



Development of a Local Wisdom-Based Digital Comic Media Integrating the Sidakarya Mask to Enhance Cultural Literacy and Reading Outcomes in Primary Education

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Abstract: This study aims to develop and examine the validity, practicality, and effectiveness of a digital comic learning media incorporating the local wisdom of the Sidakarya Mask to improve cultural literacy and reading learning outcomes among fifth-grade elementary school students. The study employed a Research and Development (R&D) method using the ADDIE model. The participants consisted of all fifth-grade students at SD Negeri 4 Peliatan, selected through total sampling. The effectiveness of the media was evaluated using a one-group pretest-posttest design. Data were collected through expert validation, teacher and student response questionnaires, and tests of cultural literacy and reading achievement. Data analysis involved qualitative and quantitative descriptive analysis, paired-sample t-tests, and N-Gain calculations. The results indicate that the developed media demonstrates very high validity and practicality. Its use significantly improved students' cultural literacy and reading learning outcomes, as reflected by N-Gain scores of 0.58 for cultural literacy (moderate category) and 0.72 for reading learning outcomes (high category). In conclusion, the digital comic media incorporating the local wisdom of the Sidakarya Mask is feasible and effective for Bahasa Indonesia learning in elementary schools.

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Introduction

Indonesia has a rich cultural diversity that serves as an important foundation for shaping national identity and character. However, the rapid flow of globalization and the development of information technology have shifted the orientation of younger generations, particularly students, from local culture toward global culture. This phenomenon has led to declining appreciation for local wisdom and weakening cultural literacy, which ultimately affects students' ability to understand social and cultural contexts in learning (Nudiati & Sudiapermana, 2020; Zulkarnain, 2025).

Cultural literacy refers to an individual's ability to understand, appreciate, and respond to culture as a component of national identity. It is an essential prerequisite for successful learning, communication, and interaction in a multicultural society (Nurjanah et al., 2022). In the context of primary education, cultural literacy is closely related to reading ability, as text comprehension requires not only technical reading skills but also an understanding of symbolic meanings and cultural contexts embedded in the text (Ramadhani et al., 2025).

Indonesian language learning in elementary schools plays a strategic role in fostering cultural literacy while improving reading learning outcomes. Through reading texts, folktales,



and regional literary works, Indonesian language instruction can serve as a medium for introducing local cultural values relevant to students' lives (Ramandhani & Widyartono, 2024). However, the 2022 PISA international survey results indicate that Indonesian students' reading literacy remains below the OECD average, with most students only able to comprehend texts at a basic level. The 2025 Education Report Card data also show that more than a quarter of elementary school students have not yet reached the proficient literacy category.

These issues are reinforced by empirical conditions in elementary schools, particularly at SD Negeri 4 Peliatan, where cultural literacy and reading learning outcomes among fifth- grade students remain suboptimal. Students tend to be more familiar with foreign cultures than with local ones, including having limited understanding of the local wisdom of the Sidakarya Mask as part of Balinese cultural heritage. This low level of cultural literacy affects students' ability to comprehend reading texts that contain cultural contexts, thereby influencing their reading achievement.

One factor contributing to this problem is the limited availability of contextual and locally relevant learning media. The learning media currently used are still conventional and make limited use of digital technology, making them less effective in stimulating reading interest and student engagement (Laksana, 2024). In fact, visual and narrative-based learning media such as digital comics have been proven effective in enhancing learning motivation, conceptual understanding, and reading skills among elementary school students (Febriyandani & Kowiyah, 2021).

Based on these issues, there is a need for learning media innovation that not only integrates digital technology but also addresses the limitations of many existing educational media. Previous digital learning media have often been designed in a generic way, with limited connection to students' local cultural contexts and, in some cases, a greater emphasis on global or Western-centered narratives and visual representations. Consequently, technology in education tends to function merely as a tool for content delivery rather than as a medium for preserving and transmitting local wisdom. This study seeks to fill that gap by positioning digital technology as a curator of local culture through the development of a digital comic integrating the Sidakarya Mask, one of Bali's significant cultural heritages. The expected contribution of this research is twofold. Practically, it offers an innovative and culturally relevant learning medium that can enhance students' cultural literacy and reading outcomes in primary education. Theoretically, it contributes to the growing discourse on culturally responsive digital pedagogy by demonstrating how local wisdom can be meaningfully embedded into digital media design, so that technology supports not only academic achievement but also the preservation of cultural identity from an early age.

Research Method

This study employed the Research and Development (R&D) method to produce a learning media product and to evaluate its quality. The development of the digital comic media incorporating the local wisdom of the Sidakarya Mask was based on the ADDIE model, which includes the stages of Analysis, Design, Development, Implementation, and Evaluation (Branch & Varank, 2009; Sumiati, 2022). Product effectiveness was tested using a one-group pretest-posttest design, involving measurement of students' abilities before



(pretest) and after (posttest) the use of the media. The study was conducted at SD Negeri 4 Peliatan, Ubud District, Gianyar Regency, Bali, from September to November 2025. The trial subjects consisted of all fifth-grade students selected using a total sampling technique, with a total of 66 students: 33 students in the experimental class and 33 students in the control class. The research objects included the validity, practicality, and effectiveness of the developed digital comic media. Data were collected using both non-test and test techniques. The instruments used in this study were developed by the researcher based on the research objectives and relevant indicators of cultural literacy, reading learning outcomes, and digital media quality, rather than being directly adopted from standardized instruments. Prior to implementation, all instruments underwent content validation through expert judgment using Gregory's formula. The validation process examined several aspects, including the appropriateness of the content with learning objectives, clarity of language and narrative, accuracy in representing the local wisdom values of the Sidakarya Mask, relevance to students' cultural context, and the technical quality of the digital comic media, such as visual design, layout, readability, navigation, and ease of use. Item validity and reliability were then tested empirically for both the cultural literacy questionnaire and the reading achievement test. Data analysis was conducted qualitatively to process validators' comments, suggestions, and trial findings as a basis for product revision, and quantitatively through Gregory's validity test, practicality percentages based on teacher and student responses, and effectiveness testing using the Paired Sample t-test and N-Gain calculation to determine improvements in cultural literacy and reading learning outcomes.

Results and Discussion

The development of the digital comic media incorporating the local wisdom of the Sidakarya Mask in this study was systematically designed through the ADDIE model to address the need for contextual Indonesian language learning relevant to the characteristics of elementary school students. The media design was based on Piaget's and Bruner's cognitive development theories, which state that elementary school students are at the concrete operational stage and more easily understand material through visual and narrative representations (Babullah, 2022). The low level of students' reading interest and cultural literacy, as reported by OECD (2023), underlies the selection of digital comics that integrate text and visuals harmoniously to enhance students' cognitive and affective engagement (Plass et al., 2020). The media was also designed in alignment with the Indonesian Language Learning Outcomes for Phase C and Barrett's Taxonomy by integrating literal, inferential, evaluative, and appreciative elements into story panels, while embedding Sidakarya cultural values such as religiosity, responsibility, and mutual cooperation within a contextual cultural literacy framework (Rutten, 2020).

At the design and development stage, the digital comic was created in HTML5 format with CGI visuals, sequential panel flow, and concise dialogue to avoid overloading students' working memory (Ismail & Ling, 2025). The implementation of the media showed a significant improvement in students' cultural literacy and reading learning outcomes, indicated by the achievement of all KKTP indicators after its use. Strong visualization of local culture and narrative learning experiences helped students identify cultural elements, understand symbolic meanings, and connect cultural values with everyday life (Supartayasa

& Wibawa, 2022). Formative and summative evaluations showed that the media met pedagogical, aesthetic, and functional aspects and effectively enhanced students' text comprehension and cultural value understanding according to learning media quality criteria (Syahmi et al., 2022).

The final product of this development study is a learning medium in the form of a digital comic incorporating the local wisdom of the Sidakarya Mask, used in fifth-grade Indonesian language learning in elementary school. The study was conducted based on the ADDIE model, which includes the stages of analysis, design, development, implementation, and evaluation. The digital comic media product was designed in an interactive digital format that integrates narrative text, visual illustrations, and Balinese local cultural values, particularly the philosophy and symbolic meaning of the Sidakarya Mask. The digital comic media incorporating the local wisdom of the Sidakarya Mask can be accessed at: <https://go.undiksha.ac.id/31425>. The display of the digital comic media incorporating the local wisdom of the Sidakarya Mask can be seen in Figure 1.



Figure 1. Digital Comic Media Product Incorporating the Local Wisdom of the Sidakarya Mask.

The developed product was subsequently tested through validity, practicality, and effectiveness assessments. The initial stage of analysis focused on media validity testing to determine the feasibility of the digital comic media before its implementation in learning. The validity test was conducted by media experts, material experts, and language experts using an instrument in the form of assessment questionnaires. The results showed that the digital comic media incorporating the local wisdom of the Sidakarya Mask fell into the valid category and was suitable for use in Indonesian language learning for fifth-grade elementary students. A summary of the media validity test results is presented in Table 1.

Table 1. Media Validity Test Results

| No. | Aspect | Expert 1 | Expert 2 | Score | Category |
|-----|----------|----------|----------|-------|----------|
| 1 | Media | 0,93 | 0,95 | 0,94 | Valid |
| 2 | Material | 0,92 | 0,88 | 0,90 | Valid |
| 3 | Language | 0,91 | 0,94 | 0,92 | Valid |

Based on Table 1, validation of the digital comic media incorporating the local wisdom of the Sidakarya Mask was conducted to ensure product feasibility before the practicality and effectiveness testing stages, involving media, material, and language experts. The validation results showed that all three aspects obtained very high scores (0.90–0.94),



indicating that the media met standards of visual quality, content suitability, and language clarity as key components of a feasible learning medium (Wulandari et al., 2023). The visual quality, layout, and navigation of the digital comic were considered capable of supporting the understanding of elementary students at the concrete operational stage, as clear and engaging visuals are proven to enhance students' attention and information processing (Kusumadewi et al., 2022). These findings are consistent with studies stating that well-designed digital comics can increase students' interest, motivation, and learning comprehension (Ranting & Wibawa, 2022).

In terms of content, the high validity indicates that the Sidakarya cultural content and storyline were aligned with Indonesian Language Learning Outcomes for Phase C and presented contextually and relevantly to students' lives. The presentation of cultural values through visual narratives was considered effective in building cultural literacy and improving elementary students' reading comprehension (Rutten, 2020). These results are consistent with previous studies showing that digital comics based on local wisdom can enhance cultural appreciation as well as students' reading comprehension skills (Nurjanah et al., 2022).

In terms of language, the very high validity score indicates that the sentence structure, vocabulary, and language style in the comic were appropriate for the language development level of fifth-grade students. The use of simple sentences and communicative dialogue facilitated students' understanding of the reading content and the cultural messages conveyed (Supartayasa & Wibawa, 2022). This language suitability also contributed to reducing cognitive load and improving reading comprehension effectiveness when combined with appropriate visuals (Plass et al., 2020).

Constructive feedback from experts regarding enlarging font size, adding information on Learning Outcomes, and refining language was followed up through product revisions to make the media more readable, informative, and consistent. This revision process aligns with the principles of the ADDIE model, which positions expert feedback as the primary basis for product refinement to achieve optimal quality before implementation (Martatiyana et al., 2023). Thus, the digital comic media incorporating the local wisdom of the Sidakarya Mask was declared highly valid and ready for practicality and effectiveness testing to improve cultural literacy and reading learning outcomes of fifth-grade elementary students.

After being declared valid, the digital comic media was tested at the practicality stage to determine ease of use and user responses. The practicality test involved fifth-grade teachers and students through a media-use response questionnaire. The analysis results indicated that the digital comic media received very positive responses from both teachers and students, showing that the media is easy to use, engaging, and appropriate to the characteristics of elementary school learners. The practicality test results are presented in Figure 2.

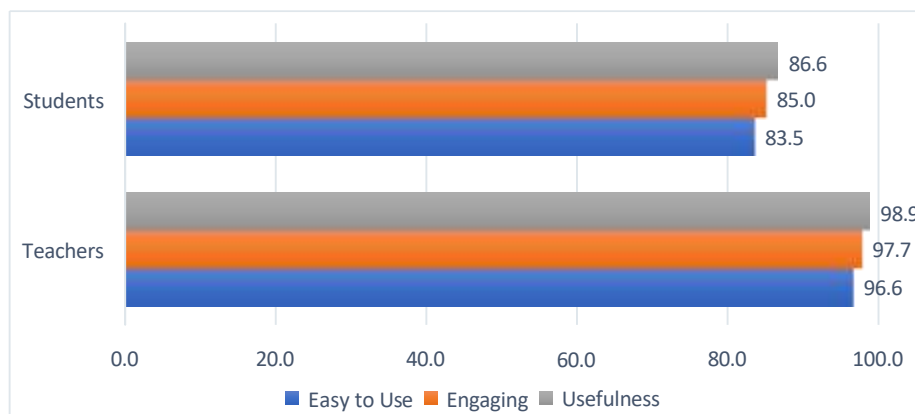


Figure 2. Media Practicality Test Results.

According to Figure 2, the practicality of the digital comic media incorporating the local wisdom of the Sidakarya Mask was tested through student and teacher responses as end users to ensure that the media was easy to use, engaging, and applicable in real Indonesian language learning contexts. Practicality is an important indicator in learning media development because it reflects the applicability of the product in the classroom and user comfort in operating it (Fadilah et al., 2023). Individual trial results showed very positive scores, indicating that the navigation, visual display, and storyline of the digital comic were very well received by students individually, consistent with the view that interactive visual media can enhance elementary students' learning engagement (Syahmi et al., 2022).

In small-group and large-scale trials, the digital comic media continued to receive a very positive category, indicating that the media was effectively used in collaborative learning and capable of encouraging discussion, story comprehension, and the collective introduction of cultural values. The visual and narrative presentation in the digital comic was proven to help students understand reading content and actively interact within learning groups (Kusumadewi et al., 2022). The high scores in usability and attractiveness indicate that the media aligns with the characteristics of students at the concrete operational stage who require visual and story support to optimally understand information (Babullah, 2022). Although the ease-of-use aspect obtained a relatively lower score, it still fell within the very good category, indicating that the media could be operated without significant difficulty, although there remains slight room for navigation refinement (Ismail & Ling, 2025).

Teachers' responses also indicated a very high level of practicality, particularly in terms of usability and ease of use, suggesting that the digital comic media assists teachers in delivering learning materials, instilling cultural values, and serving as a learning facilitator. The media was considered practical because it supports learning objectives and can be easily integrated into the teaching and learning process (Nurrisa, 2025). Ease of use and perceived usefulness further strengthened teachers' acceptance of digital comics as technology-based learning media (Plass et al., 2020). These findings are consistent with previous studies stating that digital comics are considered practical and effective by teachers due to their accessibility, content relevance, and ability to enhance students' motivation and understanding (Ranting & Wibawa, 2022).

Thus, the results of the practicality test indicate that the digital comic media incorporating the local wisdom of the Sidakarya Mask is highly feasible for use in Indonesian



language learning, as it provides an interactive, engaging, and user-friendly learning experience for both students and teachers, and is therefore ready to proceed to the effectiveness testing stage to measure its impact on students’ cultural literacy and reading learning outcomes.

The next stage was testing the effectiveness of the digital comic media through its application in the learning process using a one group pretest–posttest design. Media effectiveness was analyzed based on improvements in students’ cultural literacy and reading learning outcomes before and after the use of the media. A summary of the effectiveness test results is presented in Table 2.

Table 2. Hypothesis Testing Results
Paired Samples Test

| | | t | df | Sig. (2-tailed) |
|--------|--|---------|----|-----------------|
| Pair 1 | Pretest Cultural Literacy – Posttest Cultural Literacy | -15,689 | 32 | 0,000 |
| Pair 2 | Pretest Learning Outcome – Posttest Learning Outcome | -9,940 | 32 | 0,000 |

Based on Table 2, the paired sample t-test results show a significant difference between pretest and posttest scores for both cultural literacy and learning outcomes after the implementation of the digital comic media incorporating the local wisdom of the Sidakarya Mask, with t-values of -15.689 and -9.940 and a significance value of $0.000 (< 0.05)$. This indicates that posttest scores were consistently higher than pretest scores. Therefore, it can be concluded that the developed digital comic media is effective in improving cultural literacy and reading learning outcomes of fifth-grade students at SD Negeri 4 Peliatan.

The effectiveness stage in the ADDIE model serves to confirm that the developed media is not only feasible and practical but also capable of significantly improving learning outcomes (Martatiyana et al., 2023). The results showed a clear improvement in cultural literacy. These findings support the view that cultural values are more effectively internalized when presented contextually, visually, and integrated into meaningful narratives (Rutten, 2020). A significant improvement was also observed in students’ reading learning outcomes. The structured visual narrative texts presented in the digital comic supported the development of reading skills at the literal, inferential, and evaluative levels, as explained in Barrett’s reading comprehension theory (Himawan, 2023). This is consistent with the perspective that effective learning media can equalize learning opportunities for students with diverse ability backgrounds (Supartayasa & Wibawa, 2022).

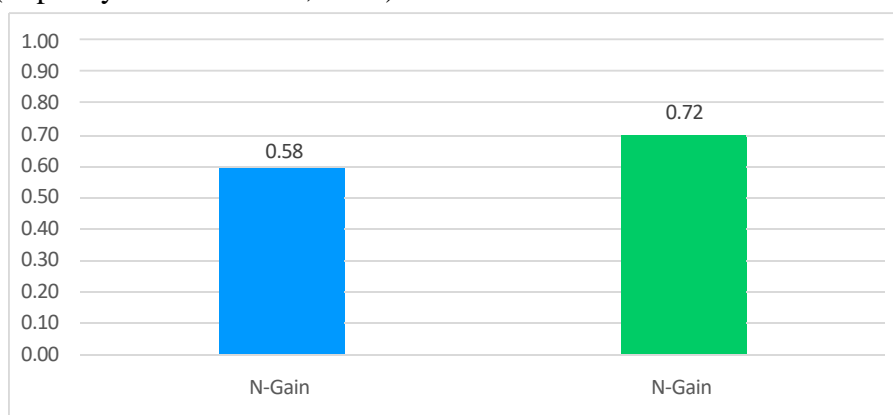


Figure 3. N-Gain Test Results.



Based on Figure 3, the N-Gain results show that cultural literacy reached 0.58, which falls into the moderate category, while reading learning outcomes reached 0.72, which is categorized as high. These findings indicate that the developed digital comic media was effective in improving both aspects, although the improvement in reading outcomes was greater than that of cultural literacy. This difference can be explained pedagogically. Reading comprehension tends to improve more quickly because it is directly trained through repeated interaction with narrative texts, vocabulary, and comprehension tasks provided in the digital comic. In contrast, cultural literacy is a more complex construct, as it involves not only understanding cultural information but also interpreting meanings, appreciating values, and connecting cultural content to students' personal and social contexts. Such processes require guided reflection, repeated exposure, and longer-term internalization beyond a single learning intervention. Therefore, the moderate gain in cultural literacy suggests that students had begun to develop understanding and appreciation of the cultural values embedded in the Sidakarya Mask, but this development naturally occurs more gradually than the improvement of reading skills. Furthermore, the paired sample t-test results showed a very significant difference between pretest and posttest scores for both cultural literacy and reading learning outcomes, with a significance value of 0.000 (< 0.05), confirming that the improvement was a direct result of the use of the digital comic media.

These findings are consistent with previous studies indicating that digital comics based on local wisdom are effective in improving cultural literacy, learning motivation, and reading comprehension among elementary school students (Fitria et al., 2023; Nurjanah et al., 2022; Pratiwi et al., 2025; Putri & Sukasih, 2025). Therefore, the digital comic media incorporating the local wisdom of the Sidakarya Mask has proven effective in enhancing cultural literacy and reading learning outcomes of fifth-grade elementary students and is suitable for use as an innovative alternative learning medium in culturally based Indonesian language instruction.

Pedagogically, these findings imply that culturally integrated digital media can function not only as instructional support tools but also as meaningful learning environments that connect academic skills with students' cultural identities. The use of digital comics based on the Sidakarya Mask demonstrates that reading instruction in primary education can be designed to go beyond basic comprehension by engaging students in culturally relevant narratives, visual interpretation, and value recognition. For teachers, this suggests the importance of selecting and developing learning media that are contextual, culturally responsive, and aligned with students' lived experiences. Such media can increase student engagement, make abstract cultural concepts more accessible, and encourage deeper reflection on local values. In addition, the findings indicate that while reading skills may improve relatively quickly through digital text interaction, the development of cultural literacy requires more sustained pedagogical support, such as guided discussion, reflective questioning, and repeated exposure to local cultural content. Therefore, the integration of local wisdom into digital learning media can serve as an effective strategy for fostering both literacy development and cultural identity formation in primary education.



Conclusion

Based on the research results, it can be concluded that the digital comic media incorporating the local wisdom of the Sidakarya Mask was successfully developed through the ADDIE model and was found to be feasible, practical, and effective for use in fifth-grade Indonesian language learning in elementary school. The validation results indicated very good media quality in terms of visual appearance, content, and language, while the practicality test showed that the media is easy to use, engaging, and supportive of the learning process for both students and teachers. The effectiveness test proved that the use of digital comics significantly improved students' cultural literacy and reading learning outcomes, demonstrating that this media is capable of addressing the need for contextual learning based on local cultural values.

Recommendations

The digital comic media incorporating the local wisdom of the Sidakarya Mask is recommended as a follow-up learning resource for several stakeholders. For teachers, this media can be used not only as an innovative alternative to increase students' reading interest and cultural understanding, but also as a basis for developing more reflective and culturally responsive classroom activities, such as guided discussions, storytelling, and contextual literacy tasks related to local wisdom. For school leaders, the findings suggest the need to strengthen institutional support through the provision of adequate ICT facilities, teacher training in digital and culturally based pedagogy, and school policies that encourage the integration of local culture into classroom learning. For future researchers, this study opens opportunities to examine the long-term impact of local wisdom-based digital media on students' cultural identity, literacy development, and character formation, as well as to test similar media in different educational contexts, grade levels, or cultural settings in order to broaden its applicability and effectiveness.

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