

CULTURAL INTEGRATION IN DIGITAL LEARNING: A MIXED-METHODS STUDY OF THE BANTAIAAN ADAT ELECTRONIC MODULE

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ABSTRACT

This study aims to analyze the integration of *Bantaian Adat* local wisdom into the teaching of Integrated Science and Social Studies (IPAS) through the use of an electronic module in elementary schools. The research employed a mixed methods approach with a sequential explanatory design, combining quantitative and qualitative techniques in successive stages. The study involved 40 fourth-grade students from classes IVA and IVB, as well as two fourth-grade teachers, one from the experimental class and one from the control class, who participated in interviews. Quantitative data were collected through pretests and posttests to measure the improvement in students' learning outcomes after using the Bantaian Adat-based electronic module. The results indicated a significant improvement, with an average pre-test score of 68.25 and a post-test score of 85.40, yielding an N-gain of 0.54 (moderate category). Qualitative data were obtained through in-depth interviews and classroom observations in both groups, showing that the teacher in the experimental class perceived an increase in student engagement and greater ease in connecting local values with scientific and social concepts. This study emphasizes that the integration of *Bantaian Adat* local wisdom through an electronic module not only enhances students' learning outcomes but also strengthens their character and cultural identity in IPAS learning at the elementary school level.

Keywords: *Bantaian Adat, electronic module, contextual learning, character education*

INTRODUCTION

Education plays a crucial role in shaping a knowledgeable, ethical, and culturally rooted generation. Within the context of national education, character strengthening through learning based on local cultural values is an essential strategy for fostering national identity. The currently implemented *Merdeka Curriculum* provides schools and teachers with the flexibility to develop contextual, meaningful learning experiences grounded in local culture. This aligns with the spirit of local wisdom-based education, which emphasizes not only academic achievement but also the development of students' social, moral, and spiritual dispositions. However, in practice, the integration of local cultural values into learning, particularly in the subject of Integrated Science and Social Studies (IPAS), remains suboptimal.

Integrating local wisdom into the learning process is a strategic step to connect scientific knowledge with community life values. Local wisdom is not merely a cultural heritage but also a source of expertise encompassing social, moral, and ecological values that are highly relevant

to modern life (Alfarizi et al., 2025). In this context, *Bantaian Adat*, a traditional practice from the Jambi community, holds great potential as a contextual learning resource. This tradition embodies values such as cooperation, deliberation, social concern, and respect for nature and others. These values can be directly linked to IPAS learning, which emphasizes understanding the interrelationship between humans, their environment, and society.

Previous studies have affirmed that the integration of local culture into learning can enhance learning outcomes, student engagement, and character development. Research conducted by Arma (2024) revealed that local wisdom-based learning improves students' conceptual understanding while simultaneously strengthening moral values. Similarly, Imaduddin and Sundi (2024) found that the use of culturally based teaching materials increases students' learning motivation and active class participation. Nevertheless, most of these studies remain focused on social and thematic subjects. At the same time, the incorporation of cultural values into science-oriented IPAS learning has rarely been explored in depth and systematically.

Bantaian Adat, as part of the cultural heritage of the Jambi community, embodies educational values that align with the objectives of Integrated Science and Social Studies (IPAS) learning in elementary schools. Within this tradition, communities engage in *gotong royong* (cooperation) activities for the common good, reflecting principles of collaboration, responsibility, and social solidarity. These values correspond to the social competencies and character traits emphasized in the *Merdeka Curriculum*. Unfortunately, the cultural potential of *Bantaian Adat* as a contextual learning resource has not been widely utilized in modern educational practice, particularly in technology-based learning. In fact, integrating local cultural values through innovative learning media such as electronic modules can serve as a bridge between tradition and technological advancement, contributing to the improvement of learning quality in elementary education.

The advancement of educational technology today provides significant opportunities to integrate local cultural values into digital learning media. One promising medium is the electronic module (e-module), which facilitates interactive, visual, and contextual learning experiences. Several previous studies (Susanti & Saputro, 2025; Palumpun et al., 2022) have shown that the use of culture-based e-modules can enhance student engagement and learning independence. However, most of these studies have focused primarily on the development of the media itself, without deeply addressing the integration of cultural values within the context of IPAS learning, which requires a balance between scientific knowledge and sociocultural values. This condition reveals a research gap that remains underexplored: how *Bantaian Adat* values can be effectively and meaningfully implemented through digital learning media.

This research gap underscores the need for a new approach to developing learning that emphasizes not only cognitive aspects but also affective and social dimensions. The integration of *Bantaian Adat* values through electronic modules can serve as an innovative learning model that connects modern scientific knowledge with local cultural contexts. Consequently, students are not only able to understand scientific concepts abstractly but also to internalize noble values such as cooperation, social responsibility, and environmental awareness. Such an approach aligns with the vision of the *Pancasila Student Profile* in the *Merdeka Curriculum*, which emphasizes the importance of nurturing faith-based, globally diverse, collaborative, independent, critical, and creative learners in every learning process (Rahayu et al., 2023).

Furthermore, the integration of *Bantaian Adat* into IPAS learning carries significant implications for the preservation of regional culture. Through the use of electronic modules based on local cultural values, teachers can serve as agents for safeguarding traditional values that are increasingly eroded by the forces of globalization and modernization. Strengthening cultural identity through digitally based science and social learning helps students understand that technological advancement does not have to eliminate cultural values; instead, it can serve as a means to promote and disseminate them more widely (Sabila et al., 2025). Therefore, this study is essential to provide both theoretical and practical contributions to the development of local wisdom-based learning models that align with the needs of 21st-century education.

Teachers play a central role in bridging cultural values with classroom learning processes (Wirda, 2025). In the context of *Bantaian Adat* integration, teachers act as cultural mediators who not only transmit knowledge but also instill social and moral values in students. Teachers serve as key figures in contextualizing IPAS material so that it becomes relevant to students' real-life experiences and social environments. However, many teachers still lack a deep understanding of how to adapt local wisdom into modern learning processes, particularly in utilizing digital technology as a learning tool. Hence, there is a need for supportive media and instructional models that can assist teachers in implementing local cultural values creatively and effectively.

The electronic module (e-module)-based learning approach offers a strategic alternative for integrating local wisdom values into IPAS education. Electronic modules allow for the presentation of content that is more interactive, contextual, and tailored to the characteristics of elementary school students (Deniarti et al., 2025). Through this approach, students can learn independently while simultaneously understanding cultural values presented through visual, narrative, and exploratory activities. The use of *Bantaian Adat*-based modules is expected to enhance students' conceptual understanding while fostering cultural and social awareness.

Moreover, module-based learning supports the development of students' digital literacy, which is one of the essential competencies needed to address the challenges of education in the technological era (Mustofiyah et al., 2024).

The novelty of this research lies in the integration of two key aspects that have rarely been explored simultaneously: the incorporation of *Bantaian Adat* local wisdom and the utilization of electronic modules in IPAS learning at the elementary school level. Previous studies have generally focused either on the development of digital learning media or on the application of local culture in education as separate endeavors. In contrast, this study holistically examines both dimensions through a mixed methods approach. This approach enables the researcher to assess the effectiveness of the module quantitatively while also exploring teachers' experiences and perceptions qualitatively. Thus, the findings are expected to provide a comprehensive understanding of how *Bantaian Adat*-based learning can enhance students' learning outcomes, character, and cultural identity in elementary education.

Based on this background, the present study aims to analyze the effectiveness and pedagogical significance of integrating *Bantaian Adat* values into Integrated Science and Social Studies (IPAS) learning through the use of electronic modules in elementary schools. Specifically, this research seeks to examine the extent to which the use of *Bantaian Adat*-based electronic modules can improve students' learning outcomes and social attitudes, as well as to explore teachers' experiences in implementing them in the classroom. Theoretically, this study contributes to the development of a contextual learning model grounded in local culture that aligns with the *Merdeka Belajar* paradigm. Practically, the findings can serve as a reference for teachers and curriculum developers in designing learning media that not only enhance cognitive abilities but also strengthen students' character and cultural identity. Therefore, the integration of *Bantaian Adat* values through digital media represents a strategic step toward realizing holistic education that is culturally rooted and adaptive to contemporary developments.

LITERATURE REVIEW

Local wisdom represents a system of knowledge and values developed over generations within a community, functioning as a guideline for social and environmental interactions. As Sartini (2020) explains, local wisdom is not merely a collection of traditions but embodies a community's worldview concerning balance, harmony, and ethics in life. In the educational context, it serves as a vital learning resource that enriches curricula with contextual moral and social values, allowing students to appreciate their cultural heritage while fostering character development rooted in national ideals. In line with this, the national education policy through

the Merdeka Curriculum emphasizes contextual, student-centered learning grounded in local culture. According to Widiyanto et al. (2024), local wisdom-based learning effectively nurtures the Pancasila Student Profile, which encompasses faith, global diversity, cooperation, independence, critical thinking, and creativity. Therefore, local wisdom should not be viewed merely as cultural decoration but as a core educational element shaping values, behaviors, and social responsibility. Teachers are thus required to identify local cultural potential and integrate it into innovative learning designs aligned with 21st-century educational demands.

Integrated Science and Social Studies (IPAS) is an interdisciplinary subject that emphasizes the interrelationships between humans, the environment, and various natural and social phenomena. According to Dwi et al. (2025), IPAS learning in elementary schools aims to equip students with scientific thinking skills, social sensitivity, and ecological awareness. Therefore, IPAS holds significant potential as a medium for internalizing the values of local wisdom. Through this approach, students not only learn theoretical scientific concepts but also understand their application within cultural and community contexts. By linking IPAS content with local cultural values such as *Bantaian Adat*, the learning process becomes more meaningful, as it is rooted in real-life experiences that are closely connected to students' everyday lives.

Bantaian Adat is one of the forms of local wisdom in the Jambi community, rooted in the values of togetherness, cooperation (*gotong royong*), and social solidarity, reflecting a collective spirit aimed at helping community members in need across social, economic, and communal contexts. The values embodied in Bantaian Adat not only highlight mutual assistance but also cultivate responsibility, sincerity, and unity, making it a relevant model for character education that emphasizes participation in community life and respect for diversity. Furthermore, its ecological dimensions are evident in practices that promote harmony between humans and nature, particularly in natural resource management and environmental conservation. These values are highly relevant to Integrated Science and Social Studies (IPAS) learning, which encourages students to understand the interconnection between natural and social systems—relationships naturally illustrated through cultural practices like Bantaian Adat. The cooperative spirit within this tradition aligns with concepts of ecosystem balance, social responsibility, and collaboration in environmental preservation. Therefore, integrating Bantaian Adat into learning not only contextualizes scientific concepts but also nurtures care, cooperation, and empathy, positioning it as both a source of moral values and a contextual medium that strengthens the integration of scientific knowledge and social experience in elementary education.

The advancement of digital technology has significantly transformed the educational landscape, particularly in terms of learning resources and media, making the teaching and learning process more interactive, flexible, and student-centered. Resti et al. (2024) emphasize that the use of digital technology in education enhances students' motivation, creativity, and critical thinking by presenting information through diverse formats such as text, images, audio, and video. Digital media also enable teachers to design contextual learning experiences that connect instructional content with students' social and cultural realities, positioning technology not as a substitute for teachers but as a tool that enriches learning and deepens reflection. Among various digital innovations, the electronic module (e-module) stands out as a prominent form of digital learning media designed to promote independent learning through systematic, visual, and interactive presentation of material. As noted by Hadawang et al. (2025) and Yuni et al. (2024), e-modules not only facilitate progressive understanding and flexibility in managing study time but also incorporate multimedia elements—such as animations, simulations, and contextual illustrations—that strengthen conceptual comprehension. In the context of Integrated Science and Social Studies (IPAS) learning, e-modules possess great potential to bridge scientific and social concepts with local phenomena relevant to students' daily lives, thereby fostering meaningful and applicable learning experiences.

The integration of *Bantaian Adat* values into IPAS e-modules represents an innovative step that combines educational technology with the reinforcement of local culture. Through local wisdom-based e-modules, students not only learn to understand scientific concepts such as the interrelationships among living organisms, environmental balance, or socio-economic activities, but also internalize values of cooperation, empathy, and social responsibility embodied in the *Bantaian Adat* tradition. This approach aligns with the 21st-century learning paradigm, which emphasizes the integration of cognitive, affective, and psychomotor domains. Therefore, the use of culture-based e-modules can serve as an effective medium for fostering holistic learning that harmoniously combines knowledge, values, and skills.

The constructivist approach emphasizes that knowledge is actively built through experience and social interaction rather than transmitted from teacher to student (Chand, 1995). In this view, local wisdom-based learning, such as *Bantaian Adat*, enables students to construct meaning from cultural experiences closely tied to daily life, connecting scientific and social concepts with real community practices. Similarly, Contextual Teaching and Learning (CTL) highlights the need to relate learning materials to students' real-world contexts; as Djonko et al. (2018) note, contextual learning links lessons to social, cultural, and environmental realities. Through a *Bantaian Adat*-based e-module, teachers can guide students to explore scientific and

social values reflected in cooperation, environmental care, and community life. Thus, combining constructivist theory, CTL principles, and Bantaian Adat values provides a solid theoretical basis for developing technology-based learning that is meaningful, culturally relevant, and suited to 21st-century education.

METODOLOGY

This study employed a *mixed-methods* approach with a *sequential explanatory* design. The research began with the collection and analysis of quantitative data, followed by qualitative data to provide a deeper understanding of the findings (Nasution et al., 2024). This approach was chosen because it enables a comprehensive examination of the effectiveness of using an electronic module based on *Bantaian Adat* in teaching *Ilmu Pengetahuan Alam dan Sosial* (IPAS) at the elementary school level. The quantitative approach was utilized to measure the improvement in students' learning outcomes, while the qualitative approach aimed to explore teachers' experiences in integrating local cultural values through the use of the module.

The research subjects consisted of 40 fourth-grade students from an elementary school in Jambi City, divided into two classes: Class IVA as the experimental group, which used the Bantaian Adat-based electronic module, and Class IVB as the control group, which used conventional teaching materials. In addition, two fourth-grade teachers, one from each class, participated in interviews to provide in-depth insights into the teaching and learning processes in both groups. The study was conducted during the 2025/2026 academic year.

The instruments used in this study included learning achievement tests (pretest and posttest), student activity observation sheets, and teacher interview guides. The learning achievement tests were designed to measure students' cognitive abilities in understanding IPA and IPS concepts, as well as their ability to relate these concepts to *Bantaian Adat* values. The observation sheets were used to assess students' engagement during lessons, with indicators such as cooperation, active participation, and the application of the *gotong royong* (cooperation) values. Meanwhile, the interview guide was employed to explore teachers' perceptions regarding the effectiveness, practicality, and challenges of implementing the *Bantaian Adat-based* electronic module. A summary of the indicators for each instrument is presented in the following table.

Table 1. Research Instrument Indicators

Instrument	Purpose of Use	Measured Indicators	Data Source
Pre-test Post-test	& To measure the improvement in IPAS learning outcomes	Understanding of scientific and social concepts; ability to relate them to local cultural values	Fourth-grade students
Observation	To assess student engagement during learning activities	Learning activity, cooperation, enthusiasm, and application of <i>Bantaian Adat</i> values	Students and teachers

Instrument	Purpose of Use	Measured Indicators	Data Source
Interview	To explore experiences in using module	teachers' Perceived effectiveness, ease of implementation, challenges, and impact on students' character	Two fourth-grade teachers

Before being implemented in the study, all research instruments underwent a content validation process conducted by two experts: a lecturer in elementary education and an expert on *Bantaian Adat* local wisdom. The validation aimed to ensure the alignment of the instrument items with the objectives and indicators of the study. Feedback from the experts was utilized to refine the wording, clarify instructions, and enhance the relevance of the content to the context of culturally based learning. The validation results indicated that all instruments were deemed suitable for use and categorized as valid.

Quantitative data were analyzed using a paired sample *t-test to measure the significance of the improvement in learning outcomes between the pre-test and post-test in both the experimental and control classes, as well as an N-gain* analysis to determine the effectiveness level of the learning improvement. Meanwhile, qualitative data from interviews and observations were analyzed using a thematic analysis approach, which involved data reduction, categorization, and thematic conclusion drawing. The results from both approaches were then integrated during the interpretation stage to produce a comprehensive understanding of the effectiveness and pedagogical implications of using the *Bantaian Adat-based* electronic module in IPAS learning.

RESULT AND DISCUSSION

The results of the study revealed a significant improvement in students' learning outcomes following the implementation of the *Bantaian Adat-based* electronic module in the Integrated Science and Social Studies (*Ilmu Pengetahuan Alam dan Sosial / IPAS*) learning process. Based on the pretest and posttest results, the average pretest score in the experimental class was 68.25, while the posttest average increased to 85.40. In contrast, the control class, which utilized conventional learning materials, obtained an average pre-test score of 67.90 and a post-test score of 75.10.

The improvement in the experimental class indicates that the integration of local cultural values through digital media effectively enhanced students' conceptual understanding of IPAS content. Overall, learning with the *Bantaian Adat-based* electronic module proved to be more effective than conventional instruction.

Table 2. Comparison of Pre-test and Post-test Scores between Experimental and Control Classes

Group	Number of Students	Average Pre-test Score	Average Post-test Score	N Gain	Category
Experimental Class (IVA)	20	68.25	85.40	0.54	Moderate
Control Class (IVB)	20	67.90	75.10	0.28	Low

Based on the analysis results, there was a greater improvement in learning outcomes in the experimental class compared to the control class. The N Gain score of 0.54 in the

experimental class fell into the *moderate* category, whereas the control class achieved only 0.28, classified as *low*. The results of the paired sample *t*-test showed a significance value ($p < 0.05$), indicating a statistically significant difference between students' pre-test and post-test scores. These findings demonstrate that the use of the *Bantaian Adat*-based electronic module was effective in improving students' learning outcomes. This effectiveness is likely due to the module's ability to integrate local cultural values with technology-based learning approaches, making the learning process more contextual and meaningful for students.

These findings align with Vygotsky's constructivist theory, which emphasizes that knowledge is built through social interaction within cultural contexts, with *Bantaian Adat* serving as a framework that helps students understand scientific and social concepts through familiar experiences. When learning about cooperation and communal solidarity, students developed deeper comprehension, supporting Ibrahim's (2025) finding that local wisdom-based learning enhances conceptual understanding and moral awareness.

Consistent with Johnson's (2002) Contextual Teaching and Learning (CTL) theory, connecting lessons to real-life experiences made learning more meaningful. The values of *gotong royong* and social responsibility in *Bantaian Adat* provided a concrete context for understanding human-environment relationships in IPAS learning. Thus, the local wisdom-based electronic module functioned not only as an effective digital learning tool but also as a means of strengthening students' character and cultural identity.

Observations during the learning process revealed a notable difference between student learning activities in the experimental and control classes. Students in the experimental class appeared more active in discussions, demonstrated greater collaboration, and showed higher interest in lessons linked to the values of *Bantaian Adat*. In contrast, students in the control class tended to be more passive, waiting for teacher instructions, as lecture-based methods and textbook use still dominated learning. The teacher in the experimental class acted more as a facilitator, guiding students in exploring both cultural values and scientific concepts, whereas the control class teacher focused primarily on verbal content delivery. These findings align with Gan et al. (2015), who assert that interactive digital media can create participatory and collaborative learning environments that ultimately enhance students' motivation and comprehension.

Interviews with the experimental class teacher revealed that the implementation of the *Bantaian Adat*-based electronic module helped students understand the interrelation between scientific and social concepts and their application in daily life. The teacher stated, "Through this module, students find it easier to understand the material about the interaction between living things and the

environment because it is presented within the context of the gotong royong activities they recognize in the Bantaian Adat tradition.” The teacher also added that throughout the learning process, students were more active, displayed cooperation, mutual respect, and social responsibility in every activity. Meanwhile, the control class teacher expressed, *“In general, the learning process went well, but students seemed less enthusiastic and showed low participation because the material was delivered abstractly without connecting it to familiar cultural contexts.”*

The statements of both teachers indicate that integrating local cultural values through the Bantaian Adat-based electronic module not only enhances students’ conceptual understanding but also fosters positive attitudes during the learning process. This finding is in line with Fathoni’s (2024) study, which emphasizes that culturally based learning increases students’ sense of relevance and connectedness to the subject matter. The difference observed between the two classes can be further explained through Baker’s (1994) theory of Contextual Learning, which asserts that learning becomes more meaningful when linked to students’ social and cultural environments.

In this regard, Bantaian Adat serves as a bridge between scientific knowledge and everyday life values. The experimental class teacher observed that students not only grasped IPAS concepts more effectively but also demonstrated improved social behaviors, such as teamwork, appreciation and collective responsibility. These results suggest that the Bantaian Adat-based electronic module influences both cognitive and affective domains, reinforcing the idea that educational media integrating technology and local culture can effectively promote holistic, character-based learning.

Furthermore, the integration of Bantaian Adat values in IPAS learning contributed not only to students’ academic improvement but also to their character formation. Findings from interviews and classroom observations revealed that students in the experimental class displayed stronger cooperative behaviors, a greater sense of responsibility, and mutual respect compared to those in the control class. Group activities embedded in the electronic module encouraged collaboration and engagement with local cultural contexts, helping students internalize values of togetherness and empathy. Teachers noted a marked increase in students’ respect for peers’ opinions, willingness to help others, and pride in their regional traditions. This result aligns with Hakim and Daraojat (2013), who argue that culture-based education plays a strategic role in fostering learners’ sense of identity and national character, underscoring the transformative potential of integrating local wisdom into modern educational media.

The implementation of the Bantaian Adat-based electronic module aligns with the *Kurikulum Merdeka*’s objectives, which emphasize character building and 21st-century

competencies. The values of *gotong royong*, *musyawarah*, and social concern embedded in Bantaian Adat reflect the dimensions of the *Profil Pelajar Pancasila*, fostering collaborative, virtuous, and globally minded learners. Integrating these cultural values into IPAS learning enables students to internalize Pancasila principles through contextual experiences (Yuliatin & Rosmilawati, 2024), showing that culture-based education shapes both knowledge and character. However, challenges such as uneven digital literacy and limited technological infrastructure remain, echoing Muhaimin et al. (2024), who highlight the technological gap between teachers and students in e-module implementation. Thus, while combining digital innovation and local culture effectively enhances learning quality, its sustainability requires institutional support through facilities, training, and equitable technology access.

The results of this study reinforce constructivist and contextual learning paradigms that highlight the cultural dimension of knowledge construction. Learning becomes more meaningful when students engage with familiar social and cultural contexts (Rahmi & Saril, 2025). In this regard, Bantaian Adat acts as a conceptual bridge linking scientific understanding with real-life moral and social values, aligning with Vygotsky's Zone of Proximal Development (ZPD), which underscores the importance of social and cultural interaction in cognitive growth. The Bantaian Adat-based electronic module, through its narratives, visuals, and collaborative tasks, enhances students' conceptual grasp of IPAS while fostering character development rooted in local identity. This finding supports Lestari et al. (2024), who note that culturally grounded e-modules improve scientific literacy alongside empathy and social responsibility. Thus, integrating cultural values into digital learning media offers a practical and holistic pedagogical strategy consistent with the *Kurikulum Merdeka*'s vision of cultivating competent, ethical, and culturally aware learners.

CONCLUSION

This study concludes that integrating **Bantaian Adat values** through electronic modules in Natural and Social Science (Ilmu Pengetahuan Alam dan Sosial – IPAS) learning effectively enhances students' academic achievement, social attitudes, and character development in elementary education. The analysis showed a significant improvement in the experimental class, with an N-Gain score of 0.54 (moderate category), supported by qualitative evidence that students more easily understood scientific and social concepts when linked to familiar cultural contexts. Learning grounded in Bantaian Adat not only deepened conceptual understanding but also cultivated cooperation, responsibility, and social awareness. Pedagogically, these findings affirm that combining technology with local wisdom fosters

contextual and meaningful learning experiences aligned with the *Kurikulum Merdeka*, promoting learners who are both character-driven and culturally grounded.

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