CHALLENGES AND OPPORTUNITIES OF DIGITAL TRANSFORMATION POLICY FOR PRIMARY EDUCATION IN CENTRAL KALIMANTAN

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ABSTRACT

Digital transformation in education has become a national strategic agenda to strengthen technology-based learning systems throughout Indonesia. However, the implementation of digital transformation policies in regions outside Java, such as Central Kalimantan, faces complex contextual challenges. This study aims to identify and analyze the challenges and opportunities of digital transformation policies in the context of primary education in Central Kalimantan. Using a descriptive qualitative approach, data were collected through in-depth interviews with policy actors, school principals, teachers, and community stakeholders. The results show that key challenges include limited ICT infrastructure, disparities in digital literacy, and lack of integration of local cultural values in policy design. On the other hand, there are significant opportunities through national policy support (SPBE and Merdeka Belajar), increased awareness among educators, and potential collaboration with local communities. This study recommends more adaptive local policies, inclusive digital literacy training, and infrastructure strengthening grounded in cultural and spatial justice. With a deep understanding of the local context, digital transformation in primary education in Central Kalimantan can be directed inclusively and sustainably.

Keywords: Digital transformation; education policy; Central Kalimantan; Cultural Integration

INTRODUCTION

Digital transformation has become one of the most prominent priorities in Indonesia's national education reform agenda. In recent years, the government has launched numerous initiatives such as the Sistem Pemerintahan Berbasis Elektronik (SPBE), the Merdeka Belajar policy, and the digitalization of administrative and instructional services to promote the integration of information and communication technology (ICT) into the classroom. These efforts are expected to improve learning outcomes, enhance access to quality education, and prepare students for the demands of the digital economy. However, the realization of such goals varies greatly across

regions. In provinces located outside Java, particularly in Kalimantan and Eastern Indonesia, implementation is often constrained by contextual limitations such as infrastructure gaps, workforce disparities, and socio-cultural differences that are not always accounted for in top-down policies.

In the case of Central Kalimantan, the challenges are both structural and cultural. Geographically, the province spans a vast area characterized by river systems, forests, and scattered rural settlements, many of which lack stable internet connections or even electricity. In these settings, digital infrastructure is underdeveloped, and schools often operate with minimal technological resources. Teachers may have little exposure to online learning platforms, and students face barriers in accessing digital content. Beyond technological issues, however, lies a deeper layer of complexity—many national policies fail to accommodate the local identity and cultural philosophies that shape community life. For the Dayak communities, values rooted in the Huma Betang philosophy—emphasizing harmonious coexistence, collective responsibility, and mutual respect—are central to daily interaction, yet they are rarely reflected in formal education systems or digital frameworks.

The omission of cultural relevance in policy design has led to a disconnect between national objectives and local implementation. Schools and education offices often find themselves applying generic digital transformation frameworks without the flexibility or resources to adapt them to the needs of their local communities. In many instances, this results in fragmented adoption, low engagement among educators, and passive resistance from parents or traditional leaders. Nevertheless, local actors continue to demonstrate resilience and innovation. Several community-based initiatives have emerged, combining traditional values with digital practices, including storytelling projects, community-led learning centers, and local training programs. These examples highlight that cultural values need not conflict with modernization; instead, they can serve as foundational elements that enhance community ownership and sustainability in digital transformation.

Amid these challenges, opportunities for meaningful reform remain strong. Central Kalimantan holds significant cultural capital and social cohesion that can be harnessed to support inclusive digital learning ecosystems. The province benefits from national decentralization policies that grant regions greater autonomy to contextualize programs like SPBE and Merdeka Belajar. Furthermore, there is increasing awareness among local educators about the importance of integrating technology into instruction, particularly after the pandemic-induced shift to remote learning. When combined with community-based support systems, these elements create fertile ground for localized strategies that align technological change with cultural continuity. However, this potential has yet to be fully realized due to

insufficient policy alignment, weak intersectoral collaboration, and limited data-driven decision-making at the regional level.

Prior studies emphasize the necessity of culturally responsive and participatory approaches to education reform. Brennan, King, and Travers (2021) note that inclusive pedagogy thrives when grounded in shared values and collective commitment among stakeholders. Similarly, DeMatthews and Watson (2021) argue that the success of school leadership in driving digital innovation hinges on their capacity to bridge national mandates with local realities. These insights reinforce the notion that transformation must be more than infrastructural—it must also be ethical, relational, and grounded in mutual understanding. In this sense, values like Huma Betang should not be viewed as cultural artifacts but as active pedagogical principles that can guide collaboration, trust-building, and shared responsibility in school governance and digital learning.

This study is therefore positioned to explore the intersection between policy, culture, and technology in the context of primary education in Central Kalimantan. By analyzing the experiences of teachers, school leaders, policymakers, and community members, the research aims to uncover both the bottlenecks and enablers of digital transformation at the grassroots level. Special attention is given to how cultural frameworks such as Huma Betang influence stakeholder perceptions of collaboration, participation, and digital ethics. Through qualitative inquiry supported by data visualization tools like Orange Data Mining, the study attempts to construct a locally grounded model of digital transformation that respects indigenous wisdom while embracing technological progress.

Ultimately, the goal of this research is to generate recommendations that are not only evidence-based but also culturally anchored. In doing so, it hopes to contribute to the national discourse on education equity by presenting Central Kalimantan not as a periphery of policy, but as a center of innovation rooted in tradition. The study also invites education planners, regional governments, and development actors to rethink the binary between tradition and technology. Instead of imposing abstract digital standards, policy must evolve to accommodate the realities and values of local communities. Only through such integrative and empathetic frameworks can digital transformation become a truly inclusive and sustainable force for educational development across Indonesia.

METHODOLOGY

This study adopted a qualitative case study approach to explore the implementation landscape of digital transformation policies in primary education within Central Kalimantan. The choice of this methodology was rooted

in the need to deeply understand the contextual, institutional, and cultural complexities that shape how educational policies are interpreted and executed at the grassroots level. A qualitative approach allowed for the collection of rich, descriptive data from multiple stakeholders involved in the planning and implementation of digital education. The case study design was chosen specifically to focus on bounded systems within defined sites—namely, selected urban and rural primary schools in Palangka Raya and Gunung Mas Districts. These two areas were selected purposively to represent both administrative centers and remote, under-resourced contexts where digital transformation presents contrasting dynamics.

The data collection process involved several interrelated strategies to capture diverse perspectives. Semi-structured in-depth interviews were conducted with a range of informants, including officials from the provincial and district Education Offices, school principals, ICT and classroom teachers, as well as representatives of school committees and parents. The interviews were designed to elicit information about stakeholders' understanding of digital policies, perceptions of readiness, implementation experiences, and suggestions for improvement. In addition to interviews, field observations were carried out in classrooms, teacher meetings, and school digital facilities to directly assess the availability and use of technological infrastructure and to observe the pedagogical practices being applied.

nother crucial data collection method was the review of relevant documents, such as local education policy guidelines, digital transformation roadmaps, internal school memos, teacher training materials, and budget allocation records. These documents helped the researcher triangulate interview and observational data with official directives and institutional realities. Furthermore, Focus Group Discussions (FGDs) were held with groups of teachers and school staff to stimulate collective reflection and debate on the challenges and opportunities they faced. The FGDs were particularly useful for validating preliminary findings, exploring shared narratives, and generating locally informed insights on how digital transformation could be improved.

Participants were selected using purposive sampling, guided by the principle of capturing maximum variation in stakeholder roles and experiences. Efforts were made to include both high-performing and under-resourced schools, as well as urban and remote settings. In total, 30 key informants participated in interviews, while FGDs involved an additional 40 school actors across five schools. Ethical research principles were strictly adhered to, including informed consent, voluntary participation, and data confidentiality. Prior to fieldwork, official permissions were obtained from the relevant education authorities, and participants were given clear explanations about the purpose and scope of the research.

For data analysis, the study employed the interactive model of Miles, Huberman, and Saldana (2014), which includes three key steps: data condensation, data display, and conclusion drawing. Interview transcripts, observation notes, and document extracts were coded thematically to identify recurring patterns and divergent perspectives. Emerging themes were grouped into categories such as "infrastructure readiness," "digital literacy," "policy perception," "cultural integration," and "stakeholder collaboration." These themes were then analyzed to understand their interconnections and influence on the success or failure of digital policy implementation. Particular attention was given to how local cultural values— especially Huma Betang—were perceived, internalized, or neglected within school digital practices.

To enrich the analysis, selected quantitative data were processed using Orange Data Mining, an open-source visual analytics platform. This component was employed not to generalize findings but to support interpretation and stakeholder engagement. Using classification and clustering algorithms, the software enabled the researcher to visualize relationships between key variables such as communication intensity, planning participation, and understanding of local values. The resulting decision trees and scatter plots were shared with school stakeholders during feedback sessions, allowing them to reflect on their own collaborative patterns. This participatory data visualization approach served both as an analytical tool and a capacity- building mechanism to help schools self-evaluate their digital transformation trajectories.

DISCUSSION

The implementation of digital transformation policies in primary education in Central Kalimantan reveals significant disparities between national objectives and local realities. While the central government promotes ambitious frameworks like SPBE and Merdeka Belajar, schools in regions such as Palangka Raya and Gunung Mas face uneven levels of readiness to operationalize these initiatives. Through interviews and field observation, the research uncovered that many rural schools lack reliable internet access, digital devices, and teacher training. Even in urban schools, resources may be available but are not always accompanied by effective integration into pedagogical practice. This variation underscores the need to design localized strategies that accommodate infrastructure conditions and socio-economic diversity.

Table 1. Readiness Comparison between Urban and Rural Schools

Aspects	Urban Schools (Palangka Raya)	Rural Schools (Gunung Mas)

Internet connectivity	Stable	Unstable / spotty
ICT facilities	Available in most classrooms	Very limited
Teacher digital training	Frequently received	Rarely accessed
School budget allocation	Annual ICT line item available	Ad hoc or none
External support	Some NGO and gov't programs present	Largely absent

Stakeholder collaboration proved to be a decisive factor in the success of digital initiatives. Visual classification using Orange Data Mining revealed that the intensity of communication among stakeholders strongly predicted the overall effectiveness of collaboration. Schools with high levels of communication among principals, teachers, and parents were more likely to sustain regular planning, reflection meetings, and instructional innovation. On the other hand, low-communication environments correlated with stagnation and reliance on outdated instructional methods. This finding reinforces the critical role of communication not only as a management tool but as a cultural behavior that reflects openness, trust, and cooperation.

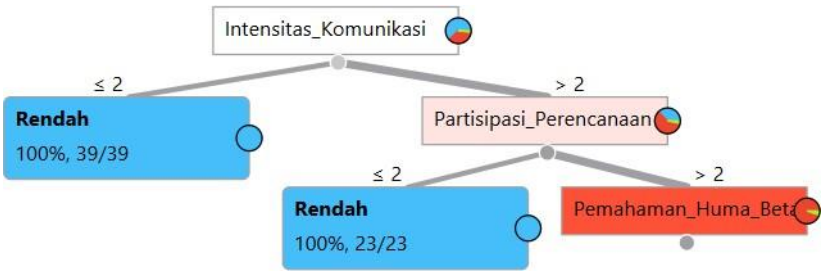

Figure 1. Decision Tree Result on Collaboration Effectiveness

Visual description:

- If communication intensity ≤ 2 → Low Collaboration
- If communication > 2 and planning involvement > 2:

- If understanding of Huma Betang ≤ 2 → Moderate
- If understanding > 2 → High Collaboration

The cultural dimension, particularly the philosophy of Huma Betang, emerged as a latent asset in shaping collaborative behaviors. In schools where the values of Huma Betang—mutual respect, deliberation, and coexistence— were internalized, collaboration was not only more consistent but also more inclusive. These cultural practices bridged gaps between different stakeholder groups, especially when formal structures were limited. However, the research also found that these cultural elements were rarely incorporated into formal education policy or teacher training modules, thus limiting their institutional potential.

Figure 2. Conceptual Mapping of Huma Betang Values in School Collaboration

Value Dimension	Cultural Meaning	Educational Application
Gotong royong	Mutual cooperation	Joint school planning and learning design
Musyawarah	Deliberation-based decisions	Consensus-building in policy interpretation
Hidup bersama	Social coexistence	Inclusion of all stakeholders including parents

Significant disparities were also observed in the levels of stakeholder engagement between urban and rural schools. Urban schools generally showed higher levels of structured collaboration, supported by better access to technology and programs from education offices or NGOs. In contrast, rural schools suffered from both physical and social distance, with parents and community members having little exposure to digital learning or involvement in school decision-making. Despite this, strong social cohesion existed in these communities, which could be leveraged to foster collaborative engagement—if supported by context-sensitive policies and basic infrastructure provision.

Table 2. Stakeholder Participation Levels in Urban and Rural Schools

Stakeholder Group	Urban Schools (High)	Rural Schools (Low)	Barriers Observed
School Principals	✓✓✓	✓✓	Distance from education offices
Classroom Teachers	✓✓✓	✓	Limited devices and training
Parents	✓✓	✗	Lack of internet, literacy, time constraints
Stakeholder Group	Urban Schools (High)	Rural Schools (Low)	Barriers Observed
ICT Coordinators	✓✓✓	✓✓	Workload too concentrated on few individuals

To further analyze stakeholder dynamics, this study employed clustering using Orange Data Mining. The clustering model classified stakeholders into three distinct participation groups: high, moderate, and low. Cluster A included principals and ICT coordinators who were regularly involved in communication, planning, and had a strong understanding of cultural values. Cluster B contained teachers with irregular participation, often due to lack of support. Cluster C was dominated by parents and administrative staff with minimal engagement. This data-driven segmentation provides actionable insights for policy and school-level interventions.

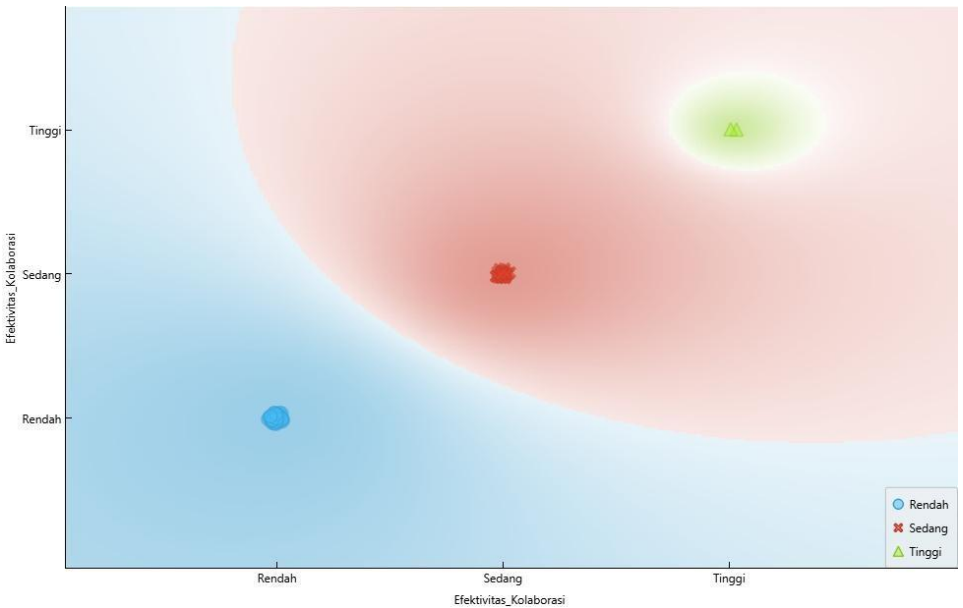

Figure 3. Clustering of Stakeholder Engagement (K-Means Algorithm)

Cluster	Stakeholder Type	Traits
A	Principals, ICT Teachers	High comm., strong Huma Betang, trained
B	Classroom Teachers, Sc	Mid comm., irregular planning involvement
C	Parents, Admin Staff	Low tech use, low understanding, untrained

These findings support the conclusion that digital transformation in education must be understood not only as a technological or administrative process but as a socio-cultural adaptation. While national digital policies serve as useful frameworks, their success hinges on how well they align with local capabilities, values, and social relations. Central Kalimantan, with its distinctive cultural heritage and decentralized governance context, holds great potential to innovate from within. The integration of participatory analytics, stakeholder engagement, and cultural wisdom like Huma Betang into policy and practice can create a more inclusive and sustainable model of educational transformation.

CONCLUSION

This study has explored the multifaceted dynamics of digital transformation policy implementation in primary education within the context of Central Kalimantan. It reveals that while national frameworks such as SPBE and Merdeka Belajar offer foundational structures for innovation, their practical application at the regional level is far from uniform. The research highlights that successful digital transformation is not merely a matter of technological provision or regulatory compliance, but fundamentally a question of alignment—between policy aspirations, cultural realities, and the capacity of educational actors to collaborate meaningfully. In this regard, local cultural values, particularly the Dayak philosophy of Huma Betang, emerge as a powerful yet underutilized framework for fostering inclusive and sustainable change.

The challenges facing digital transformation in the region are substantial. These include limited digital infrastructure in rural schools, disparities in teacher and parental digital literacy, and the absence of systematic engagement strategies for stakeholders outside urban centers. However, the study also uncovers clear opportunities. Many educators express a growing openness to

integrating technology, school leaders demonstrate commitment to innovation, and strong social capital exists within local communities that—if activated—can support a shared educational vision. What remains critical is the ability of policies to adapt to these local conditions rather than impose generic standards that fail to resonate with lived realities.

One of the study's central contributions lies in its emphasis on participatory and culturally grounded implementation models. The integration of visual data tools such as Orange Data Mining not only supported stakeholder self-reflection but also enabled schools to better understand patterns of engagement and collaboration. The visual representation of participation clusters and decision-making pathways allowed for more democratic and transparent evaluation processes. When combined with the moral compass provided by Huma Betang—rooted in values of cooperation, dialogue, and coexistence—digital transformation becomes not simply a technological project, but a human-centered, community-driven endeavor.

Ultimately, this research affirms that the future of education in regions like Central Kalimantan depends not on replicating external models of digitalization but on cultivating internal systems of trust, adaptability, and shared ownership. Technology, in this light, becomes a means rather than an end—a tool for empowerment when deployed with empathy, cultural intelligence, and policy flexibility. The path toward equitable and sustainable digital transformation in Indonesian primary education, therefore, must begin with listening to the voices of local schools, recognizing the strength of indigenous wisdom, and co-creating frameworks that are as diverse and inclusive as the communities they aim to serve.

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