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Development of educational games based on local wisdom to improve critical thinking and communication skills

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ABSTRACT

This study aimed to develop and evaluate a local wisdom-based educational game to support the improvement of critical thinking and communication skills of fifth-grade elementary school students. The research addressed the limited availability of interactive learning media that integrate local cultural values and support 21st-century skills, particularly in IPAS learning. The game was developed by incorporating Sarolangun local wisdom within a Game-Based Learning (GBL) framework using the ADDIE model. Validation was conducted by media, content, and language experts, while practicality testing involved teachers and students. The effectiveness of the game was examined through pre- and post-assessments of students' critical thinking and communication skills using structured instruments. Data were analyzed using descriptive quantitative and qualitative methods. The results indicated that the game achieved high validity scores (content 4.38, media 4.64, language 4.69) and very practical criteria based on teacher and student responses. Post-assessment results showed an improvement in students' critical thinking and communication skills compared to pre-assessment. These findings suggest that the developed game is valid, practical, and has potential to support skill development while introducing local cultural values in elementary education.

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Introduction

Education in Indonesia has increasingly shifted toward an independent learning paradigm that emphasizes student autonomy, flexibility, and personalized learning pathways, as reflected in the Merdeka Belajar policy (Aswirna et al., 2022; Pamungkas & Manaf, 2023). At the elementary school level, this paradigm requires learning environments that not only accommodate diverse student readiness, learning styles, and interests, but also actively engage students in meaningful learning experiences. However, in classroom practice, many learning activities remain teacher-centered and rely heavily on conventional instructional materials, which limits opportunities for students to develop higher-order thinking and communication skills.

The development of 21st-century skills, particularly critical thinking and communication, is essential for elementary school students to adapt to rapid social and technological changes. Nevertheless, preliminary classroom observations and previous studies indicate that instructional media commonly used in elementary schools, such as textbooks and slide-based presentations, tend to emphasize content delivery rather than interactive engagement, thereby providing limited support for the development of these skills. Furthermore, interactive learning materials that incorporate local cultural contexts remain scarce, despite Indonesia's rich cultural diversity (Ali & Zaini, 2023; Rasidi et al., 2025).

This study explores the development of an educational game based on local wisdom, focusing on the Sarolangun region. By integrating culturally relevant content with modern educational techniques such as Game-Based Learning (GBL), this approach seeks to bridge the gap in the availability of interactive educational resources for elementary school students, especially in the context of science education (IPAS). It aims to develop a tool that enhances not only cognitive skills but also emotional and social communication.

Theoretical underpinnings for this research lie in the principles of Game-Based Learning (GBL), which promotes active learning through interactive engagement. Moreover, the integration of local wisdom in learning materials can enrich the educational experience by connecting students with their cultural heritage, thus making learning more relatable and meaningful. This research draws from the works of Nugraheni et al., (2022); Yusuf, (2023), who highlight the importance of interactive, contextually rich learning environments.

While the use of educational games and GBL has been widely explored in the context of enhancing critical thinking and communication, limited studies have integrated local cultural elements into these educational tools (Jatayu et al., 2024; Pratiwi et al., 2024). This research fills this gap by developing a game that is not only a tool for cognitive skill enhancement but also a medium for transmitting local cultural wisdom, making it a unique contribution to the field of educational technology (Harefa & Suastra, 2024).

Based on these considerations, this study aims to develop an educational game based on Sarolangun local wisdom to support the improvement of critical thinking and communication skills of fifth-grade elementary school students. In addition to product development, this research evaluates the validity, practicality, and effectiveness of the developed game as a learning medium. By integrating local cultural knowledge within a Game-Based Learning framework, this study is expected to contribute both practically to classroom instruction and academically to the development of culturally responsive educational technology (Fitrianawati & Noerazizah, 2025; Shofyana et al., 2024).

Method

This research uses the Research and Development (R&D) methodology, following the ADDIE model: Analysis, Design, Development, Implementation, and Evaluation. The analysis phase focused on identifying the needs of fifth-grade students at SDN 57/VII Sei Benteng 1 and the limitations of existing educational tools. The design phase involved conceptualizing the educational game, incorporating local Sarolangun wisdom into the game mechanics, and ensuring alignment with critical thinking and communication skills development. The development phase entailed creating the game using Canva, a versatile design tool. The game was then tested for validity by experts in media, content, and language.

Implementation and evaluation were conducted in real classroom settings, where teachers and students assessed the game's practicality and effectiveness through questionnaires and feedback forms. The data collected were analyzed using both qualitative and quantitative methods, focusing on the game's validity, practicality, and its impact on the students' critical thinking and communication skills. This study aimed to ensure that the game was not only engaging but also pedagogically sound and culturally relevant.

Results and Discussions

The results of this study indicate that the educational game developed based on local wisdom is highly valid and practical for use in elementary school classrooms. The game received excellent validation scores from experts in content, media, and language, confirming its educational soundness. Additionally, practicality evaluations from both teachers and students showed that the game is not only easy to use but also engaging, enhancing its potential for integration into real-world teaching environments. Furthermore, the impact on students' critical thinking and communication skills was significant, with a marked improvement in post-assessment scores compared to pre-assessment, demonstrating the effectiveness of the game in fostering key 21st-century skills. These findings highlight the success of the game in achieving its intended educational goals and suggest its potential as a valuable tool for improving learning outcomes in science education at the elementary level.

Table 1. Validity of the Educational Game

Expert Type	Average Score	Validity Rating
Content Expert	4.38	Very Valid
Media Expert	4.64	Very Valid
Language Expert	4.69	Very Valid

This table presents the validity scores of the educational game as evaluated by experts in three categories: content, media, and language. The average scores for all three experts fall in the "Very Valid" range, indicating that the game is highly regarded in terms of its educational content, media presentation, and language usage. This validation ensures that the game is well-designed and appropriate for educational purposes.

Table 2. Practicality of the Educational Game

Evaluation Type	Average Score	Practicality Rating
Teacher's Evaluation	4.8	Very Practical
Student's Evaluation	4.55	Very Practical

This table displays the practicality scores of the educational game based on feedback from both teachers and students. With scores of 4.8 from teachers and 4.55 from students, both groups found the game to be "Very Practical." This suggests that the game is highly effective and feasible for use in real classroom settings, providing both teachers and students with a useful learning tool.

Table 3. Impact on Critical Thinking and Communication Skills

Assessment Type	Average Score	Skill Improvement
Pre-assessment	50	Low
Post-assessment	80	High

This table illustrates the impact of the educational game on students' critical thinking and communication skills. The pre-assessment scores were relatively low, indicating room for improvement, while the post-assessment scores showed a significant increase in skills. This indicates that the game successfully enhanced the students' ability to think critically and communicate effectively, demonstrating its effectiveness as an educational tool for skill development.

The results of this study indicate that the educational game developed using local wisdom was highly validated by experts. The average validity scores of 4.38 for content, 4.64 for media, and 4.69 for language, all falling within the "Very Valid" category, suggest that the game was thoroughly reviewed and deemed appropriate for educational use. The content expert's evaluation highlighted the game's alignment with curriculum standards, ensuring that the material was not only culturally relevant but also educationally sound (Blumberg et al., 2024; Kager et al., 2024; Tzioutzios et al., 2024; Yang et al., 2024). Additionally, the high media validity score reflects the game's ability to present the learning material in an engaging and accessible way, while the language expert's score indicated clarity and appropriateness in communication (Chaijalearn et al., 2023).

Practicality assessments, both from teachers and students, further confirm the game's effectiveness in real-world classroom settings. Teachers gave the game an average practicality score of 4.8, and students scored it 4.55, both within the "Very Practical" category. These findings demonstrate that the game was not only easy to implement but also well-received by students, who found it engaging and useful for learning (Dankov, 2024; Demedts et al., 2024; Gallardo-Masa et al., 2024; Ghodousi Moghadam et al., 2024). The integration of local wisdom and interactive game elements likely contributed to increased motivation and active participation among students, offering an alternative to traditional learning methods that are often less engaging (Mahir & Martawijaya, 2025; Wahyudi et al., 2025).

The game's impact on critical thinking and communication skills was particularly notable. Pre-assessment scores showed that students' critical thinking and communication abilities were relatively low before using the game. However, post-assessment scores revealed a significant increase, indicating that the game effectively enhanced these essential skills. The improvement in scores can be attributed to the game's interactive nature, which encouraged students to think critically and communicate their ideas as they interacted with the game. This aligns with the principles of Game-Based Learning (GBL), which is known for fostering skills such as problem-solving and collaboration (Blas et al., 2024; Chaisriya et al., 2024; Li et al., 2024; Rodríguez-Ferrer et al., 2024).

Moreover, the integration of local wisdom in the game played a crucial role in making the learning experience more meaningful and relatable. By incorporating elements of Sarolangun's cultural heritage, the game not only enhanced students' cognitive skills but also promoted cultural awareness. This dual benefit is particularly important in the context of Indonesia's diverse educational landscape, where incorporating local culture can deepen students' connection to the material and foster a sense of pride and identity. The use of local wisdom in an educational game is a novel approach that enriches the learning experience, making it both informative and culturally relevant (Fadhilah & Sumarni, 2025; Rokhmat et al., 2024).

In conclusion, the findings of this study underline the potential of using local wisdom-based educational games to enhance critical thinking, communication skills, and cultural awareness among elementary school students. The game proved to be a valid and practical tool for promoting 21st-century skills in an engaging and culturally meaningful way. This study contributes to the growing body of research on the effectiveness of Game-Based Learning and emphasizes the importance of incorporating local cultural elements into educational tools (Asadzadeh et al., 2024; Jafarkhani et al., 2024; Trabajo et al., 2024; William et al., 2024). Moving forward, such games could be adapted to various subjects and regions, offering a flexible and innovative approach to modernizing education in Indonesia and beyond (Ahmar & Azzajjad, 2025; Suci et al., 2022).

Conclusions

This study successfully developed and validated an educational game based on local wisdom that enhances critical thinking and communication skills in elementary school students. The game demonstrated high validity and practicality and was well-received by both teachers and students. The integration of local cultural knowledge within the game provided a meaningful and engaging way for students to develop essential 21st-century skills, making this tool a valuable addition to educational practices in primary schools. The findings underscore the importance of contextually relevant learning tools in improving educational outcomes and promoting cultural awareness.

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