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Development of Augmented Reality Book Media Containing Cultural Diversity to Improve Global Diversity Insights of 5th Grade Elementary School Students

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Abstract

This study aimed to develop an Augmented Reality Book (AR Book) containing cultural diversity content to enhance fifth-grade students' global multicultural awareness. The development employed the ADDIE model, involving validation by material and media experts, limited trials (one-to-one, small group, and field trials), and an effectiveness test using a quasi-experimental nonequivalent control group design. The AR Book was validated as feasible (material expert = 80.9%, media expert = 90%) and rated very practical by both teachers and students (>90%). Effectiveness testing involved SD Negeri 17 Badau (experimental) and SD Negeri 15 Badau (control). The experimental class, which used the AR Book, showed an increase from an average score of 75.45 to 89.60 (N-Gain = 0.526, medium), while the control class increased from 70.45 to 77.18 (N-Gain = 0.301, low to medium). Independent and paired sample t-tests confirmed significant differences ($p < 0.05$). Qualitative findings also indicated high student engagement, enthusiasm, and interaction. These results demonstrate that the AR Book is a feasible, practical, and effective medium that not only improves academic achievement but also fosters multicultural awareness, aligning with the goals of Civic Education and the Pancasila Student Profile.

Keywords: *Augmented Reality; Cultural Diversity; Global Multicultural Insight; Elementary School; Learning Media*

Introduction

The development of digital technology has brought significant changes in education, particularly in the use of innovative and interactive learning media. Learning media are no longer merely instructional aids but serve as strategic tools to deliver learning messages effectively (Muthoharoh, 2019). Information and communication technology has enabled the emergence of various forms of media that are more diverse, efficient, and aligned with the characteristics of 21st-century learners (Assulamy, Aunnurahman,

& Halida, 2023). One of the positive implications of this progress is the increased engagement, motivation, and comprehension of students toward the subject matter. However, in practice, most elementary schools in Indonesia, including those in Badau District, Belitung Regency, still rely heavily on lectures and textbooks as the main sources of learning. Based on observations and interviews conducted in six elementary schools, it was found that the lack of engaging and contextual learning media is the primary cause of students' difficulties in understanding the material, especially on the topic *"My Indonesian Cultural Diversity."* This indicates a gap between the characteristics of digital-native students and the conventional teaching approaches used in schools (Khoiruman, 2021; Wuryandani, Fathurrohman, & Herwin, 2022).

The material on Indonesian cultural diversity taught through Civic Education (PPKn) plays a crucial role in shaping tolerant attitudes, patriotism, and respect for differences from an early age (Desyandri, Agustina, & Lusiana, 2024). However, the lack of visual and interactive learning experiences hinders students' understanding of cultural values that should ideally be instilled through meaningful learning (Wuryandani & Herwin, 2021). Therefore, there is a need for learning media that are not only informative but also capable of providing contextual, profound, and meaningful learning experiences.

Augmented Reality (AR) technology emerges as one of the innovative solutions to address these challenges. AR enables the integration of three-dimensional virtual objects into the real world in real-time, thereby providing a more immersive and interactive learning experience. In the context of cultural learning, AR allows students to explore various cultural elements—such as traditional houses, traditional clothing, musical instruments, and folk songs—in engaging 3D visual formats (Sari, Batubara, Hazidar, & Basri, 2022). Previous studies have also demonstrated that the use of AR in learning can significantly increase students' motivation, active participation, and conceptual understanding (Wikayanto, 2020).

In addition, the distribution of Chromebook devices from the central government to schools in Badau District opens great opportunities for integrating AR-based media into teaching and learning activities. This media also supports the implementation of the *Merdeka Curriculum*, which encourages the use of contextual learning resources and the strengthening of student character. The use of the Augmented Reality Book is aligned with the national policy on strengthening character education as stated in Presidential Regulation No. 87 of 2017, and it supports the development of the Pancasila Student Profile, particularly the dimension of *global diversity* (Anggito & Sartono, 2022).

Based on this background, this study aims to develop an Augmented Reality Book containing cultural diversity as a learning medium for Civic Education in Grade 5 elementary schools. The Augmented Reality Book is expected not only to be feasible and practical to use in learning but also to be effective in improving students' understanding of Indonesian cultural diversity while fostering tolerance, openness, and responsibility as global citizens rooted in national culture (Banks & Banks, 2016; Nussbaum, 1997). The novelty of this development lies in the integration of AR into a cultural-themed textbook, which is still rarely found in the context of Civic Education at the elementary school level.

Research Methods

This study employed a Research and Development (R&D) approach using the ADDIE development model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation (Branch, 2009). The aim of this research was to develop an interactive learning medium in the form of an Augmented Reality Book (AR Book) containing cultural diversity to improve the global multicultural insights of 5th-grade elementary school students.

The research was conducted in four elementary schools in Badau District, Belitung Regency. SDN 5 Badau and SDN 2 Badau were involved in the Development stage for limited trials (practicality testing),

while SDN 15 Badau and SDN 17 Badau were involved in the Implementation stage to test the effectiveness of the product. The subjects of the study included 5th-grade students and classroom teachers. At the Analysis stage, the researcher conducted a needs analysis through classroom observations and interviews with teachers and students to identify learning challenges and the need for supporting media. The Design stage involved formulating learning objectives, selecting materials, creating storyboards, and designing marker-based and markerless tracking features for Augmented Reality using the Assemblr EDU platform.

The Development stage included the production of the AR Book, followed by validation by content experts and media experts using a 4-point Likert scale assessment instrument. After validation, the media was tested through limited trials consisting of a one-to-one trial, a small group trial, and a field trial at SDN 5 and SDN 2 Badau to measure the level of practicality based on teacher and student responses. The Implementation stage was carried out at SDN 15 Badau and SDN 17 Badau. The product implementation used a quasi-experimental method with a nonequivalent control group design. The experimental class used the Augmented Reality Book, while the control class used PowerPoint media. Effectiveness testing was conducted to assess the improvement of learning outcomes that reflect students' global multicultural insights.

The Evaluation stage involved product revisions based on the results of practicality and effectiveness testing, as well as data analysis to refine the media. Data were analyzed both descriptively and inferentially, including normality tests, homogeneity tests, paired-sample t-tests, and independent-sample t-tests with the assistance of SPSS version 26. The practicality questionnaire instrument used in this study was adapted from previous validated research, so no additional reliability testing was conducted.

Results and Discussion

The development and implementation of the Augmented Reality Book generated comprehensive findings regarding its feasibility, practicality, and effectivenes. The systematic application of the ADDIE model enabled this study to validate each stage, from needs analysis to evaluation, thereby ensuring the reliability of the final product (Branch, 2009). The resulting product took the form of a printed book integrated with AR technology, featuring an attractive cover design and content pages that combine textual explanations, illustrations, and QR codes linked to interactive 3D cultural objects. The following figures present the cover and sample content pages of the Augmented Reality Book as an innovative learning medium developed in this study.

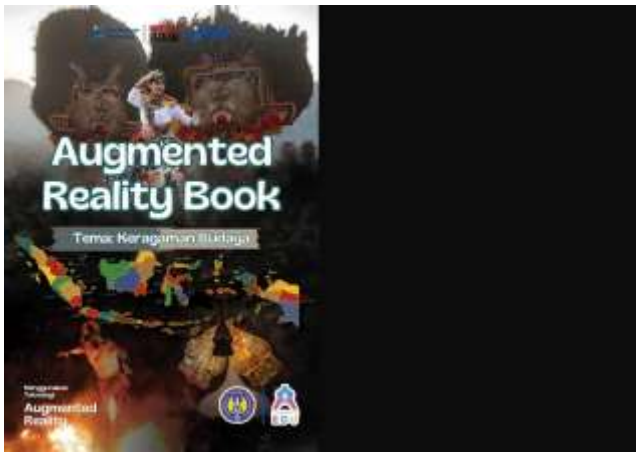

Figure 1. Cover of the Augmented Reality Book

Figure 2. Content page with cultural diversity theme

The validation results confirmed that the AR Book was suitable for classroom use. The material expert rated the product with a feasibility score of 80.9%, highlighting the accuracy, clarity, and relevance of the cultural content presented. Meanwhile, the media expert gave a higher rating of 90%, particularly appreciating the visual layout, QR code functionality, and the smooth integration of AR technology. These findings suggest that the AR Book not only met the pedagogical requirements but also adhered to technical standards necessary for interactive learning media. Such validation is essential because feasibility determines whether media can be realistically integrated into real classroom contexts.

The practicality of the AR Book was tested through three trials: one-to-one, small group, and field trial. In all stages, the media was consistently rated in the "very practical" category, with teacher and student responses exceeding 90%. Students expressed that the 3D visualizations and AR features provided a new and enjoyable learning experience. Teachers also emphasized the ease of use, which is critical for classroom adoption, given the diverse digital literacy levels among educators. These results echo the findings of (Dünser, Walker, Horner, & Bentall, 2014), who reported that AR-based media increased student engagement and facilitated comprehension of abstract concepts. In this study, practicality is further reinforced by the positive alignment with Generation Alpha students' preferences, who tend to favor visual, interactive, and technology-driven media.

The effectiveness test provided robust quantitative evidence. In the experimental class using the AR Book, the average student score improved from 75.45 (Good category) to 89.60 (Very Good category). In contrast, the control class using PowerPoint improved from 70.45 to 77.18, remaining within the Good category. When measured using the N-Gain formula, the experimental class achieved 0.526 (medium category), while the control class obtained 0.301 (low to medium category). Statistical analysis using independent sample t-test ($p = 0.001 < 0.05$) and paired sample t-test ($p = 0.000 < 0.05$) confirmed significant differences both within groups (pretest vs. posttest) and between groups (experimental vs. control).

Table 1. Independent Sample Test

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means					Sig. (2-tailed)	
		F	Sig	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Nilai	Equal variances assumed	0,148	0,702	-3,648	41	0,001	-8,846	2,425	-13,744	-3,949
	Equal variances not assumed			-3,657	40,860	0,001	-8,846	2,419	-13,732	-3,960

Table 2. Paired Sample Test

Paired Samples Test										
Paired Differences										
			Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
						Lower	Upper			
Pair 1	Kontrol Kontrol	–	-0,571	1,805	0,394	-1,393	0,250	-1,451	20	0,162
Pair 2	Eksperimen Eksperimen	–	14,182	14,365	3,063	-20,551	-7,813	-4,631	21	0,000

These results underscore that the Augmented Reality Book is more effective than conventional media in improving global multicultural insights. Such findings align with (Wikayanto, 2020), who showed that Augmented Reality significantly enhances students' conceptual understanding and motivation. However, this study extends existing knowledge by applying Augmented Reality specifically to cultural education in the Indonesian elementary school context, thus highlighting its potential for character formation and the promotion of multicultural values.

Beyond the quantitative results, qualitative data provided deeper insights. Observations and interviews revealed that students in the experimental class were more enthusiastic, attentive, and participatory compared to those in the control class. Many students expressed amazement at being able to explore traditional houses, musical instruments, and dances in 3D form through their Chromebooks. This immersive experience allowed them to grasp cultural diversity in a way that was both enjoyable and memorable. Teachers also reported that the Augmented Reality Book encouraged active discussions, collaborative learning, and curiosity, which are indicators of meaningful learning experiences.

The findings of this study are consistent with previous research demonstrating the benefits of AR in educational contexts (Fujiyati, Sunarso, & Isdaryanti, 2024; Rahmawati, Wiguna, & Zunaidah, 2024). However, the present research contributes novelty by embedding AR technology into a printed book format, which bridges traditional and digital media. Unlike stand-alone digital applications, the AR Book combines tangible learning resources with immersive AR features, offering flexibility for schools with varying levels of technological infrastructure. Furthermore, while many AR studies focus on STEM subjects, this study extends its application to Civic Education (PPKn), a subject crucial for developing values of tolerance, cultural appreciation, and citizenship. This positions the AR Book not only as a tool for cognitive learning but also as a medium for character education.

From a theoretical perspective, the results support the constructivist view of learning, where students actively construct knowledge through interaction with contextual and meaningful experiences. The AR Book facilitates such experiences by enabling students to directly engage with cultural artifacts in an interactive manner. From a practical perspective, the AR Book supports the implementation of the Merdeka Curriculum and strengthens the Pancasila Student Profile, particularly the dimension of global diversity. It provides a concrete example of how technology can be harnessed to integrate local cultural values into 21st-century learning.

Despite these promising results, certain challenges were identified, such as unstable internet connectivity and varying digital competencies among teachers. These limitations suggest that future development should focus on offline-accessible AR features and provide training for educators to optimize the use of such media. Moreover, future studies could expand the cultural content to include more regions of Indonesia and assess its impact on other 21st-century skills such as collaboration, communication, and critical thinking.

Overall, the findings demonstrate that the AR Book is a feasible, practical, and effective learning medium. It not only enhances students' academic outcomes but also fosters multicultural awareness, tolerance, and appreciation of cultural diversity. By integrating AR into Civic Education, this study contributes to bridging the gap between digital-native learners and traditional teaching approaches, making learning more engaging, contextual, and aligned with national educational goals.

Conclusion and Suggestions

The results of this study show that the development of the Augmented Reality Book featuring Indonesian cultural diversity was successfully carried out through systematic stages based on the ADDIE model, starting from needs analysis, design, development, implementation, to evaluation. The developed media was declared highly feasible based on validation from material and media experts and received positive responses from both students and teachers in the practicality test. At the implementation stage, this media was proven effective in enhancing the global multicultural awareness of fifth-grade elementary school students, as demonstrated by improved learning outcomes and active engagement in the learning process.

This conclusion reinforces the idea that integrating Augmented Reality technology into cultural learning media not only enriches the learning experience but also bridges the gap between the needs of digital-native learners and conventional teaching approaches. The meaningful substance that can be drawn is that interactive media based on local culture plays an essential role in strengthening students' national identity while equipping them with global multicultural character as part of the *Pancasila Student Profile*.

Based on the findings, several suggestions can be made. First, teachers are encouraged to utilize the AR Book as an alternative learning resource in Pancasila Education, particularly in topics that involve cultural values and tolerance. Second, for media developers, further innovations are needed by expanding the scope of cultural content from various regions across Indonesia and refining interactive features to make them more engaging and adaptive to technological advancements. Third, for future researchers, it is recommended to conduct broader-scale trials and involve other 21st-century skills variables such as collaboration, communication, and critical thinking, so that this media can contribute more widely to enhancing the holistic quality of elementary school learning.

References

Anggito, A., & Sartono, E. K. E. (2022). The development of multicultural education comics to embed tolerance character for 4th grade of elementary school. *Jurnal Prima Edukasia*, *10*(1), 66–81. https://doi.org/10.21831/jpe.v10i1.40504

Assulamy, H., Aunnurahman, & Halida. (2023). Pengunaan Media Pembelajaran Scratch pada SMP. *Journal on Education*, *6*(1), 9521–9528. https://doi.org/https://doi.org/10.31004/joe.v6i1.4553

Banks, J. A., & Banks, C. A. M. (2016). *Multicultural Education ISSUES AND PERSPECTIVES*. United States: John Wiley & Sons, Inc.

Branch, R. M. (2009). *Instructional Design: The ADDIE Approach*. New York: Springer. https://doi.org/10.1007/978-0-387-09506-6

Desyandri, Agustina, Y., & Lusiana, D. (2024). The Development of Problem-Based Learning Model E-Module Integrated with Multiculturalism in Elementary Schools. *Jurnal Prima Edukasia*, *12*(2), 183–193. https://doi.org/https://doi.org/10.21831/jpe.v12i2.62368

Dünser, A., Walker, L., Horner, H., & Bentall, D. (2014). Creating Interactive Physics Education Books with Augmented Reality. *Proceedings of the 26th Australian Computer-Human Interaction Conference, OzCHI 2014*, 107–114. https://doi.org/https://doi.org/10.1145/2414536.2414554

Fujiyati, I., Sunarso, A., & Isdaryanti, B. (2024). Efektivitas penggunaan media pembelajaran ipas materi tata surya melalui aplikasi. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, *09*(04), 2548–6950. https://doi.org/https://doi.org/10.23969/jp.v9i04.20070

Khoiruman, M. (2021). Analisis Hambatan Pembelajaran Bahasa Indonesia di Sekolah Dasar. *Kajian Linguistik*, *9*(2), 51–62. https://doi.org/10.35796/kaling.9.2.2021.38949

Muthoharoh, M. (2019). Media PowerPoint dalam Pembelajaran. *Tasyri` : Jurnal Tarbiyah-Syari`ah-Islamiyah*, *26*(1), 21–32. Retrieved from http://www.e-journal.stai-iu.ac.id/index.php/tasyri/article/view/66

Nussbaum, M. C. (1997). *Cultivating Humanity A CLASSICAL DEFENCE OF REFORM IN LIBERAL EDUCATION*. London: HARVARD UNIVERSITY PRESS.

Rahmawati, A. D., Wiguna, F. A., & Zunaidah, F. N. (2024). Pengembangan Media Pembelajaran “Siar” Berbasis Augmented Reality untuk Siswa Kelas V Sekolah Dasar. *Edukatif : Jurnal Ilmu Pendidikan*, *6*(3), 2584–2593. https://doi.org/10.31004/edukatif.v6i3.6861

Sari, I. P., Batubara, I. H., Hazidar, A. H., & Basri, M. (2022). Pengenalan Bangun Ruang Menggunakan Augmented Reality sebagai Media Pembelajaran. *Hello World Jurnal Ilmu Komputer*, *1*(4), 209–215. https://doi.org/10.56211/helloworld.v1i4.142

Wikayanto, A. (2020). Augmented Reality for Media Promotion Research Findings. *RESTI*, *4*(3), 608–617. https://doi.org/https://doi.org/10.29207/resti.v4i3.1879

Wuryandani, W., Fathurrohman, F., & Herwin, H. (2022). The Environmental Utilization as a Learning Resource for Civic Education in Elementary Schools by Prospective Teacher College Students. *Jurnal Prima Edukasia*, *10*(2), 194–200. https://doi.org/10.21831/jpe.v10i2.51923

Wuryandani, W., & Herwin. (2021). The effect of the think–pair–share model on learning outcomes of Civics in elementary school students. *Cypriot Journal of Educational Sciences*, *16*(2), 627–640. https://doi.org/https://doi.org/10.18844/cjes.v16i2.5640

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