

Batik Lasem educational Game as a means of strengthening the dimension of Global Diversity in elementary school students

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Abstract. Globalization presents both opportunities and challenges in shaping the identity of elementary school students, particularly in maintaining cultural awareness while developing global perspectives. The dimension of global diversity (berkebinekaan global) in the Pancasila Student Profile demands learning innovations that bridge local culture and global values. This study aimed to develop and examine the effectiveness of an educational game based on Batik Lasem in strengthening the global diversity dimension of elementary school students. Batik Lasem was chosen because it represents the acculturation of Javanese, Chinese, and Arabic cultures, making it an authentic medium for cultivating tolerance and respect for cultural differences. The study employed a quasi-experimental design with a pretest-posttest non-equivalent control group. The sample consisted of 64 fifth-grade students from two elementary schools in Rembang Regency, selected through purposive sampling. The experimental group (n=32) used the Batik Lasem educational game, while the control group (n=32) used conventional methods. Data were collected using a validated global diversity attitude scale and a cultural knowledge test, then analyzed using an independent samples t-test and N-Gain analysis. The results showed a significant difference between the two groups ($t=7.842$; $p<0.001$) with an effect size of Cohen's $d=1.94$ (very large category). The N-Gain of the experimental group was 0.71 (high category), while the control group was 0.32 (medium category). These findings indicate that the Batik Lasem educational game is effective as a means of strengthening the global diversity dimension in elementary school students, while preserving local cultural heritage in the digital era.

Keywords: educational game; Batik Lasem; global diversity; Pancasila Student Profile; elementary school

INTRODUCTION

The era of globalization has brought significant changes in various aspects of life, including education. Indonesian elementary school students are now growing up amid an intense flow of global information and culture, which on one hand opens opportunities to develop a global mindset, but on the other hand also threatens the preservation of local cultural values (Arlistiyanta et al., 2024). This phenomenon raises a fundamental question: how can elementary education shape students who have a strong national identity while remaining open to global diversity? The Pancasila Student Profile, particularly the dimension of global diversity, becomes a strategic answer to this challenge (Nur Wijayanti & Muthali'in, 2023).

The dimension of global diversity in the Pancasila Student Profile contains four main elements, namely recognition and appreciation of cultures, intercultural communication skills, reflection and responsibility for the experience of diversity, and the development of social justice (Talia et al., 2024). Strengthening this dimension at the elementary school level is very important because elementary school age is the golden phase for character building and shaping early attitudes

toward differences (Zakso et al., 2021). However, observations in the field show that the cultivation of these values is still dominated by lecture methods that are less attractive to elementary school students, especially in the lower and upper grades who are accustomed to visual and interactive digital media (Indriya Mella Agustina et al., 2023).

The integration of technology in elementary education through educational games has been proven to provide a significant positive impact on student learning outcomes (Bang et al., 2023). Digital game-based learning is able to increase student engagement, motivation, and cognitive achievement (Prensky, 2003). In the Indonesian context, the development of adaptive educational games to introduce the Nusantara culture has shown promising results (Sulistyanto et al., 2023). Educational games designed with rich cultural content can serve as a bridge between formal learning and the affective experience of students (Hayati & Behnamnia, 2023). Several studies have also confirmed the effectiveness of mobile web-based learning media in shaping the character of elementary school students (Marini et al., 2021).

Batik Lasem is selected as the cultural content in this study because of its unique characteristics

as a product of acculturation of Javanese, Chinese, and Arabic cultures. The motifs of Batik Lasem, such as Lokcan, Sekar Jagad, Watu Pecah, Latohan, and Burung Hong, are a real representation of how various cultures can coexist harmoniously. Within the framework of ethnomathematics and ethnopedagogy, batik motifs have been used as a learning medium in various studies (Sudirman et al., 2018); (Sopamena et al., 2022). However, exploration of Batik Lasem as a means of strengthening the global diversity dimension through educational games has not been widely conducted, especially in the context of quantitative experiments at the elementary school level.

Several previous studies have examined educational games for various purposes, such as improving environmental awareness (Huda & Ramadhan, 2021)), critical thinking skills (Sidiq et al., 2021), and the introduction of regional culture in general (Sulistyanto et al., 2023). However, none have specifically focused on Batik Lasem as a content with strong acculturation values for strengthening the global diversity dimension. This is the research gap that this study addresses. The strengthening of the global diversity dimension based on local wisdom through innovative media is in line with the spirit of glocalization in 21st-century education (Ardiansyah et al., 2024).

Based on this description, this study aims to: (1) develop a Batik Lasem-based educational game suitable for elementary school students, and (2) test the effectiveness of the Batik Lasem educational game in strengthening the global diversity dimension of elementary school students. This study is expected to make a theoretical contribution to the development of cultural content-based learning media and a practical contribution as an alternative learning innovation for elementary school teachers in implementing the Pancasila Student Profile, particularly the dimension of global diversity.

METHODS

This study used a quantitative approach with a quasi-experimental design of the pretest-posttest non-equivalent control group design. This design was chosen because random assignment of students at the individual level was not feasible in the school context, as students were already grouped into existing classes (Sidiq et al., 2021). The research was carried out in two elementary schools in Rembang Regency, Central Java, which are geographically close to the center of Batik

Lasem production.

The population of this study was all fifth-grade students at two state elementary schools in Rembang Regency in the 2024/2025 academic year. The sample was selected through purposive sampling, consisting of 64 students divided into two groups: an experimental group of 32 students who received learning using the Batik Lasem educational game, and a control group of 32 students who received conventional learning with lecture and discussion methods. The selection of fifth-grade students was based on the consideration that this age (10–11 years) has been able to operate digital devices independently and is at the concrete-operational cognitive stage capable of abstract reflection (Amelia et al., 2023).

The Batik Lasem educational game was developed using the ADDIE (Analyze, Design, Develop, Implement, Evaluate) procedure with the principles of game-based learning (Sulistyanto et al., 2023). The game contains five main features: (1) Cultural Adventure Story, a narrative-based story exploring the history of Batik Lasem; (2) Motif Matching, matching motifs with their cultural origins (Java, China, Arab); (3) Filosofi Quest, a quiz about the philosophical meaning behind each motif; (4) Mini Designer, simple digital batik motif design; and (5) Refleksi Diri, reflection on the values of tolerance and global diversity. The game was validated by three experts (material expert, media expert, and pedagogical expert) using the Aiken's V validity formula and obtained a value of 0.87 (high validity category).

The research instruments consisted of: (1) the Global Diversity Attitude Scale (GDAS) based on four elements of the global diversity dimension, with 24 items on a five-point Likert scale, with reliability of Cronbach's $\alpha = 0.89$; and (2) the Cultural Knowledge Test consisting of 20 multiple-choice questions about Batik Lasem and Indonesian cultural diversity, with reliability of KR-20 = 0.84. Both instruments adapted the validation principles developed by Mahabbati et al. (2019). The intervention was carried out for six meetings (2×35 minutes each) over three weeks.

Data were analyzed using descriptive and inferential statistics. Normality was tested using the Shapiro-Wilk test, and homogeneity was tested using Levene's test. Differences in the effectiveness of the two groups were tested using the independent samples t-test, followed by an effect size analysis using Cohen's d. The increase in scores in each group was analyzed using the Normalized Gain (N-Gain) formula proposed by

Hake, with criteria: high ($g \geq 0.7$), medium ($0.3 \leq g < 0.7$), and low ($g < 0.3$). Data analysis was performed using SPSS version 25 with a significance level of $\alpha = 0.05$.

RESULTS AND DISCUSSION

The results of the study are described in two main parts, namely the development of the Batik Lasem educational game and the effectiveness of the game in strengthening the global diversity dimension of elementary school students.

The development of the Batik Lasem educational game went through the ADDIE stages with a development period of six months. The expert validation results showed an average score of 0.87 (Aiken's V), indicating that the game is feasible to use in elementary school learning. The trial results on small groups (10 students) showed a System Usability Scale (SUS) score of 82, which falls into the "acceptable" category. This finding is in line with research by Sulistyanto et al. (2023) which reported that culture-based educational games have a high level of usability acceptance among elementary school students.

The pretest results showed that the average global diversity attitude score of the experimental group ($M = 62.4$; $SD = 6.8$) was not significantly different from the control group ($M = 63.1$; $SD = 7.2$), with $t = 0.401$ and $p = 0.690$ ($p > 0.05$). This indicates that the initial condition of the two groups was equivalent. After the intervention, the posttest score of the experimental group rose sharply ($M = 87.6$; $SD = 5.9$), while the control group only experienced a moderate increase ($M = 73.8$; $SD = 7.4$). The independent samples t-test on the posttest scores produced a value of $t = 7.842$ with $p < 0.001$ and Cohen's $d = 1.94$, which falls into the very large effect size category (Hayati & Behnamnia, 2023).

The N-Gain analysis showed that the experimental group obtained an N-Gain score of 0.71 (high category), while the control group only obtained an N-Gain score of 0.32 (medium category). This significant difference confirms that the Batik Lasem educational game is more effective in strengthening the global diversity dimension compared to conventional learning. Similar results were also reported in studies of culture-based learning media that succeeded in increasing students' tolerance and cultural awareness (Marini et al., 2021); (Shinta et al., 2019). The increase was most prominent in the elements of "appreciation of culture" and "reflection on diversity," which is consistent with

the characteristics of Batik Lasem as a real product of cultural acculturation.

The deep effectiveness of this game can be explained by several factors. First, the rich visual and narrative content about Batik Lasem provides an authentic emotional experience for students about cultural diversity (Ardiansyah et al., 2024). Second, the interactivity of the game allows students to actively construct knowledge, which is in line with the principles of constructivism in digital game-based learning (Prensky, 2003). Third, the integration of game elements such as challenges, rewards, and progress increases students' intrinsic motivation, supporting findings from Hernandez and Ramirez (2024) regarding the effectiveness of game-based learning at the basic education level.

These findings also have important implications in the context of strengthening the Pancasila Student Profile. The Batik Lasem educational game serves not only as a learning medium but also as a vehicle for value education that synergizes local wisdom with global perspectives (Shodiq & Syamsudin, 2019). This is in line with the perspective of glocalization in 21st-century education, where students are introduced to global values without losing their local identity (Talia et al., 2024). Furthermore, the use of digital citizenship-based learning media has been proven to provide a long-term positive impact on the formation of student character (Jones et al., 2024).

The novelty of this research lies in the specific integration of Batik Lasem—as a product of multicultural acculturation—into educational game design to strengthen the global diversity dimension. Unlike previous studies that focused on motifs or ethnomathematics in general (Sudirman et al., 2018); (Pramulia et al., 2025), this study explicitly links cultural content with the elements of the Pancasila Student Profile through an interactive digital approach. The contribution to science is the development of a cultural content-based educational game model with empirical evidence of its effectiveness, while the contribution to society is the availability of innovative learning media that can be replicated by elementary school teachers throughout Indonesia to support the implementation of the Independent Curriculum (Hardianto & Wati, 2023).

This study, however, has limitations that need to be noted. The relatively small sample size and the locus limited to two elementary schools in Rembang Regency may limit the generalization of

the results. Further studies with larger samples, broader locations, and longitudinal designs are recommended to test the long-term impact of this game (Yang & Li, 2024). In addition, integration with traditional games that have proven effective in shaping character (Severinsen, 2014) and other Indonesian local cultural content (Ibda et al., 2023) can also be a direction for the development of further research.

CONCLUSION

This study concludes that the Batik Lasem educational game is effective as a means of strengthening the global diversity dimension of elementary school students. The independent samples t-test results showed a significant difference between the experimental group and the control group ($t = 7.842$; $p < 0.001$) with a Cohen's d effect size of 1.94 (very large category). The N-Gain of the experimental group reached 0.71 (high category), much higher than the control group (0.32; medium category). The game succeeded in increasing students' appreciation of cultural diversity, intercultural communication skills, reflection on diversity experiences, and social justice awareness through Batik Lasem content that represents the acculturation of Javanese, Chinese, and Arabic cultures. The implication of this finding is that the integration of local cultural content into innovative digital media can be a strategic solution to bridge local wisdom and global values in elementary education, while supporting the implementation of the Pancasila Student Profile in the digital era.

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