

Managing Digital Media-Based Indonesian Language Learning to Enhance Literacy: A Comparative Case Study of Adaptive Practices in Resource-Variable School Contexts

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Abstract

Despite the integration of digital technologies in education, Indonesian students' literacy remains concerning, with PISA 2022 showing only 25% achieving basic reading proficiency. This study investigates how digital media-based Indonesian language learning is managed through classical management functions to support literacy development. A qualitative multiple case study design was employed at two public senior high schools in different regional contexts. Data were collected through semi-structured interviews with four teachers and twenty-four students, classroom observations across sixteen sessions, and document analysis. Thematic analysis was conducted using Terry's management framework encompassing planning, organizing, actuating, and controlling functions. Both schools implemented all four management functions but with different emphases. SMAN 1 Tegalwaru demonstrated high adaptive capacity through flexible planning and contingency strategies despite infrastructural limitations, while SMAN 1 Cikatomas exhibited more systematic procedural consistency. Critical gaps were identified in organizational documentation and supervision follow-up mechanisms across both sites. Unexpectedly, resource constraints at Tegalwaru stimulated independent digital literacy behaviors among students. Effective digital literacy development depends not merely on technological access but on the quality, adaptability, and systematization of learning management practices. Strengthening teachers' adaptive expertise, formalizing documentation processes, and establishing structured supervision feedback loops are essential for sustainable improvement.

INTRODUCTION

The rapid expansion of digital technologies has fundamentally transformed educational landscapes worldwide, reshaping how knowledge is accessed, processed, and constructed. In contemporary educational discourse, literacy is no longer confined to the traditional skills of reading and writing, but increasingly encompasses critical, analytical, and evaluative capacities required to interpret and navigate complex digital information environments. Recent systematic and bibliometric reviews have emphasized that digital literacy constitutes a multidimensional competence involving cognitive, technical, and ethical dimensions (Cisneros-Barahona et al., 2024; Zakir et al., 2025; Nguyen & Habók, 2024; Tinmaz, 2022). Contemporary frameworks identify key dimensions including information and data literacy, communication and collaboration, digital content creation, critical thinking, and problem-solving capabilities (Moreira-Choez et al., 2024; Wang & Fan, 2025). International policy frameworks also highlight that digital literacy is integral to preparing learners for participation in knowledge-based societies (UNESCO, 2023). In the Indonesian context, strengthening literacy has been officially positioned as a strategic foundation for developing adaptive and competent future generations (Ministry of Education and Culture, 2017).

Effective learning management is widely recognized as a decisive factor in transforming technological potential into meaningful learning outcomes. Classical management theory, as articulated by G.R. Terry (1972), conceptualizes management as a set of interrelated functions comprising planning, organizing, actuating, and controlling. Contemporary international scholarship on school leadership and management confirms that coherent managerial practices significantly influence instructional quality and student achievement (Bush, 2024; Leithwood et al., 2008). Recent meta-analyses have demonstrated that educational leadership can account for up to 20% of the variance in student outcomes, with instructional management and teacher capacity enhancement showing particularly strong effects (Karadağ & Sertel, 2025; Tan et al., 2024). Large-scale policy analyses have further demonstrated that strategic planning, systematic organization of resources, purposeful instructional leadership, and continuous evaluation are essential features of effective school systems (OECD, 2019). These findings suggest that classical management frameworks remain conceptually relevant and empirically supported within modern educational contexts, including digital and media-rich learning environments.

Despite the strong theoretical and empirical support for the integration of digital technologies and sound management practices, literacy outcomes among Indonesian students remain a critical concern. Data from the national Education Report of 2023 indicate that literacy competencies among senior high school students remain at a moderate level, with persistent disparities between urban and rural schools (Ministry of Education and Culture, 2023). International comparative assessments further reinforce this concern. The Programme for International Student Assessment (PISA) 2022 results placed Indonesia among the lower-performing countries in reading literacy, with a mean score of 359 points—substantially below the OECD average of 476 points (OECD, 2023a, 2023b). Analysis reveals that only 25% of Indonesian students achieved Level 2 or above in reading comprehension, compared to the OECD average of 74%, with almost no students reaching the highest proficiency levels (Center for Digital Society, 2024). Such trends are consistent with global discussions on the challenges faced by developing education systems in leveraging digital tools to reduce rather than widen educational inequalities.

A growing body of international empirical research has examined the effectiveness of digital media in supporting literacy development. Recent meta-analyses have reported that technology-supported literacy instruction generally produces small to moderate positive effects on reading and writing outcomes, particularly when aligned with evidence-based instructional designs (Dahl-Leonard et al., 2024; Li et al., 2025). Other large-scale syntheses indicate that digital technologies hold particular promise for supporting students from disadvantaged backgrounds when accompanied by structured pedagogical and organizational support (Di Pietro et al., 2025; Forsström et al., 2025). However, these reviews consistently emphasize that the effectiveness of digital media is highly contingent on how technologies are managed, integrated, and monitored at the institutional and classroom levels, rather than on their mere availability.

Prior studies have also demonstrated the pedagogical potential of specific media formats. Research grounded in multimedia learning theory has shown that well-designed combinations of text, audio, and visual elements can significantly enhance comprehension and retention by engaging dual-channel processing in working memory (Clark & Mayer, 2024; Mayer, 2020, 2024). Empirical investigations into the educational use of video-sharing platforms such as YouTube have reported increased student engagement and improvements in language-related skills when such media are pedagogically structured, particularly in enhancing language proficiency and intercultural communication (Yassin, 2024; Sadeq Aburub & Singh, 2025; Daeli & Santosa, 2025). Visual design tools, frequently used to support multimodal composition and creative expression, have similarly been associated with enhanced motivation and meaning-making processes in language learning (Kimmoms & Rosenberg, 2020). Nevertheless, most of these studies have tended to focus on tools and instructional strategies, rather than on the broader managerial processes that structure and sustain their use in formal schooling.

A critical gap therefore remains in the literature concerning the systematic examination of how core management functions are enacted within subject-specific digital learning environments, particularly in the context of language education. International reviews of educational leadership research have repeatedly called for more context-sensitive and comparative studies that connect managerial practices with classroom-level implementation and learner outcomes (Karadağ & Sertel, 2025; Leithwood et al., 2008; OECD, 2019). Similarly, systematic reviews in the field of digital literacy highlight substantial heterogeneity in existing findings and recommend the use of multiple case study designs to better understand how contextual and organizational factors shape the effectiveness of digital learning innovations (Tinmaz, 2022).

In response to these gaps, this study is designed to investigate the management of digital media-based Indonesian language learning through a comparative case study approach. Focusing on two public senior high schools in different regional contexts—SMAN 1 Tegalwaru in Karawang Regency and SMAN 1 Cikatomas in Tasikmalaya Regency—this research aims to analyze how the functions of planning, organizing, actuating, and controlling are operationalized in practice, to identify institutional challenges and adaptive strategies, and to generate evidence-based recommendations for strengthening literacy-oriented learning management. The study is significant both theoretically and practically. Theoretically, it extends the application of classical management theory into the domain of digital language education. Practically, it offers insights for teachers, school leaders, and policymakers to design more coherent and effective managerial strategies that enhance students' literacy competencies and reduce regional educational disparities in the digital era.

METHODS

This study employed a qualitative research approach with a multiple case study design to explore how digital media-based Indonesian language learning is managed to improve students' literacy competencies in different school contexts. A qualitative design was considered appropriate because the research sought to gain an in-depth understanding of managerial processes, practices, and meanings as they occur in natural educational settings, rather than to measure effects in a controlled environment. The multiple case study design enabled systematic comparison between two public senior high schools, namely SMAN 1 Tegalwaru in Karawang Regency and SMAN 1 Cikatomas in Tasikmalaya Regency, which were purposefully selected based on documented declines in students' literacy achievement as indicated in recent school performance reports. This design strengthened the analytical power of the study by allowing both within-case and cross-case analyses.

The participants of this study consisted of Indonesian language teachers of grades XI and XII and students who were directly involved in digital media-based learning practices. Purposive sampling was used to select participants who were considered information-rich and actively engaged in the planning, implementation, and evaluation of digital-based instruction. The final sample included four Indonesian language teachers and twenty-four students (twelve from each school), with participation determined based on data saturation, that is, when no new significant information emerged from additional data. School principals and vice-principals for curriculum were also involved as key informants to provide complementary perspectives on institutional management and supervision practices.

Data were collected through semi-structured interviews, non-participant classroom observations, and document analysis. The interview protocol was developed based on G.R. Terry's management framework, focusing on the functions of planning, organizing, actuating, and controlling in digital media-based learning. Content validity of the interview guide and observation checklist was established through expert review by two senior scholars in educational management and language education. To enhance reliability, a pilot interview was conducted and minor revisions were made to improve clarity and consistency of the questions. Observations were guided by a structured observation sheet to ensure systematic recording of instructional activities, teacher-student

interactions, and the use of digital media. Relevant documents, including lesson plans, supervision records, and students' digital work, were examined to triangulate the findings.

The data collection procedure was carried out in several stages. First, formal permission was obtained from school authorities, and informed consent was secured from all participants. Second, interviews were conducted and audio-recorded, each lasting approximately 45–60 minutes. Third, classroom observations were carried out over eight instructional sessions in each school. Finally, institutional and instructional documents were systematically collected and organized. Throughout the process, ethical considerations were strictly observed, including confidentiality, voluntary participation, and the anonymization of participants' identities.

Data were analyzed using thematic analysis. Interview transcripts, observation notes, and documents were coded inductively and deductively, guided by the theoretical framework of management functions. The analysis involved data reduction, data display, and conclusion drawing, following an iterative and recursive process. Cross-case analysis was then conducted to identify patterns of similarity and difference between the two schools, thereby enhancing the credibility and transferability of the findings.

RESULTS AND DISCUSSION

Results

This section presents empirical findings derived from interviews, classroom observations, and document analysis conducted at SMAN 1 Tegalwaru and SMAN 1 Cikatomas. The findings are organized around four management functions—planning, organizing, actuating, and controlling—which constitute the analytical framework guiding this study. These functions correspond directly to the research question concerning how managerial processes shape digital media-based Indonesian language learning to support literacy development.

To provide an overview of the comparative patterns observed across both research sites, Table 1 synthesizes key differences and similarities in how the two schools enacted each management function. This table serves as a structural map that guides the interpretation of the detailed qualitative findings that follow.

Table 1. Summary of Digital Media-Based Learning Management Practices

Management Function	SMAN 1 Tegalwaru	SMAN 1 Cikatomas	Analytical Notes
Planning	Flexible, adaptive planning; limited infrastructure alignment	More systematic, curriculum-aligned planning	Differences rooted in infrastructure availability
Organizing	Informal role distribution; limited documentation	Similar informal practices	Both lack formalized role documentation
Actuating	High teacher adaptability; responsive to technical issues	Higher procedural consistency	Tegalwaru shows resilience-based implementation
Controlling	Formal supervision by principal/peers	Primarily self-reflective supervision	Different accountability cultures observed

The patterns presented in Table 1 indicate that while both schools implemented all four management functions, they did so with different emphases and degrees of formalization. These distinctions reflect contextual adaptations to local conditions, particularly infrastructure capacity and institutional culture. The following subsections elaborate on these patterns through detailed qualitative evidence.

Planning Function

Interviews with teachers and analysis of lesson plan documents revealed that instructors at both schools formulated learning objectives systematically based on national curriculum standards and

competency indicators. One teacher at SMAN 1 Tegalwaru explained: "I always start by identifying what literacy skills students need to develop, then I select digital media that can help achieve those objectives." This comment reflects an intentional alignment between pedagogical goals and media selection. Document analysis confirmed that lesson plans in both schools incorporated interactive digital materials such as YouTube videos, online news articles, and presentation-based media. Field observations further documented that teachers consistently prepared structured lesson components including opening activities, core instructional sequences, and closure routines.

However, a critical distinction emerged between the two sites. At SMAN 1 Cikatomas, digital media selection demonstrated more consistent alignment with available technological facilities. For instance, lesson plans specified particular platforms and tools that were known to function reliably within the school's infrastructure. In contrast, at SMAN 1 Tegalwaru, teachers frequently modified their plans in real-time due to technical limitations or infrastructure constraints. Field notes recorded multiple instances where teachers substituted planned digital activities with alternative approaches when internet connectivity failed or devices malfunctioned. One teacher noted: "Sometimes I plan to use an interactive quiz platform, but if the connection is unstable, I immediately switch to downloaded videos or offline materials."

To further illustrate these patterns, Table 2 presents indicators of planning quality derived from systematic document reviews and classroom observations.

Table 2. Observed Indicators of Planning Quality

Indicator	Tegalwaru	Cikatomas	Interpretation
Clear written objectives	Present	Present	Both schools met baseline planning standards
Infrastructure-aligned media planning	Inconsistent	Consistent	Differentiates school readiness
Contingency planning	Evident	Limited	Adaptive strength of Tegalwaru

The data in Table 2 demonstrate that while both schools possessed formal lesson plans meeting curriculum requirements, the practical coherence between media planning and infrastructure availability was more stable at SMAN 1 Cikatomas. At SMAN 1 Tegalwaru, teachers compensated for infrastructural instability through adaptive planning strategies, developing alternative scenarios that could be activated when technical problems occurred.

Organizing Function

Observational data and teacher interviews indicated that both schools organized digital learning through group work structures, task distribution protocols, and systematic time management. Teachers at both sites reported structuring classes to include individual work, pair activities, and collaborative group projects. One teacher stated: "I organize students into groups of four or five, assigning different roles such as researcher, writer, and presenter." Classroom observations confirmed dynamic student collaboration during digital literacy activities, including searching for online information, analyzing digital texts, and creating multimedia presentations.

However, a significant limitation was identified across both sites: role distribution among students was predominantly communicated orally rather than documented in written form. Document analysis revealed that while lesson plans specified group activities, they did not include explicit documentation of student role assignments or organizational structures. Field notes recorded that teachers verbally assigned roles at the beginning of class sessions, but these arrangements were not formalized in instructional materials or assessment rubrics. This pattern was consistent at both SMAN 1 Tegalwaru and SMAN 1 Cikatomas, suggesting a systemic gap in managerial documentation practices rather than a site-specific issue.

Actuating Function

The actuating function, which encompasses the implementation and facilitation of planned learning activities, was reflected in observed classroom interaction patterns. Observations documented active teacher involvement in guiding students' use of digital tools, facilitating whole-class discussions, responding to technical problems, and providing individualized support. Teachers demonstrated various forms of instructional mediation, including modeling how to evaluate online sources, scaffolding digital composition tasks, and prompting critical reflection on digital texts.

A notable distinction emerged between the two schools. Teachers at SMAN 1 Tegalwaru demonstrated exceptionally high levels of improvisational skill and adaptive expertise, sustaining instructional continuity despite unstable internet connectivity and limited device availability. One observed lesson illustrated this pattern: when the planned YouTube video could not be accessed due to connectivity issues, the teacher immediately shifted to a downloaded alternative video and restructured the discussion questions to maintain learning momentum. Students interviewed commented that "our teacher is very good at finding solutions when technology doesn't work." In contrast, SMAN 1 Cikatomas exhibited more routinized and procedurally consistent use of digital platforms. Teachers utilized structured online quizzes, interactive learning management tools, and scheduled digital activities with greater predictability. Observations documented fewer instances of technical disruption, and when problems occurred, teachers followed established backup protocols. Table 3 synthesizes these comparative patterns in instructional implementation.

Table 3. Observed Patterns of Instructional Implementation

Aspect	Tegalwaru	Cikatomas	Interpretation
Student engagement	High but fluctuating	Consistently high	Linked to procedural stability
Teacher flexibility	Very high	Moderate	Compensatory strategy in Tegalwaru
Technical disruption handling	Adaptive	Preventive	Different management cultures

An unexpected and theoretically significant finding emerged regarding student literacy behaviors outside formal instruction. Despite infrastructural limitations at SMAN 1 Tegalwaru, several students demonstrated heightened independent exploration of digital texts beyond school hours. During interviews, multiple students explained: "Because we can't always access materials at school, I search for articles and videos at home using my phone," and "I've become good at finding information on my own because I can't rely only on school resources." This pattern was less pronounced at SMAN 1 Cikatomas, where students reported more consistent in-school access to digital materials. This finding complicates deterministic assumptions about resource scarcity and reveals potential pathways through which constraints may inadvertently stimulate learner autonomy and self-directed literacy practices.

Controlling Function

The controlling function, encompassing supervision, evaluation, and feedback mechanisms, was evidenced in distinct institutional practices at the two schools. At SMAN 1 Tegalwaru, supervision was characterized by external structural accountability. Principals and vice-principals conducted regular classroom observations, and peer supervision among teachers was institutionalized through scheduled mutual visits. Documentation review confirmed that supervision reports were filed systematically, though follow-up action plans were not consistently formalized.

In contrast, SMAN 1 Cikatomas relied primarily on teacher self-reflection and informal evaluation processes. Teachers reported engaging in personal review of their instructional practices and student outcomes, but formal external supervision occurred less frequently. One teacher explained: "I continuously reflect on what worked and what didn't, and I adjust my approach accordingly." Document analysis revealed that both schools utilized digital assessment tools to

evaluate student learning, including online quizzes and digital portfolios. However, neither school maintained systematic written records of follow-up actions based on evaluation results, representing a shared limitation in the sustainability of continuous improvement mechanisms.

Collectively, these findings demonstrate that digital media-based learning management was operationalized at both schools through all four management functions, but with varying degrees of formalization, adaptability, and institutional support. The differences observed reflect contextual adaptations to local conditions, particularly infrastructure stability and institutional culture, directly addressing the research question regarding how managerial processes are enacted in practice to support literacy-oriented digital learning.

Discussion

This study investigated how digital media-based Indonesian language learning is managed through classical management functions in two public senior high schools. The core finding—that planning, organizing, actuating, and controlling were implemented at both schools but with different emphases and degrees of formalization—directly answers the research question and confirms the continued relevance of classical management theory in contemporary digital learning environments.

Planning Function and Contextual Adaptation

The evidence that both schools maintained formal lesson planning aligned with curricular standards supports classical management theory's foundational assumption that structured planning is essential for effective organizational performance (Terry, 1972). This finding aligns with international scholarship demonstrating that goal clarity and resource alignment are critical determinants of instructional quality (Bush, 2024; Karadağ & Sertel, 2025; Tan et al., 2024). However, the observed inconsistency between planned media use and infrastructure realities at Tegalwatu reveals an important theoretical nuance: planning in resource-constrained digital learning contexts cannot be interpreted solely as a technical-rational process but must be understood as an adaptive practice requiring continuous situational responsiveness.

This insight extends Terry's (1972) management framework by emphasizing that flexibility and contingency planning should be treated as integral dimensions of the planning function in digital education contexts. Recent studies on adaptive teaching expertise support this interpretation, defining it as a teacher's capacity characterized by fluidity and reflexiveness in teaching dynamics rather than mere flexibility (Ryan et al., 2019). The development of contingency plans and alternative instructional scenarios at Tegalwatu reflects what the literature describes as adaptive expertise—the ability to modify instruction in response to contextual demands while maintaining pedagogical coherence. This finding contributes to ongoing theoretical debates about how classical management principles should be operationalized in technologically mediated, resource-variable educational settings.

Organizing Function and Documentation Gaps

The organizing function emerged as a significant yet underdeveloped component of digital learning management. Although teachers effectively structured group activities and time allocation in practice, the systematic absence of formal documentation of student roles and organizational structures represents a managerial vulnerability that could limit instructional consistency and accountability. This finding partially corroborates international observations that organizational clarity in classrooms often depends on implicit practices rather than formalized systems (OECD, 2019).

However, the findings also challenge assumptions in some leadership literature that organizational effectiveness uniformly requires codified structures. Recent meta-analyses of classroom management demonstrate that effective practices can exist along a continuum from highly formalized to more flexible approaches, with effectiveness contingent on contextual factors (Chow et al., 2024; Yanto et al., 2025). The data from this study suggest that in resource-constrained contexts, teachers may prioritize practical functionality and instructional flow over administrative completeness. While

this adaptive strategy enables operational continuity, it may also create challenges for quality assurance, teacher succession, and systematic program improvement.

The absence of formalized documentation practices identified in this study resonates with broader concerns in the educational management literature about the need for systematic record-keeping to support continuous improvement (Mitchell et al., 2016). Contemporary research emphasizes that pedagogical documentation not only aids teachers in enhancing classroom management skills but also contributes to program evaluation and institutional learning. The findings therefore suggest that professional development initiatives should emphasize documentation competencies alongside instructional strategies, enabling teachers to balance flexibility with systematic accountability.

Actuating Function and Teacher Adaptive Expertise

The enactment of the actuating function revealed substantial teacher agency and resilience, particularly at SMAN 1 Tegalwaru. Teachers' ability to sustain instructional continuity despite technical disruptions reflects what the international literature describes as adaptive teaching expertise—the capacity to respond fluidly to unexpected situations while maintaining pedagogical effectiveness (Ryan et al., 2019). Research on technology-enhanced learning consistently demonstrates that the effectiveness of digital tools is highly contingent on teacher capacity to mediate and scaffold their use (Dahl-Leonard et al., 2024; Wang & Fan, 2025).

This study's findings extend that literature by demonstrating that teacher adaptability can partially compensate for infrastructural deficits, enabling meaningful digital learning experiences even in resource-limited settings. This dynamic is underrepresented in existing meta-analyses, which often assume stable technological environments and may underestimate the role of teacher expertise in navigating variability. The findings suggest that investments in teacher professional development focused on adaptive expertise and improvisational pedagogical strategies may yield substantial returns in contexts where technological infrastructure remains uneven.

Contemporary research on adaptive learning emphasizes that technology alone does not guarantee educational success; rather, success depends on teachers' ability to integrate technology purposefully and respond to learners' diverse needs (Alamri et al., 2021). The high level of adaptive capacity demonstrated by teachers at Tegalwaru aligns with this perspective and underscores the critical importance of human expertise in mediating technological affordances and constraints.

Unexpected Finding: Resource Scarcity and Learner Autonomy

The emergence of independent digital literacy behaviors among students at SMAN 1 Tegalwaru represents a particularly noteworthy and theoretically significant unexpected finding. Contrary to prevailing assumptions in digital divide literature that infrastructural limitation necessarily constrains literacy development, some students demonstrated heightened autonomy and self-directed learning behaviors by accessing digital texts outside school hours using personal devices. This phenomenon complicates deterministic interpretations of the digital divide, which often frame limited access solely as a deficit (Afzal et al., 2023; Pierce & Cleary, 2024).

The finding suggests that resource scarcity may, under certain conditions, stimulate adaptive learning strategies and self-directed literacy practices—a possibility that has been only partially explored in prior research. Recent systematic reviews of the digital divide acknowledge that students' use of technology, including frequency, purpose, and autonomy, significantly influences educational outcomes (Li, 2025). This study provides empirical evidence that constraints can catalyze learner agency, potentially through mechanisms such as increased motivation to overcome barriers, development of problem-solving skills, or cultivation of intrinsic interest in digital texts.

However, this finding should not be interpreted as evidence that resource scarcity is pedagogically desirable. Rather, it reveals the complex, non-linear relationship between access, constraint, and learner agency. The development of autonomy observed among some Tegalwaru students appears to emerge from necessity rather than design, and may not be uniformly experienced

across all student populations. Future research should investigate the conditions under which resource constraints stimulate rather than inhibit learner autonomy, including factors such as prior digital literacy, family support, and intrinsic motivation.

Controlling Function and Accountability Cultures

The controlling function illuminated divergent institutional cultures of accountability and professional autonomy. The presence of principal-led external supervision at Tegalwaru and self-reflective supervision at Cikatomas reflects different models of educational quality assurance. International leadership studies have debated the relative effectiveness of external monitoring versus professional autonomy, with evidence suggesting that both approaches can support instructional quality when implemented with fidelity (Bush, 2024).

The current findings suggest that both supervision models enabled functional digital learning practices, but that the shared absence of documented follow-up action plans represents a critical limitation potentially constraining continuous improvement. This gap aligns with OECD (2019) arguments that systematic feedback loops and formalized action planning are essential for sustainable school improvement. Recent research on teacher professional development emphasizes that ongoing support, targeted training, and structured follow-up are critical for effective implementation of educational innovations (Amemasor et al., 2025).

The findings therefore indicate that while supervision occurred at both schools, its effectiveness may be limited by insufficient linkage between evaluation and subsequent instructional refinement. Strengthening this connection through formalized documentation of evaluation results, collaborative analysis of findings, and structured action planning could significantly enhance the impact of supervisory practices on instructional quality and student outcomes.

Implications for Theory and Practice

Theoretically, this study refines classical management theory's application to digital language education by demonstrating that Terry's (1972) four functions remain conceptually robust but require contextual adaptation. Flexibility, contingency planning, adaptive expertise, and systematic documentation emerge as critical dimensions that should be explicitly integrated into management frameworks for digital learning contexts. The study also contributes to digital literacy scholarship by revealing the complex, bidirectional relationship between infrastructure, management practices, and learner outcomes, challenging overly deterministic models of the digital divide.

Practically, the findings offer several implications for educators, school leaders, and policymakers. First, professional development programs should prioritize the development of adaptive teaching expertise and improvisational pedagogical strategies alongside technical digital competencies. Second, schools should strengthen documentation practices related to organizational structures, student role assignments, and supervision follow-up to support accountability and continuous improvement. Third, instructional planning processes should explicitly incorporate contingency planning and infrastructure-aligned media selection to enhance implementation fidelity. Fourth, supervision and evaluation systems should be designed to systematically connect assessment findings with documented action plans, enabling evidence-based instructional refinement.

Study Limitations

This study is subject to several limitations that should be acknowledged. First, the qualitative case study design, while offering rich contextual insights, limits the generalizability of findings to other educational settings. The focus on two schools in particular regional contexts means that the observed patterns may not be representative of the full diversity of Indonesian secondary education. Second, the absence of standardized quantitative measures of literacy improvement constrains the ability to establish direct causal relationships between specific managerial practices and measurable learning outcomes. Future research employing mixed-methods designs could address this limitation by integrating literacy assessments with qualitative case analysis.

Third, the reliance on school-based documentation and participant self-report means that informal or tacit practices may have been incompletely captured, and social desirability bias may have influenced interview responses. Fourth, the relatively brief observation period (eight instructional sessions per school) may not fully capture longitudinal patterns or seasonal variations in managerial practices. Fifth, the study did not systematically examine external factors such as district-level policies, parental involvement, or community resources, which may significantly influence school-level management practices and student outcomes.

Despite these limitations, the study makes a meaningful contribution by illuminating how management functions operate within real-world digital learning environments experiencing literacy challenges. The comparative case design strengthened analytical rigor by enabling identification of both context-specific adaptations and cross-site patterns, enriching understanding of how managerial practices mediate technological affordances and constraints.

Synthesis and Conceptual Contribution

The synthesis of findings underscores a fundamental principle: effective digital media-based language learning is not defined merely by the presence or availability of technology, but by the quality, adaptability, and systematization of managerial processes that structure, support, and sustain pedagogical practice. This study demonstrates that classical management functions remain empirically relevant in contemporary digital education, but require theoretical refinement to account for contextual variability, infrastructural uncertainty, and the critical mediating role of teacher adaptive expertise.

The conceptual contribution lies in articulating how management theory should be adapted for technology-mediated, resource-variable educational contexts—emphasizing flexibility, documentation, contingency planning, and systematic follow-up as essential complements to traditional management functions. By revealing the complex interplay between infrastructure, management practices, teacher expertise, and learner agency, this study strengthens the conceptual bridge between educational management theory and digital literacy development, offering a nuanced framework that can inform both scholarly inquiry and practical intervention in diverse educational settings.

CONCLUSION

This study examined the management of digital media-based Indonesian language learning in two public senior high schools through the lens of classical management functions: planning, organizing, actuating, and controlling. The findings demonstrate that both schools implemented these functions in ways that meaningfully supported students' literacy development, although with differing emphases. SMAN 1 Tegalwatu exhibited strong adaptive capacity in responding to infrastructural limitations, while SMAN 1 Cikatomas demonstrated more systematic procedural consistency. These results suggest that effective digital literacy development depends not only on technological access but also on the quality and flexibility of learning management practices.

The study contributes to the field of educational management by extending the application of classical management theory into the context of digital language education and by providing empirical evidence from comparative school-based case studies. Practically, the findings highlight the importance of strengthening teachers' managerial competencies, improving the alignment between instructional planning and infrastructure, and formalizing supervision and documentation processes to sustain continuous improvement. These implications are relevant for school leaders and policymakers seeking to enhance literacy outcomes through digital learning strategies.

Several limitations should be acknowledged. The qualitative design limits the generalizability of findings, and the absence of standardized quantitative measures of students' literacy gains restricts the ability to establish causal relationships. In addition, the study was conducted in only two schools, which may not fully represent the diversity of educational contexts in Indonesia.

Future research is recommended to employ mixed-methods designs, include larger and more varied samples, and integrate standardized literacy assessments to more robustly examine the

relationship between learning management practices and student literacy outcomes in digital learning environments.

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