

Effect of an Indonesian Social and Cultural Identity E-Book on Grade 4 Natural and Social Sciences Learning Outcomes in Cultural Diversity Material

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doi: 10.17977/um065.v6.i1.2026.1

Article history

Submitted: 7 October 2025

Revised: 5 November 2025

Accepted: 6 November 2025

Published: 21 November 2025

Keywords

E-book

Indonesian social and cultural identity

Learning outcomes

Natural and social sciences

Abstract

This study aimed to examine the effect of using an Indonesian Social and Cultural Identity e-book on Natural and Social Sciences learning outcomes, specifically on cultural diversity material, for fourth-grade students at Elementary School. The research was motivated by the limited implementation of e-books in schools and the dominance of conventional materials, which contribute to low student motivation and learning outcomes. Employing a quantitative approach with a One Group Pretest-Posttest design, the study involved 30 fourth-grade students. Data were collected through observations, interviews, and cognitive tests (pretest and posttest). The results showed a significant improvement in students' learning outcomes after using the e-book. The average pretest score of 43 increased to 61 in the posttest. Statistical analysis using the Paired Samples t-Test yielded a p -value $< .001$, indicating a significant difference between pretest and posttest results. These findings suggest that the Indonesian Social and Cultural Identity e-book is effective in enhancing students' comprehension and academic achievement, while also supporting the development of socio-cultural values in primary education. The e-book also aligns with Gagne's and Piaget's cognitive learning theories, as well as Bloom's taxonomy, in facilitating information processing, knowledge construction, and the development of various cognitive levels.

1. Introduction

The rapid development of digital technology has greatly influenced various aspects of life, including education. In the 21st century, the learning process increasingly requires the integration of technology to make it more effective, interactive, and relevant to students' needs. One of the innovations is the use of e-books, which provide digital learning resources with more engaging visualizations. The availability of innovative and relevant teaching materials is crucial because it affects both students' motivation and their learning outcomes.

Although e-books have been widely introduced in education, their implementation in schools is still limited. Based on preliminary observations at Elementary School, Natural and Social Sciences learning remains dominated by conventional materials such as student worksheets. This condition contributes to low motivation and learning outcomes, which have not yet reached the expected learning objectives (Criteria for Achieving Learning Objectives). Therefore, it is necessary to develop digital learning materials that not only help students understand concepts but also relate to their socio-cultural context, making the learning process more meaningful.

Several studies have shown that e-books can improve students' motivation, participation, and academic performance. Research by Syakur et al. (2023) and Ngaini and Mukhlisina (2023) reported significant improvements in learning outcomes after using interactive e-books. Similarly, Nengseh and Damayanti (2022) found that students in experimental groups achieved higher results than those in control groups. On the other hand, not all studies produced positive results. Chairunnisa (2022) and Wijaya et al. (2022) indicated that e-books are not always effective, especially when not supported by appropriate teaching strategies. These findings suggest that the effectiveness of e-books depends heavily on their design, relevance, and instructional context.

Although many studies have investigated the use of e-books, most of them focus on general learning skills or certain subjects. Research that specifically examines the impact of e-books integrating Indonesian social and cultural identity on Natural and Social Sciences learning outcomes remains limited. Therefore, this study aims to fill this gap by investigating how such e-books can support students' understanding of cultural diversity and improve their learning achievement.

The integration of social and cultural identities into the learning process plays a significant role in enhancing student engagement and learning outcomes. Learning that connects material to students' socio-cultural contexts creates more meaningful learning experiences by enabling them to connect new knowledge to the realities of everyday life. Based on the theory of Contextual Teaching and Learning and Vygotsky's constructivist perspective, students will more easily understand and remember concepts when learning is presented in a context close to their cultural background and social environment. Furthermore, the introduction of local cultural values plays a role in fostering a sense of pride, self-identity, and intrinsic motivation, which positively impact active participation in learning activities. Thus, the integration of socio-cultural identities not only enriches learning content but also serves as an effective pedagogical strategy to improve learning outcomes while strengthening students' character as part of Indonesia's multicultural society.

Furthermore, 21st-century education emphasizes critical thinking, creativity, collaboration, and communication. A learning model that focuses only on memorization is no longer sufficient to prepare students for global challenges. The use of interactive e-books supports these competencies by enabling students to explore knowledge independently, collaborate with peers, and utilize technology in their learning process. Thus, this study is not only relevant for improving Natural and Social Sciences learning outcomes but also for supporting the achievement of essential 21st-century skills.

The local context of Elementary School further strengthens the importance of this research. The school still faces limitations in adopting digital learning resources, while students have diverse learning needs. By implementing the E-book on Indonesian Social and Cultural Identity, students are expected to develop a deeper understanding of national cultural diversity and connect it to their social environment. This effort can foster appreciation for diversity and reinforce national identity from an early age.

The purpose of this study is to examine the effect of the E-book on Indonesian Social and Cultural Identity on the learning outcomes of fourth-grade students at Elementary School in the subject of Natural and Social Sciences, particularly on the topic of cultural diversity. This research also aims to contribute to the development of technology-based learning strategies while strengthening socio-cultural values in elementary schools.

2. Method

This study employed a quantitative approach with a pre-experimental design, specifically the One Group Pretest-Posttest Design. The choice of this design was based on the research objective, namely, to measure the effect of using an e-book on students' cognitive learning outcomes in the subject of Social and Cultural Identity of Indonesia. In this design, a single group of participants was given a pretest, exposed to a treatment in the form of learning with an e-book, and then given a posttest to measure the learning gains. The quantitative approach was selected because it allows the measurement of changes in learning outcomes through numerical data, which can then be analyzed statistically to test the proposed hypothesis. The participants of this study were 30 fourth-grade students at Elementary School during the academic year 2024/2025, consisting of both male and female students aged between 9 and 10 years old. The main reason for selecting the research location was because the learning outcomes of Natural and Social Sciences subjects, especially the material on cultural diversity and local wisdom, were still relatively low. No exclusion criteria were applied since all students in the class participated in the study, making the data reflective of the actual classroom condition. The target population was all fourth-grade students at Elementary School, and given the relatively small population, a saturated sampling technique was employed so that all members of the population were included as participants. This method was considered appropriate because it minimized sampling error and ensured that the findings represented the entire class.

The experiment was conducted in four meetings, each lasting 2 x 45 minutes. In the first meeting, the research activity began with an introduction and preliminary stage, followed by a pretest. The pretest was given to students in the form of multiple-choice questions that had been arranged according to the material indicators. Based on the results of the initial test, the average score was 43, with the lowest score being 27. At this stage, learning using the research material had not yet been implemented, so the pretest was entirely aimed at measuring students' initial knowledge before being given treatment.

In the second meeting, the research activity continued with the implementation of learning using the e-book teaching material Indonesian Social and Cultural Identity. The material studied was the subject of Social Sciences Chapter 7 concerning Cultural Diversity and Local Wisdom. In this treatment stage, students were introduced and explained in depth about traditional Indonesian dance and Indonesian traditional houses. After the presentation of the material, students were divided into several groups of 3-4 people each. Each group was given a Student Worksheet to work on together, so that the teacher could determine the level of students' understanding of the material that had been studied.

In the third meeting, the lesson continued with a presentation on traditional Indonesian clothing and traditional foods. Afterward, students were divided into small groups of 3-4 people to work collaboratively on student worksheets, with the aim of deepening their understanding of the material presented. At the end of the

series of activities, namely the fourth meeting, students were given a posttest as a form of evaluation of learning outcomes. This posttest aimed to assess the extent to which students' understanding had improved after receiving treatment through e-book-based learning.

Data were collected using observation, interviews, and tests in the form of pretest and posttest. The main instrument was a cognitive test consisting of multiple-choice questions related to cultural diversity and local wisdom, scored dichotomously with one point for each correct answer and zero for incorrect answers. The maximum score was 25, which was then converted into a scale to represent students' cognitive achievement. Prior to use, the instrument was validated for content validity by subject matter experts and tested for reliability using Cronbach's Alpha to ensure internal consistency. Observation and interviews were conducted during the preliminary stage to gather contextual information about the learning environment and students' needs, while documentation supported the analysis of teaching materials. Together, these instruments ensured that the data obtained were comprehensive and suitable for addressing the research objectives.

3. Results and Discussion

This study, conducted among 30 fourth-grade students at Elementary School, aimed to examine the effect of using an e-book on Indonesian social and cultural identity on students' learning outcomes in Natural and Social Sciences subject Chapter 7, which discusses cultural diversity and local wisdom. The research was carried out in four sessions. The first session involved a pretest with an average score of 43 and the lowest score of 27, reflecting students' initial knowledge before treatment. During the second and third sessions, students engaged in learning activities using the e-book (see Figure 1), which covered topics on traditional dances, traditional houses, traditional clothing, and regional cuisine. Students worked collaboratively using worksheets. The fourth session involved a posttest to measure learning improvement. The results showed a significant increase in learning outcomes, indicating that the e-book effectively enhanced students' comprehension of cultural diversity and local wisdom.



Figure 1. E-Book applications

In the context of education, the use of interactive teaching materials is a crucial factor in increasing learning effectiveness (Winaya, 2019). Teaching materials are one of the teaching tools needed to support the learning process so that it is carried out optimally, effectively, and efficiently (Fanani et al., 2022). Teaching materials are media that can act as facilitators between teachers and students to understand the material more deeply (Destiara, 2020). An effective learning process requires teaching materials that are appropriate and relevant to the cultural context and the needs of students (Sudirman et al., 2024). The use of teaching materials that align with students' needs plays a crucial role in creating a more focused and structured learning process. Conversely, if teaching materials do not meet the appropriate criteria, it can create various obstacles in the implementation of learning (Weryanti et al., 2020).

Along with technological developments, modern learning demands the use of innovative teaching materials. In the 21st century, student engagement with information technology has become an unavoidable necessity. One form of technology utilization in learning is e-books, which act as innovative digital teaching materials to support student learning processes more effectively and interactively (Hariawan & Sakti, 2021). E-books are an innovation in technology-based learning materials that can visualize abstract material in visual or animated forms. This makes it easier for students to understand complex concepts and increases their interest in learning. Furthermore, e-books also provide a more interactive and engaging learning experience than conventional textbooks, thereby increasing student motivation and learning outcomes (Hanikah et al., 2022). Students who use interactive e-books show improved motivation and academic achievement compared to those who only use textbooks as learning resources (Jannah et al., 2017). Ginting and Simamora (2021) also reported that e-books are highly effective in increasing student activity, motivation, creativity, and learning outcomes.

These findings confirm that e-books serve not only as instructional guides but also as evaluation tools that facilitate learning (Nurdiansyah & Mutala'iah, 2018). According to Adip (2022), instructional materials are essential in supporting teachers and students to achieve learning objectives. In this study, the e-book created an engaging and contextual learning experience by combining text, visuals, and collaborative tasks. This approach made it easier for students to grasp complex cultural concepts compared to traditional learning methods.

The results align with Gagne's cognitive learning theory, which views learning as an internal process of acquiring and storing information in long-term memory (Habsy et al., 2023). The e-book's multimodal presentation integrating text, visuals, and interactivity supported effective information processing and retention. Sweller et al. (2022) emphasized that managing cognitive load is essential in digital learning, and a well-designed e-book can reduce unnecessary cognitive strain while enhancing understanding. This supports the notion that digital materials, when cognitively aligned, can significantly improve learning performance.

Piaget's theory of cognitive development also provides a strong foundation for interpreting these results. Learning occurs through assimilation and accommodation processes in which learners integrate new information into existing schemas or modify them to fit new experiences (Santrock, 2011; Sari & Amanda, 2025). In this context, students not only learned factual information about Indonesian culture but also related it to their own cultural experiences, thus promoting meaningful knowledge construction. Studies by López-Escribano et al. (2021) and Petri et al. (2025) support this finding, showing that culturally contextualized digital materials strengthen connections between prior knowledge and new learning.

Bloom's taxonomy further explains how the e-book enhanced multiple cognitive levels from remembering and understanding to applying, analyzing, synthesizing, and evaluating (Suprastowo et al., 2020). Through the e-book, students could recall cultural facts, explain cultural meanings, compare regional traditions, and evaluate cultural practices critically. Wardana and Djmaluddin (2021) also found that digital learning resources embedded with social and cultural contexts effectively enhance cognitive achievement and critical thinking skills among students.

Cultural identity-based e-books are effective for use in learning because they are able to integrate cognitive, affective, and contextual elements in a balanced manner. Through a combination of text, images, and multimedia elements, e-books help students process information more optimally. The integration of local cultural values and symbols also strengthens students' emotional engagement and intrinsic motivation, such as encouraging learning behavior and motivation, personal interest, curiosity, the desire to achieve, and a sense of responsibility for the learning process as explained in the concept of Culturally Responsive Teaching. Furthermore, the presentation of material linked to students' socio-cultural realities makes learning more meaningful, in line with the Contextual Teaching and Learning approach. Thus, cultural identity-based e-books not only improve conceptual understanding but also foster an appreciation for Indonesia's cultural diversity.

More specifically, e-books help students through various cognitive stages. Students can acquire factual knowledge about cultural diversity (remembering), explain the meaning of cultural diversity and local wisdom (understanding), and relate these to everyday life (applying). Furthermore, e-books also encourage students to compare cultural differences (analyzing), draw conclusions about the importance of unity (synthesizing), and assess cultural practices in their environment (evaluating). Thus, according to the cognitive evaluation framework in this book, the implementation of e-book teaching materials has proven effective in increasing student engagement, motivation, and understanding of the concepts of cultural diversity and local wisdom. The advantages of e-books, such as their ease of download and direct use, their environmentally friendly nature, and their greater conciseness and durability (Ruddamayanti, 2019), make them the right choice as supplementary teaching materials (Artama et al., 2023).

The implications of this research highlight the need for teachers to design and utilize digital learning resources that align with students' developmental characteristics. The e-book on Indonesian social and cultural identity offers an engaging, eco-friendly, and interactive learning medium suitable for 21st-century education (Ruddamayanti, 2019; Artama et al., 2023). It fosters not only academic understanding but also character formation and cultural awareness, promoting active and meaningful learning experiences.

Nevertheless, this study has certain limitations. It involved a small sample size of 30 students, was conducted over a short period of four sessions, and focused solely on cognitive learning outcomes. Future research should involve a larger sample, extend the duration of intervention, and incorporate affective and psychomotor assessments to provide a more comprehensive understanding of how e-book learning materials influence student development.

4. Conclusion

The findings of this study conclude that the use of the Social and Cultural Identity of Indonesia e-book has a significant impact on improving the learning outcomes of fourth-grade students at Elementary School in the

topic of Cultural Diversity and Local Wisdom. The average pretest score of 43 increased to 61 in the posttest after the integration of the e-book into the learning process. Statistical analysis using the Paired Samples T-Test yielded a p-value $< .001$, indicating a significant difference between pretest and posttest results. Therefore, the implementation of the e-book is proven to be effective in enhancing students' comprehension and academic achievement, while also demonstrating the potential of culture-based complimentary teaching materials to support primary education learning practices.

Author Contributions

All authors have equal contributions to the paper. All the authors have read and approved the final manuscript.

Funding

No funding support was received.

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/ or publication of this article.

Data Availability

The datasets generated during and/ or analyzed during the current study are available from the corresponding author on reasonable request.

Declaration on AI Use

The authors declare that no artificial intelligence (AI) or AI-assisted tools were used in the preparation of this manuscript. AI were used only to improve readability and language under strict human oversight; no content, ideas, analyses, or conclusions were generated by AI.

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