



The Evolution of Digital Media in Elementary School Learning: A Historical Case Study in an Indonesian Urban School

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Abstract

This study examines the historical evolution of digital media use in learning within an Indonesian elementary school from the perspective of educational policy development. The continuing challenges in Indonesian educational outcomes provide a broader context for examining changes in technology-supported learning at the classroom level. Using a qualitative approach with a retrospective case study design, data were collected through in-depth interviews with 2 teachers of grades IV and V, 6 students, and an analysis of education policy documents, lesson plans (RPP), and school archives from 2013 to 2025. Data collection techniques included semi-structured interviews, participatory observation of current practices, and document studies. Validation used source triangulation, method triangulation, and member checking. Data analysis employed Miles and Huberman's interactive model with chronological thematic coding. The findings indicate three phases in the evolution of digital media use within the school examined: the initiation phase (2013–2019), characterized by the introduction of basic technologies as supplementary teaching equipment; the adaptation phase (2020–2022), marked by crisis-induced compulsory digitalization during the COVID-19 pandemic; and the integration phase (2023–2025), distinguished by a shift from compulsory use toward pedagogical selection under the Merdeka Belajar (Freedom of Learning) policy. The study contributes an empirically-grounded periodization of technology adoption in a single school case, demonstrating that digital change is non-linear and shaped by the interaction of policy, crisis, infrastructure, and teacher agency. Practical implications include the need for systematic documentation of educational technology history and the development of learning designs responsive to the historical context of basic education development in Indonesia.



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INTRODUCTION

The history of basic education in Indonesia records various paradigmatic transformations influenced by technological developments and government policies. In the global context, the integration of technology in education has become one indicator in assessing the progress of a country's education system. The results of the Programme for International Student Assessment (PISA) 2022 show that Indonesian students achieved a mathematics score of 366 points, below the OECD average of 472 points, with only 18 percent of Indonesian students achieving the minimum level of competence in mathematics (OECD, 2023). These findings illustrate broader challenges in Indonesian educational outcomes and provide a context for examining how technology-supported learning has evolved at the school level. In the local context, the results of the 2024 Computer-Based National Assessment (ANBK) in Malang City show a decrease in numeracy achievement among elementary school students by 1.7 percent compared to 2023 (Radar Malang, 2025). While this data reflects local conditions rather than

national trends, it underscores the ongoing need to examine pedagogical change, including the role of digital technology, as one aspect of broader educational transformation—not as an automatic solution.

The development of educational technology in Indonesia does not occur in an empty space. History shows that every technological innovation in education is influenced by political, social, and policy contexts. The 2013 Curriculum (Kurikulum 2013) introduced by the Indonesian government represented an important phase in the integration of information and communication technology (ICT) in primary school learning, as indicated by policy documents emphasizing basic competency development (Kemendikbud, 2013). However, initial implementation faced various obstacles, including limited infrastructure and teacher readiness. The COVID-19 pandemic in 2020 became a historical turning point that compelled the Indonesian education system to shift toward emergency remote learning. The Merdeka Belajar (Freedom of Learning) policy introduced by the Minister of Education in 2019 and strengthened through the Independent Curriculum (Kurikulum Merdeka) in 2022 affirmed the government's commitment to the digital transformation of education. Despite these policy shifts, historical studies examining how educational technology has evolved at the classroom practice level remain limited.

Existing research on educational technology in Indonesia has predominantly focused on technical aspects such as the effectiveness of specific applications, digital literacy training, or infrastructure mapping rather than on the historical and evolutionary dimensions of the phenomenon (e.g., studies on LMS implementation, mobile learning adoption, and teacher digital competence). This gap is significant because understanding the process of change requires more than cross-sectional analysis; it demands historical attention to chronology, continuity, discontinuity, and the mechanisms through which policies are translated into practice. Cohen et al. (2018) emphasize that the history of education not only records events but also analyzes the social and policy dynamics that shape educational practices. Goodson (2012) further argues that educational change must be understood through the interplay of policy intentions, social contexts, and teacher agency.

This study addresses this gap by examining historically how digital media has evolved in learning practices within a single Indonesian elementary school. The study refers to an educational historiographic framework that emphasizes chronological, contextual, and critical analysis of educational changes (Cohen et al., 2018; Goodson, 2012). Specifically, the study employs three analytical concepts drawn from educational historiography: (1) chronology and periodization, to map the sequence and boundaries of change; (2) continuity and discontinuity, to identify whether technological adoption followed a linear trajectory or was disrupted by crises and policy shifts; and (3) policy enactment, to examine how national policies were interpreted, negotiated, and modified by teachers in classroom practice.

This research aims to examine the evolution of digital media use in learning within an elementary school in Indonesia from the perspective of educational history. The study answers the following questions: (1) How has digital media use evolved from 2013 to 2025 within the elementary school examined in this study? (2) What policy and social factors emerged as important contextual influences in this evolution? (3) What are teachers' and students' perceptions of changes in educational technology over time? By answering these questions, this research is expected to contribute an empirically grounded periodization of technology adoption in a single school case, offering a concrete example of how macro-level policies and crises interact with micro-level classroom practices to produce non-linear educational change.

METHOD

This study uses a qualitative approach with a retrospective case study design. A retrospective case study was chosen because it allows researchers to explore in depth the evolution of digital media utilization across a specific time span (2013–2025) within a bounded case, with the aim of understanding how educational technology changes have historically taken place at the school level (Stake, 1995; Creswell & Poth, 2023). This design is suitable for answering research questions of a historical and contextual nature, where a deep understanding of the dynamics of educational change in the field is a priority. This study is non-experimental and does not aim to generalize findings to a wider population,

but rather to provide a rich description and in-depth understanding of the evolution of educational technology within a single elementary school context (Merriam & Tisdell, 2016).

Historical Methodological Procedures

Because this study claims a historical dimension, specific procedures of historical source criticism were applied (Cohen et al., 2018). First, sources were classified into primary sources (original policy documents, lesson implementation plans/RPP from 2013–2025, school meeting minutes, historical photographs, and oral testimony from teachers) and secondary sources (scholarly literature, media reports, and policy analyses). Second, each document was subjected to external criticism (authenticity and provenance) and internal criticism (credibility and consistency with other sources). Third, a chronological log of sources was maintained to track the temporal coverage and gaps in the documentary record. Fourth, the reconstruction of past events (2013–2019) relied primarily on documentary evidence and teacher oral history, cross-verified across multiple source types.

Research Context and Participants

The research was conducted in one public elementary school located in an urban area of East Java, Indonesia. The school is a medium-sized public institution with approximately 350 students and 18 teachers, serving a mixed socioeconomic community. The school had received basic digital infrastructure support from government programs but had historically experienced uneven access to devices and internet connectivity. These contextual characteristics are relevant because they shaped the conditions under which digital media adoption occurred. The research was carried out over one academic semester, from July to December 2025.

The research participants consisted of 2 teachers in grades IV and V and 6 students, selected through purposive sampling with a maximum variation strategy. The purposive sampling technique was chosen because qualitative research requires participants who are able to provide rich and relevant information on the phenomenon being studied (Patton, 2015; Campbell et al., 2020). Inclusion criteria for teachers were: (1) grade IV or V teachers who have been actively teaching for at least 10 years, (2) have experienced various periods of education policy from the 2013 Curriculum to the Independent Curriculum, and (3) are willing to be research participants. These two teachers were selected as information-rich participants (Guest et al., 2006) because they possessed firsthand experience across the entire 2013–2025 period and could provide retrospective accounts of classroom practice. Their narratives were treated as oral historical evidence and were verified against documentary sources (RPP, school archives, policy texts) rather than taken as definitive records.

Inclusion criteria for students were: (1) students in grades IV or V (aged approximately 9–11 years at the time of data collection), (2) have experience learning with different types of digital media in recent years, and (3) willing to participate with parental permission. The maximum variation strategy was applied to ensure diversity of perspectives by selecting students with different backgrounds of technological experience (e.g., varying levels of home device access and different levels of comfort with digital tools).

Important Temporal Limitation Regarding Student Data

Because students in grades IV and V in 2025 were born around 2014–2015, they did not experience the 2013–2019 period directly. Therefore, student interviews were deliberately limited to their perceptions of contemporary and post-pandemic digital learning practices (2020–2025), particularly their experiences during and after the COVID-19 emergency remote learning period. Students were not asked to serve as historical sources for the 2013–2019 phase. Instead, their data functioned to illuminate the Integration Phase (2023–2025) and to provide a child-centered perspective on recent pedagogical changes.

Data Collection

Data collection employed source triangulation and method triangulation to ensure richness and credibility. First, in-depth semi-structured interviews were conducted with all participants. Interviews with teachers focused on changes in teaching strategies, the evolution of media used, the impact of policies on classroom practice, and specific retrospective accounts of each period (2013–2019, 2020–2022, 2023–2025). Interviews with students focused on their learning experiences with digital media in recent years, including engagement, preferences, challenges (fatigue, distraction, device availability), and the combination of digital and non-digital activities.

Second, document studies were conducted by analyzing education policy documents, lesson implementation plans (RPP) from various periods, school learning archives, meeting minutes, and infrastructure records. Table 1 presents a summary of documentary sources.

Table 1. Summary of Documentary Sources

Document Type	Period	Quantity	Origin	Source Status	Analytical Function
Lesson Plans (RPP)	2013–2025	24 documents	School archive	Primary	Evidence of intended technology use and pedagogical design over time
School meeting minutes	2015–2025	8 documents	School archive	Primary	Evidence of institutional decisions and infrastructure changes
National policy documents	2013–2025	6 documents	Government repositories	Primary	Contextual framing of curriculum mandates
Historical photographs	2013–2019	12 images	School archive	Primary	Visual evidence of technology availability and classroom arrangements
Teacher training records	2016–2024	5 documents	School archive	Primary	Evidence of professional development related to technology
Scholarly articles	Various	15 articles	Academic databases	Secondary	Theoretical framing and comparative context

Third, participatory observation was conducted to observe current learning practices during the 2025 semester. Observation data were used exclusively to understand the Integration Phase (2023–2025) and were not treated as evidence of practices in earlier periods. Fourth, historical artifacts in the form of old software screenshots, photographs of past learning activities, and obsolete devices were collected for historical analysis.

Data Validation

Data validation used source triangulation, method triangulation, and member checking. Source triangulation was carried out by comparing data from teachers, students, and policy documents. Method triangulation was conducted by comparing data from interviews, observations, and document studies (Creswell & Miller, 2000; McKim, 2023).

Member checking was carried out in two stages: (1) transcript verification, where interview transcripts were returned to participants to confirm accuracy; and (2) confirmation of analytical findings, where emerging themes and the chronological matrix were shared with both teacher participants to verify whether the interpretations resonated with their experiences. Both teachers confirmed the periodization and thematic interpretations, with one minor clarification regarding the exact year a projector was purchased (adjusted from 2014 to 2015 based on school records).

An audit trail was maintained to increase transparency and credibility. The audit trail included: (a) coding memos documenting analytical decisions; (b) a category development log showing how open codes were grouped into axial categories; (c) transcript verification records; (d) a document log tracking all sources consulted; and (e) a chronological matrix showing the alignment of evidence across periods.

Data Analysis

Data analysis employed the interactive model of Miles and Huberman (1994), adapted for historical case study through the following sequential procedures:

1. Transcription and familiarization: All interviews were transcribed verbatim and read alongside documentary sources.

2. Initial/open coding: Line-by-line coding was applied to identify units of meaning related to technology use, policy influence, pedagogical change, and participant perceptions.
3. Category development: Open codes were grouped into thematic categories through axial coding, organized chronologically.
4. Chronological comparison: Codes and categories were arranged into a chronological matrix to compare patterns across the three periods (2013–2019, 2020–2022, 2023–2025).
5. Theme construction: Cross-period patterns were synthesized into overarching themes describing mechanisms of change.
6. Triangulation: Findings were verified against documentary and observational evidence before finalizing.

The three phases (Initiation, Adaptation, Integration) emerged inductively from this analytical process. The boundaries between phases were determined by identifying turning points where (a) policy contexts shifted significantly, (b) the type and function of digital media changed substantively, and (c) teacher and student accounts indicated a qualitative transformation in pedagogical approach rather than merely a change in application tools.

RESULTS AND DISCUSSION

The findings from the school examined in this study indicate three phases in the evolution of digital media use in elementary school learning from 2013 to 2025. Table 2 presents a summary of this evolution based on the period of education policy, with supporting evidence and mechanisms of change. Table 2. The Evolution of Digital Media Utilization in the Examined Elementary School (2013–2025)

Period	Phase Name	Key Pedagogical Features	Digital Media Used	Policy Context	Evidence/Mechanism of Change
2013–2019	Initiation Phase	Technology as supplementary teaching equipment; teacher-centered presentation; no substantial change in learning design	PowerPoint, simple learning videos, single LCD projector	2013 Curriculum (Kurikulum 2013); focus on graduate competency standards	RPP analysis shows technology mentioned as "media pembelajaran" without student interaction design; teacher accounts confirm projector shared across all classrooms; school records show no student device access
2020–2022	Adaptation Phase	Crisis-induced compulsory digitalization; emergency remote learning; trial-and-error pedagogy; expanded teacher and student access to platforms	Zoom, Google Classroom, WhatsApp, YouTube, various learning apps	COVID-19 pandemic; Belajar dari Rumah (Learning from Home) policy	RPP shifted to "pembelajaran jarak jauh" formats; school records document device lending programs; teacher interviews describe intensive experimentation with multiple platforms; student accounts describe learning from home with shared family devices
2023–2025	Integration Phase	Shift from compulsory use to pedagogical	Quizizz, GeoGebra, Canva,	Independent Curriculum (Kurikulum	RPP analysis shows explicit alignment between media choice

selection; technology aligned with learning objectives; increased student interactivity; teacher autonomy in media selection	TikTok learning content, Independent Teaching Platform (Platform Merdeka Mengajar)	Merdeka); Merdeka Belajar policy; digital transformation of education	and competency goals; teacher interviews describe selective use based on lesson objectives; observation data show students creating content (Canva posters, TikTok presentations); school records show improved though still limited device ratios
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Mechanisms of Non-Linear Change

The data indicate that the evolution of digital media use was not linear. Within the Initiation Phase, there were periods of stalled adoption when the projector was non-functional or when teachers reverted to textbook-based instruction after failed attempts with downloaded videos. During the Adaptation Phase, the trajectory was not uniformly progressive: teachers reported abandoning certain platforms (e.g., one platform discontinued due to poor rural student connectivity) and returning to simpler tools like WhatsApp when more complex systems proved unworkable. In the Integration Phase, observation data revealed variation across classrooms while some lessons showed genuine pedagogical alignment, others retained a technology-as-supplement pattern, suggesting that "integration" was unevenly enacted rather than fully achieved.

Initiation Phase (2013–2019): Technology as Supplementary Equipment

The Initiation Phase was characterized by the use of digital media as supplementary teaching equipment rather than as a transformative pedagogical tool. Analysis of RPP documents from this period shows that technology was consistently listed under "media pembelajaran" (learning media) but without accompanying student-centered activity designs. The school possessed only one LCD projector shared among all classrooms, a condition confirmed by school inventory records and teacher accounts.

T1 (teaching since 2008) recalled: *"At the beginning of the 2013 Curriculum, we only had one LCD projector for the whole school. Digital media was limited to PowerPoint and videos from the internet. We used it mainly to show pictures or play short videos, but the students were still mostly listening to us explain."* This account suggests that technology functioned to support teacher presentation rather than to restructure learning. T2 (teaching since 2010) added: *"Sometimes we went back to the blackboard when the projector was broken or when the internet was too slow to download materials."*

This phase aligns with historical findings that educational technology innovation in Indonesia is often preceded by policy mandates without adequate infrastructure readiness (Cohen et al., 2018). However, the evidence in this case does not support a claim of widespread "teacher resistance." Rather, the data suggest *limited adoption* shaped by infrastructural constraints, inadequate training, and the absence of pedagogical models for integrating technology beyond presentation. The teachers were not opposed to technology; they were constrained by conditions that made sustained use difficult.

Adaptation Phase (2020–2022): Crisis-Induced Compulsory Digitalization

The COVID-19 pandemic constituted a disruptive turning point. Unlike the gradual, infrastructure-limited adoption of the Initiation Phase, the pandemic compelled an abrupt shift to emergency remote learning. National policy required schools to implement *Belajar dari Rumah*, but the form this took at the school level was shaped by local negotiation and trial-and-error.

T1 described this period as an "intensive era of trial and error" and elaborated: *"We tried Zoom at first, but many students didn't have devices or stable internet. Then we switched to WhatsApp groups because almost all parents had phones. We sent worksheets as photos and short voice notes explaining lessons. It wasn't ideal, but it was what worked for our students."* This account illustrates how national policy intention (*Belajar dari Rumah*) was translated into classroom enactment through pragmatic negotiation based on local infrastructure realities.

T2 noted: *"I experimented with Google Classroom and some educational apps, but honestly, about half of my class couldn't access them regularly. We had to be flexible sometimes I made video lessons, sometimes I just checked homework via WhatsApp."* This reveals variation in adoption within the same

school and the non-linear nature of change: the school did not simply "progress" from simple to complex tools; it moved sideways to whatever was accessible.

Students' accounts of this period focused on practical challenges and adaptations. S1 (Grade V) recalled: *"I shared my mother's phone with my brother. Sometimes I missed the online session because he had a test too."* S3 (Grade IV) remembered: *"Learning from home was hard because I missed my friends, but I learned how to open Zoom and search for videos on YouTube."* These accounts confirm that the pandemic functioned as a catalyst for digital exposure, but the quality and equity of that exposure varied significantly.

Goodson's (2012) framework of educational historiography is useful here: the pandemic represented a moment of discontinuity that broke the gradual trajectory of the Initiation Phase. However, the data also show that crisis-induced change did not automatically produce pedagogical improvement. The mechanism at work was *compulsory exposure* rather than *deliberate pedagogical transformation*.

Integration Phase (2023–2025): From Compulsory Use to Pedagogical Selection

The Integration Phase was distinguished not merely by the adoption of more applications, but by a qualitative shift in how teachers selected and used digital media. Under the *Merdeka Belajar* policy and the Independent Curriculum, teachers reported greater autonomy in designing learning activities, accompanied by a more selective approach to technology.

T1 stated: *"Now we no longer use technology because we have to, but because we understand the benefits for students. For example, when I teach geometry, I use GeoGebra so students can manipulate shapes themselves. When I want them to present projects, I let them use Canva or even TikTok to create content."* This account suggests a shift from technology-as-supplement to technology-as-pedagogical-tool, where media choice is aligned with specific learning objectives.

T2 similarly noted: *"I've become more critical. Not every lesson needs an app. Sometimes a simple video is enough; other times, I need an interactive quiz like Quizizz to check understanding immediately."* This indicates the emergence of pedagogical intentionality in media selection.

However, the claim of "integration" must be qualified. Observation data from 2025 showed that while some lessons demonstrated genuine alignment between technology and competency goals, others retained a pattern where technology was added to existing teacher-centered structures. For example, one observed lesson used Quizizz as a drill activity at the end of a conventional lecture, suggesting that "integration" was still partial and uneven. Therefore, the Integration Phase is better understood as a transition toward pedagogical integration rather than its complete achievement.

Student Perceptions: Contemporary and Post-Pandemic Experiences

Students' perceptions provided insight into recent digital learning practices rather than a full historical perspective. The interviewed students, who were born around 2014–2015, experienced only the tail end of the Adaptation Phase and the current Integration Phase.

Students generally expressed preference for interactive and multimodal digital activities over passive information delivery. S2 (Grade V) stated: *"I prefer to learn with videos and games rather than just listening to explanations on the board. When we use Quizizz, I feel like I'm playing while studying."* S5 (Grade IV) noted: *"I like making posters on Canva because I can choose my own pictures and colors."* These preferences align with the interactive affordances of recent digital tools.

However, students also reported challenges. S4 (Grade IV) mentioned: *"Sometimes my eyes get tired after looking at the tablet for too long. I like it when the teacher mixes computer work with writing in my book."* S6 (Grade V) observed: *"Not all of us have the same devices at home. During group work, we have to share, and it can be unfair if one person always does the typing."* These accounts highlight issues of digital fatigue, equity, and the continued relevance of non-digital methods findings that complicate any narrative of uniformly positive technological evolution.

Teacher Perceptions: From Skepticism to Appreciation, With Persistent Tensions

Both teachers reported a change in attitude toward educational technology over time, but the trajectory was not uniformly progressive. T1 acknowledged: *"I used to worry that technology would replace the role of teachers. Now I realize that technology is a tool, not a substitute. But I also worry about the extra preparation time. Designing a Canva-based project takes much longer than preparing a conventional worksheet."* This reveals that appreciation coexists with concerns about workload and sustainability.

T2 expressed residual skepticism about certain technologies: *"Some apps look fun but don't actually improve understanding. I've seen students excited about a game but unable to explain the concept afterward. So I'm careful now—I ask myself, does this really help learning, or is it just entertaining?"* This "negative case" is important because it demonstrates critical agency rather than passive adoption. The teachers' evolution reflects not a simple shift from resistance to acceptance, but the development of *professional discernment*.

Theoretical Discussion: Policy, Crisis, and Teacher Agency

Viewed through Rogers' (2003) diffusion of innovations perspective, the findings suggest a gradual shift from limited voluntary adoption toward broader and more deliberate use of digital technology. However, given the case-study design and limited number of teacher participants, this study does not attempt to classify teachers into adopter categories or to map an S-curve distribution. Such a mapping would require data on a larger population over time, which this study cannot provide. Instead, Rogers' theory is used here as an analytical lens to discuss the process of adoption particularly the shift from externally motivated use (pandemic compulsion) to internally motivated selection (pedagogical alignment) rather than as a classification system.

Goodson's (2012) educational historiographic framework emphasizes that educational changes must be understood within broader social and policy contexts. The findings from this school case support this perspective while adding nuance. The data show that national policies (2013 Curriculum, *Merdeka Belajar*) created *conditions* for change, but the actual trajectory was mediated by crisis (the pandemic) and teacher agency. The mechanism of change was not a direct transmission from policy to practice; rather, it involved *translation, negotiation, and pragmatic adaptation*. For instance, the *Merdeka Belajar* policy's emphasis on teacher autonomy created space for selective technology use, but teachers still operated within infrastructural and time constraints that limited the depth of integration.

A particularly significant finding is the gap between policy intention and classroom enactment. National policies envisioned systematic technology integration, but at the school level, this was realized unevenly shaped by device availability, internet reliability, teacher preparation time, and student socioeconomic backgrounds. This gap represents a potential contribution to the literature: the case demonstrates that crisis-induced acceleration (the pandemic) can modify a gradual technology-adoption trajectory, but the resulting change is not necessarily more pedagogically sophisticated unless accompanied by sustained support for teacher agency and infrastructure.

Practical Implications

The practical implications of these findings are significant, but they are offered as proposed implications derived from the case analysis rather than as empirically proven consequences.

First, systematic documentation of the history of educational technology at the school level is needed. School archives, RPP collections, and policy implementation records should be preserved as sources for future historical analysis. This implication arises directly from the difficulty this study faced in locating complete records from the 2013–2015 period.

Second, teacher training programs should include a historical component on educational technology to help teachers understand the evolutionary context of the innovations they use. This recommendation is grounded in the finding that teachers' current selective approach emerged from years of trial, error, and contextual negotiation experience that could be valuable for novice teachers if documented and shared.

Third, the development of digital education policies should consider historical lessons from previous periods. The Initiation Phase showed that policy without infrastructure produces limited adoption; the Adaptation Phase showed that crisis-driven adoption without pedagogical support produces inequitable and often superficial use; the Integration Phase suggests that autonomy without adequate preparation time and resources leads to uneven enactment.

Theoretical Contribution

This study contributes to the literature on Indonesian educational history by providing an empirically grounded periodization of technology adoption in a single school case. Rather than claiming to expand the entire literature on educational historiography, the study offers a specific contribution: it demonstrates how macro-level policy shifts and crises interact with micro-level teacher agency and infrastructural constraints to produce non-linear, contextually mediated educational change. The study also illustrates that the gap between policy intention and classroom enactment is not merely an

implementation failure but a constitutive feature of educational change that historical analysis can illuminate.

CONCLUSION

This study examined the evolution of digital media use in learning within a single Indonesian elementary school from the perspective of educational history. The findings indicate three phases in this evolution: the Initiation Phase (2013–2019), in which digital technology functioned as supplementary teaching equipment within infrastructurally constrained conditions; the Adaptation Phase (2020–2022), in which the COVID-19 pandemic induced compulsory digitalization characterized by trial-and-error negotiation; and the Integration Phase (2023–2025), in which teachers shifted toward more selective and pedagogically intentional technology use under the Merdeka Belajar policy, though this integration remained partial and uneven.

Education policy shifts, the social crisis of the pandemic, and the development of technological infrastructure emerged as important contextual influences in this case. However, these factors did not determine outcomes directly; rather, they were mediated by teacher agency, local infrastructural realities, and the practical constraints of classroom life. Teachers' and students' perceptions of educational technology changed over time, but not in a uniformly positive or linear manner. Teachers developed critical discernment alongside appreciation, while students valued interactive digital activities but also reported fatigue and equity concerns.

The study is limited by its focus on a single school, the reliance on retrospective oral history for the 2013–2019 period (which carries risks of recall bias), the incomplete nature of early archival records, and the restricted temporal perspective of student participants. These limitations mean the findings describe a specific case rather than a national pattern.

Future research might conduct comparative historical studies across multiple schools to understand regional and institutional variations, engage in national-level archival analysis of Ministry of Education policy documents, or examine the long-term impact of technology evolution on student learning outcomes through longitudinal designs.

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