized the need for authentic features, such as audio and video recordings of traditional leaders and interactive cultural maps, to strengthen the learning context. An effective learning flow, according to the teacher, must be complete, starting with a contextual introduction, followed by material exploration, discussion, interactive exercises, evaluation, and a conclusion that reinforces the value. The obstacles faced include device limitations, unstable internet access, and low digital literacy among some students. The hope is that the TIDAYU e-book can foster a sense of pride and love for regional culture while also serving as a fun and meaningful learning medium.

Overall, although the three schools face similar problems with the limited representation of local culture in learning, they differ in the emphasis they place on their needs. North Singkawang emphasizes aspects of Dayak tradition and social values that have not appeared in textbooks. West Singkawang emphasizes the

importance of presenting folklore and traditional arts in a simple visual format. At the same time, Central Singkawang stresses the need for more comprehensive, authentic content that covers all aspects of local culture, to avoid being marginalized by the dominance of the majority culture. Thus, the TIDAYU interactive e-book needs to be designed adaptively to meet these diverse needs, while remaining consistent with its main goal of fostering cultural literacy, addressing representation imbalances, and instilling in students a sense of pride in the Chinese, Dayak, and Malay cultures in Singkawang.

The average pre-test scores were relatively low and almost uniform (mean rank around 1.9–2.1), indicating that students' cultural literacy before using the TIDAYU e-book was still limited and that their skills were weak, failing to meet the indicators of mastery of basic cultural concepts. This condition is consistent with studies that found low cultural literacy/reading for culture among students when local material is not presented in an interesting and contextual form (Pratiwi, 2024).

Based on this qualitative and quantitative data, it is clear that a learning media intervention is needed that: (1) features Chinese-Dayak-Malay (TIDAYU) local wisdom content in an equal and contextual manner; (2) is interactive and multimodal (short text, illustrations, audio/local speakers, interactive quizzes) to suit the learning preferences of elementary school children; and (3) can be used offline to overcome connectivity limitations in some schools. This recommendation is supported by recent literature showing that digital storybooks/interactive e-books based on local wisdom are effective in increasing cultural understanding, reading interest, and student engagement, including empirical evidence of the development of digital storybooks and interactive e-books based on local wisdom that have been reported to improve learning outcomes and tolerant attitudes (Listiani; Juliatni,

Lasmawan, & Parmiti, 2025). In addition, a pedagogical framework that integrates the Culturally Responsive Teaching (CRT) approach is highly relevant: when learning material is connected to students' cultural knowledge, cognitive and affective engagement increases, making learning more effective and impactful on inclusive inter-ethnic attitudes. Therefore, the development of the interactive e-book should adopt CRT principles e.g., placing local stories/wisdom at the center of learning, providing space for students' experiences, and presenting reflective tasks that encourage appreciation for differences.

In short, the findings from observations and interviews in the three Singkawang areas confirm (a) a real need to enrich local cultural teaching materials; (b) the low pre-test scores (mean rank around 1.9–2.1) signal the urgency of intervention; and (c) the latest scientific evidence supports the development of an interactive e-book based on local wisdom (TIDAYU) as a practical solution with the potential to increase cultural literacy and foster tolerant attitudes. Implementative recommendations will include the creation of an e-book module containing cultural narratives, supporting multimedia (audio from local narrators, image galleries), interactive quizzes, and an offline package for widespread adoption by schools in Singkawang.

E-Book Design Results

This interactive e-book features various local cultural stories unique to the Chinese, Dayak, and Malay communities in Singkawang City. For instance, the Cap Go Meh celebration depicts Chinese ethnic traditions through the *tatung* ritual, *Naik Dango*, a Dayak traditional ceremony to welcome the rice harvest season, the art of Zapin dance and music, a hallmark of Malay culture, and Malay pantun (poetry) rich in local wisdom values. All these cultural stories are presented in text form and enhanced with visual

illustrations, audio, and simple animations to be more engaging and easier students to understand.

To support active learning, this e-book also includes interactive quizzes, practice questions, and multicultural reflection activities. The interactive quizzes are designed around activities such as rearranging the sequence of a tradition, drawing and coloring traditional houses, completing a pantun, or answering short questions about the newly learned culture. The practice questions serve to strengthen students' understanding while integrating critical thinking skills. Meanwhile, multicultural reflection activities provide a space for students to compare, appreciate, and reflect on the values of each culture, thereby fostering an attitude of tolerance, mutual respect, and pride in the cultural diversity of their environment.

E-book Development Results

Chapter 1 – Me and the Culture in My City

This chapter introduces Singkawang City as the “City of a Thousand Temples,” a multicultural city. Students are introduced to the three main ethnic groups (Chinese, Dayak, Malay) along with their cultural characteristics. A cultural map, important icons (temples, *betang* houses, mosques, markets, schools), and reflection activities emphasize that differences are not barriers but a richness for harmonious living.

Chapter 2 – Chinese Culture: Colorful Traditions Full of Meaning

This chapter discusses the origins and characteristics of Chinese culture in Singkawang. The traditions of Chinese New Year and Cap Go Meh are explained, along with the meanings of *angpao* (red envelopes), lion dances, lanterns, and special foods. The main values highlighted are hard work, respect for ancestors, and cooperation. Creative activities such as designing *angpao* and cultural posters encourage students

to develop a tolerant for attitude towards differences.

Chapter 3 – Dayak Culture: Harmony with Nature and Others

This chapter introduces the Dayak people, the indigenous inhabitants of Kalimantan, and their *Batang* traditional houses, *Naik Dango* tradition, *Sape* music, and ritual dances. The Dayak's local wisdom values include love for nature, mutual cooperation, and customary justice. Interactive activities, such as drawing Dayak motifs and creating folktales, encourage students to appreciate the close relationship of the Dayak people with nature and social justice.

Chapter 4 – Malay Culture: Gentle in Action

This chapter explains the origins of the Malay people in Singkawang, who are synonymous with politeness and Islamic values. The main features are *Mawlid al-Nabi*, *saprahan* (communal dining), *pantun*, *syair*, *zapin* dance, and *baju kurung*. The noble values instilled are politeness, respect for parents, and tolerance. The creative activity of creating pantuns teaches students to mind their words and be courteous amid differences.

Chapter 5 – Weaving Harmony, Erasing Suspicion

The final chapter emphasizes the harmony among Chinese, Dayak, and Malay cultures. A table comparing the cultures and a reflection on anti-xenophobia are presented. The main values instilled are tolerance, empathy, love for diversity, and unity. A creative activity of making a diversity poster encourages students to become “Culture Friends” who appreciate differences from an early age.

Conclusion

The e-book concludes with a final test (multiple-choice, fill-in-the-blank, essay) to measure students' understanding, as well as appendices including a cultural glossary, coloring tradition cards, and a “Culture Friend” certificate. The main message is: diversity is a strength, and xenophobia must be prevented from an early age through character education based on local wisdom.

The Validity of the TIDAYU Local Wisdom-Based Interactive E-book

The validation results of the interactive e-book based on TIDAYU local wisdom,

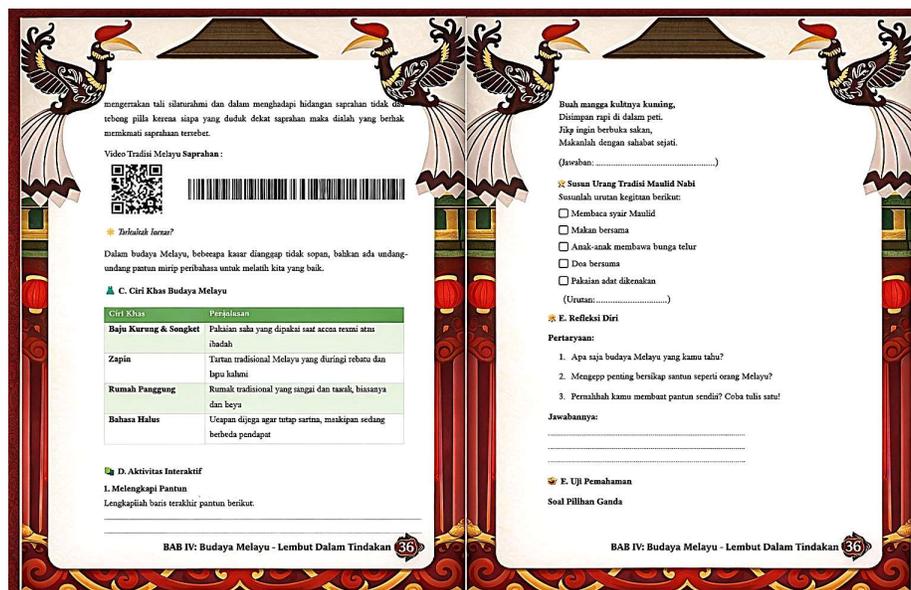


Figure 1. Example of media visualization display

Table 2. Expert validation results

No	Aspects	V1	V2	V3	Average	Category
1	Conformity of Content with TIDAYU's Local Wisdom, Scientific Quality and Academic Feasibility, Structure and Coherence of the Material, Language and Presentation Style	77%	89%	75%	81%	Highly Valid

conducted by three validators, indicate that the product achieved a very high validity rating, averaging 81%. In detail, Validator 1 provided a score of 77% (valid category with moderate revision), Validator 2 scored 89% (very valid category with minor revision), and Validator 3 scored 75% (valid category with moderate revision). The score differences among validators suggest variations in assessment, particularly regarding content validity and the emphasis on

character values. These aspects require reinforcement through the inclusion of academic references, the involvement of traditional leaders, and concrete examples of how cultural values are implemented in daily life.

The Practicality of the TIDAYU Interactive E-book

The assessment by three elementary school teachers in Singkawang City shows that the

Table 3. Interpretation of teachers' assessment

No	Aspects	Teacher 1	Teacher 2	Teacher 3	Average	Category
1	Conformity of Content with TIDAYU's Local Wisdom, Scientific Quality and Academic Feasibility, Structure and Coherence of the Material, Language and Presentation Style	84%	84%	84%	84%	Very Practical

interactive e-book based on TIDAYU local wisdom received a valid rating, with an average score of 84%. Teachers from North Singkawang, Central Singkawang, and West Singkawang gave relatively uniform ratings, especially on aspects of material suitability, local relevance, and general

feasibility, which were rated highly (average score of 4.3). This confirms that the e-book's content aligns with the curriculum, proportionally represents Chinese, Dayak, and Malay cultures, and is suitable for use as a teaching material in elementary schools.

Table 4. Recapitulation of learning implementation using the TIDAYU interactive E-book

Teacher	Maximum Score	Scores Obtained	Percentage	Category
(North Singkawang area)	60	50	83%	Implementation
(Central Singkawang Region)	60	52	87%	Highly Implemented

(West Singkawang Region)	60	51	85%	Highly Implemented
Average	60	51	85%	Highly Implemented

The large-scale trial also indicated that the learning implementation using the TIDAYU interactive e-book was in the highly implemented category, with an average of 85%. Teachers assessed that core activities, such as using cultural visuals and group discussions, were well-executed and fostered tolerance among students. Minor differences in student interactivity and visual quality were noted, suggesting these areas need refinement. Teacher recommendations also highlighted that the TIDAYU e-book has significant potential as a best practice for local wisdom-based learning and deserves wider application in elementary schools.

The Effectiveness of Using the TIDAYU E-book in Enhancing Cultural Literacy

Based on the analysis using the Friedman test on pre-test and post-test data from three

Table 5. Results of the friedman non-parametric test

Description	Value
Total N	75
Test Statistic	103.709
Degree of Freedom	5
Asymptotic Sig. (2-tailed)	< .001

schools, with 75 student respondents, a test statistic of 103.709 was obtained with $df = 5$. The asymptotic significance (Asymp. Sig.) was < 0.001 . Since the significance value is less than 0.05, it can be concluded that there is a significant difference among the compared value groups.

The Friedman test results show a significant difference between pre-test and post-test scores across all three regions (North Singkawang, Central Singkawang, and West Singkawang). This finding indicates that the intervention

provided to students in these schools significantly improved their learning outcomes. The Friedman test was chosen because the pre-test and post-test data did not meet the normality assumption, making a nonparametric analysis more appropriate than parametric tests (such as a Paired t-test or ANOVA). According to Sheskin (2020), the Friedman test is a nonparametric alternative to a repeated-measures ANOVA for comparing more than two related groups on an ordinal or nonnormal interval scale.

This result is consistent with previous research emphasizing that innovative learning media, especially those that are interactive and grounded in local wisdom, can enhance student motivation and learning outcomes (Aryaningrum & Riyanti; Wahyudi et al.; Hidayah et al., 2025). The significant difference between pre-test and post-test scores in all three schools confirms that the implemented learning strategy successfully and consistently improved students’ conceptual understanding across different school

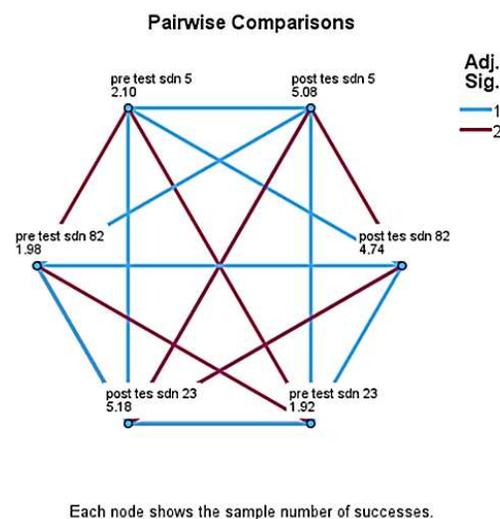


Figure 2. Significant difference between pre-test and post-test at all schools

The follow-up analysis using pairwise comparisons after the Friedman test showed a difference in success rate between the pre-test and post-test groups across the three study locations: Central, Northern, and Western. Each point (node) on the graph represents a treatment group, and the value below it indicates the Friedman test's mean rank. The average score for the pre-test group ranged from 1.92 to 2.10, while the post-test group had a higher average score of 4.74 to 5.18. This pattern indicates consistent improvement in learning outcomes after the learning intervention is implemented.

The connecting line between the points shows the results of the comparison between the group pairs. The red line indicates a statistically significant difference, while the blue line shows no significant difference between the two groups. Based on the color pattern, significant differences (red lines) are mainly observed between the pre-test and post-test groups across the Central, Northern, and Western regions. This indicates a significant increase in learning outcomes following the application of the learning treatment. Meanwhile, the blue line connecting the post-test

groups across locations showed no significant difference in post-test results among the three regions, indicating that the learning effects were relatively uniform and consistent across all schools.

Thus, the results of the analysis of the Friedman test and the overall pairwise comparisons test reinforce the finding that this e-book contributes to building students' cultural literacy through content that integrates local Chinese, Dayak, and Malay values, and that the improvement occurs evenly across the various research sites. These findings are in line with the view of Field (2024) and Pallant (2020), who stated that the Friedman test can be used to identify significant differences between three or more paired conditions in repeated measurement designs, as well as allow further analysis to be carried out to determine group pairs that show real differences. Figure 3 shows the comparison of pre-test and post-test scores in 3 regions. This visualization shows that posttest scores are higher than pretest scores in three regions, indicating an increase in cultural literacy after implementing the developed learning media.

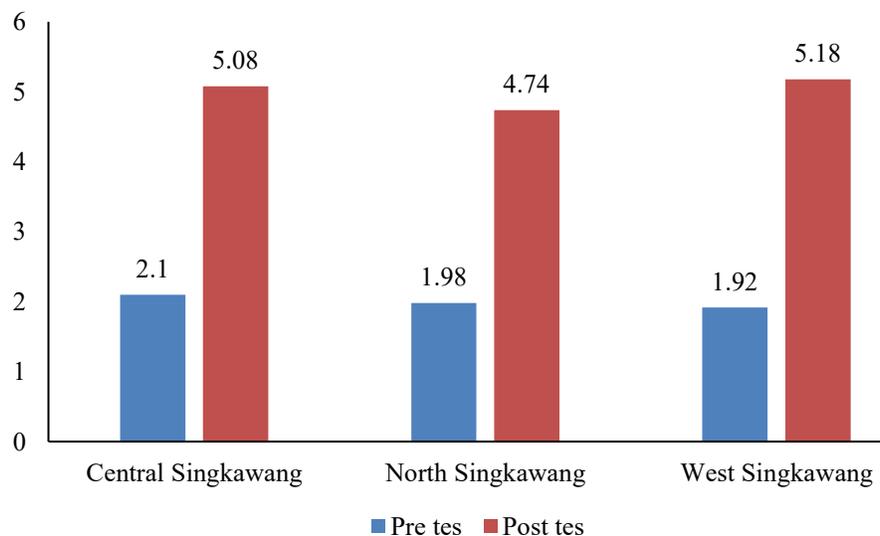


Figure 3. Comparison chart of pre-test and post-test scores in 3 regions

To complement the significance test, an effect size analysis was conducted using Kendall's Coefficient of Concordance (W), which

measures the strength of the effect across repeated measures (Field, 2024). W-Value obtained= 0.277. According to Cohen's (1988)

guidelines, this value indicates a small-to-moderate effect size (0.10–0.30 = small; 0.31–0.50 = medium; >0.50 = large). Thus, the implementation of the TIDAYU-based interactive e-book had a meaningful, though modest, effect on enhancing students' cultural literacy and reducing tendencies toward ethnic xenophobia across the three study areas. This finding implies that while the e-book intervention successfully influenced students' awareness and appreciation of cultural diversity, further refinement and broader implementation may be required to achieve a stronger effect size.

This achievement is important in the context of multicultural education, as increased cultural literacy has been shown to reduce prejudice and exclusive attitudes, which are the roots of ethnic xenophobia (Banks, 2021; Scott et al., 2023). Digital media based on local culture have also

been shown to be effective in promoting cross-cultural understanding, increasing learning motivation, and fostering tolerant attitudes (Osborne, 2023; Wahyudi et al., 2025). With uniform results across all schools, the TIDAYU e-book serves as a strategic medium for fostering tolerance, strengthening social cohesion, and reducing the tendency toward ethnic xenophobia among elementary school students (Osborne et al.; Scott et al., 2023). Therefore, this e-book contributes to building students' cultural literacy by integrating the local values of the Chinese, Dayak, and Malay communities.

Students and Educators' Responses to the TIDAYU E-book

Based on questionnaire responses from 75 students, the average was 84%, indicating very good performance. The distribution of answers

Table 6. Summary of students' responses by school

School (Region)	Number of Students	Maximum Score (12×4×respondents)	Total Score	Percentage	Category
North Singkawang	25	1200	1002	84%	Very Good
West Singkawang	25	1200	1014	85%	Very Good
Center Singkawang	25	1200	1014	85%	Very Good
Total / Average	75	3600	3030	84%	Very Good

showed a predominance of "Agree" and "Strongly Agree" scores on nearly all items. The average score per item ranged from 3.22 to 3.54, indicating that the majority of students found the TIDAYU interactive e-book to have an attractive design, be easy to understand, and be interactive and useful for increasing cultural understanding and tolerance.

The aspect with the highest score was values and benefits (average score 3.54; very good), which shows that the e-book helped students understand the importance of intercultural

tolerance and introduced them to local Chinese, Dayak, and Malay cultures. Meanwhile, the item with a slightly lower score (3.22; good) was related to the ease of understanding certain materials, suggesting a need to simplify the narrative to better suit the comprehension level of elementary school students. This result aligns with previous research, which confirms that integrating local culture into digital media can increase students' interest and comfort in learning (Aryaningrum & Riyanti; Wahyudi et al.; Hidayah et al., 2025). Furthermore, the use of interactive

e-books has proven effective in strengthening digital literacy while fostering attitudes of tolerance and multiculturalism among students (Listiani, Juliatni, Lasmawan, & Parmiti, 2025).

Thus, student responses demonstrate that the TIDAYU e-book is not only materially valid but also very well-received by learners. This strengthens the evidence that digital learning media linked to local wisdom can be a solution for enhancing cultural literacy and reducing the potential for ethnic xenophobia in elementary schools (Osborne et al; Scott et al, 2023). In general, both students and teachers responded positively to the TIDAYU interactive e-book. Student responses emphasized the values & benefits (86%), while teacher responses reinforced its feasibility for classroom use (84%) and for learning implementation (85%).

This triangulation of results confirms that the TIDAYU e-book is: 1) Feasible for use as a local wisdom-based learning medium; 2) Well-received by students because it is engaging, interactive, and meaningful; and 3) Supported by teachers as a medium that is practical, curriculum-aligned, and promotes intercultural tolerance. This finding is consistent with previous research stating that local culture-based digital media can increase students' motivation, conceptual understanding, and tolerant attitudes (Listiani, Juliatni, Lasmawan, & Parmiti, 2025). Therefore, the TIDAYU e-book is not only valid in content and practical for teachers to use, but also effective in enhancing the cultural literacy of elementary school students.

Referring to the results and discussion above, it is clear that the high level of positive student response to the TIDAYU culture-based interactive e-book is influenced by its constructivist pedagogical design and cultural relevance in a multicultural context. Interactive features that require grouping traditions encourage active meaning-making, aligning with constructivist learning theory, which emphasizes that understanding is formed through direct experience. The multicultural reflection activities

in the e-book are also effective in reducing xenophobic tendencies because they facilitate perspective-taking, a mechanism proven to reduce stereotypes and increase empathy between groups (Pettigrew & Tropp, 2019; Dhawan, 2020).

The animated cross-cultural folktales support students' emotional engagement through narrative transportation, which has been shown to increase acceptance of moral values and positive attitudes toward other groups (Green & Brock, 2020). The visual representations of Chinese, Dayak, and Malay cultures foster a sense of belonging, aligning with research findings that equitable cultural representation in educational media can increase students' motivation and identification with learning (Gay, 2018). The e-book's adaptive design, tailored to the cultural needs of different regions, aligns with the principles of culturally responsive digital learning, which has been proven to increase student participation and engagement in multicultural environments (Gay, 2018).

In terms of implementation, this e-book is designed to be flexibly integrated into various subjects, particularly science, Indonesian, civics, and arts and culture. In science, Chinese, Dayak, and Malay cultural content can be used to explain concepts of social interaction, environmental adaptation, and the dynamics of the multicultural society around students. Illustrations and tradition classification quizzes in the e-book help students observe and analyze social phenomena contextually. In Indonesian, the e-book supports literacy learning through folklore texts, character dialogues, and reflection prompts. Students can be trained to identify story elements, analyze moral values, rewrite characters and plots, and engage in reflective writing activities based on personal cultural experiences. In civics learning, the e-book reinforces the values of tolerance, togetherness, and respect for differences through multicultural reflection activities and cross-ethnic narratives that emphasize social harmony. Balanced cultural

representation helps students understand the meaning of coexistence in a pluralistic society. Meanwhile, in the Arts, Culture, and Crafts (SbdP) subject, e-books can be used to introduce a variety of visual arts and TIDAYU cultural traditions, such as Dayak carving motifs, Malay traditional clothing, typical Chinese ornaments, and elements of performing arts in folklore. Teachers can use this material as a resource for drawing, pattern-making, simple artwork, or exploring cultural movement and expression. Thus, interactive TIDAYU culture-based e-books serve as cross-subject learning media that enrich the learning experience while fostering comprehensive cultural literacy. This integration aligns with the blended character education approach, which emphasizes the use of digital media to instill social values contextually (Sieder, 2013). Learning strategies such as Problem-Based Learning, Project-Based Learning, and Cooperative Learning are also highly recommended to maximize the impact of e-books, as they can encourage cross-ethnic collaboration and strengthen experiential learning. Several recent studies have noted that cooperative strategies can increase inclusive attitudes and reduce social distance between student groups (Ferguson-Patrick & Jolliffe, 2018).

Overall, these findings suggest that the success of the TIDAYU interactive e-book is not only due to its content quality but also to its relevance to the socio-cultural realities of the Singkawang community. Its balanced cultural representation, interactive features that encourage empathy, and easy integration into the curriculum make this e-book an effective medium for increasing cultural literacy while reducing potential xenophobia among elementary school students.

■ CONCLUSION

The results of this study show that the development of interactive e-books based on

Chinese, Dayak, and Malay local wisdom (TIDAYU) can improve students' cultural literacy and enrich multicultural learning experiences in elementary schools. Although not designed to measure causal effects directly, the qualitative findings and post-test score improvements suggest a positive shift in students' cultural awareness. This e-book makes an important contribution to the field of education, especially in the context of digital learning that integrates local values to strengthen tolerance and ethnic diversity in multiethnic primary schools. Theoretically, this study expands understanding of multicultural learning media design aimed at developing cultural literacy and intercultural understanding in elementary school-age children.

This research has several implications and limitations that need to be considered. In practice, the study's results provide a basis for elementary school teachers to integrate local cultural content into digital media, making learning more meaningful and relevant to students' lives. However, the study used a single-group design without a control group, had a relatively small sample size, and was conducted in only one city. Therefore, claims about the effectiveness of e-books need to be carefully considered. Further research is suggested using a more robust experimental design, involving cross-regional samples, as well as examining the long-term impact of e-book use on the formation of inter-ethnic attitudes of tolerance and acceptance in the context of primary education.

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