

Strategies of ICT-Based Learning Management to Improve Learning Effectiveness in SD Negeri 19 Palembang

Sarifah Siahaan¹, Alhadi Yan Putra², Heri Setyo Nugroho³

¹SD Negeri 19 Palembang, South Sumatra, Indonesia

^{2,3}Universitas PGRI Palembang, South Sumatra, Indonesia

Corresponding author e-mail: sarifah.siahaan.ss@gmail.com

Article History: Received on November 8, 2025, Revised on November 30, 2025,
Published on December 16, 2025

Abstract: This study examines how ICT-based learning management is carried out at State Elementary School 19 Palembang and how these strategies contribute to improving learning effectiveness. Using a qualitative descriptive approach, data were collected through interviews, observations, and documentation involving the principal, teachers, and students. The findings show that ICT integration was strengthened through clear planning, including the preparation of digital lesson designs and targeted teacher training; the use of blended learning supported by interactive tools such as Wordwall, Quizizz, and multimedia presentations; and technology-assisted evaluation using online quizzes and digital portfolios. Beyond its practical significance, this study also offers a theoretical contribution by illustrating how ICT-based learning management at the elementary level adapts and extends classical management concepts, shifting from linear control toward more flexible, collaborative, and context-responsive leadership. The challenges faced, such as limited digital skills and unstable internet access, encouraged adaptive practices like peer mentoring and collective problem-solving, which emerged as essential drivers of successful ICT adoption. Overall, the study presents a model that not only supports practical digital transformation in resource-limited schools but also enriches the literature by highlighting the central role of adaptive management and collaborative culture in sustaining ICT-based innovation in primary education.

Keywords: digital pedagogy, ICT-based learning management, learning effectiveness

A. Introduction

The integration of Information and Communication Technology (ICT) in education has become a crucial foundation for improving learning quality in the 21st century. ICT expands access to learning resources, enhances creativity, and enables interactive instructional environments that support active student engagement. Studies show that ICT adoption in primary education leads to improved motivation and learning readiness when instructional design aligns with learners' developmental needs (Ghavifekr & Amrullah, M. F., 2020). This is consistent with global findings indicating that digital learning environments strengthen participation and interaction, particularly in early-grade classrooms. In Indonesia, however, ICT utilization remains uneven due to disparities in infrastructure, teacher competence, and institutional readiness for digital transformation (Hasibuan et al., 2021).

Ensuring that ICT contributes meaningfully to learning outcomes requires effective and systematic learning management. ICT alone does not improve teaching without adequate planning, organizing, implementation, and evaluation. Management functions as a bridge connecting technological tools with pedagogical effectiveness, shaping how teachers design instruction, make decisions, and facilitate learning (Syahputra et al., 2022). Several international studies affirm that effective digital leadership and school-level coordination are critical in supporting successful ICT integration (Pöntinen Dillon, P., & Väisänen, P., 2022); (Aldosemani, 2020). When management is strong, ICT promotes student-centered pedagogy, enhances learning flexibility, and supports the creation of digital learning ecosystems that improve academic performance (Ariyanti & Wong, L., 2023).

Despite its potential, challenges persist in implementing ICT-based learning in elementary schools. Teachers often struggle to integrate digital tools due to limited digital competence, inadequate training, and difficulties linking technology with curriculum goals (Ottenbreit-Leftwich et al., 2022). These issues are echoed globally, where elementary teachers require stronger digital pedagogical support to effectively adopt ICT (Daniela Visvizi, A., & Gutiérrez-Brun, J., 2021). School leaders also face difficulties in maintaining technical infrastructure, promoting collaborative innovation, and ensuring sustainable ICT adoption. While many studies examine ICT integration in secondary education, limited attention has been given to elementary schools, even though early-grade learners require concrete, highly interactive, and scaffolded learning experiences. Research also highlights that younger students benefit more from multimodal, visual, and game-based ICT tools, making ICT management at the elementary level inherently different and more complex than in higher grades (Nikolopoulou, 2022).

The importance of this research is further strengthened by Indonesia's educational transformation agenda. The Independent Curriculum (Kurikulum Merdeka) emphasizes contextual, project-based learning that aligns closely with digital learning approaches. At the same time, national policies promoting digital equity and infrastructure expansion demand evidence-based models of ICT learning management, particularly in resource-limited schools. International evidence reinforces that digital transformation success is heavily influenced by school leadership, teacher readiness, and contextual support systems (Daniela et al., 2021). These dynamics highlight the urgency of understanding ICT-based learning management in Indonesian elementary schools to support equitable and sustainable digital implementation.

For these reasons, this study aims to analyze how ICT-based learning management is implemented at State Elementary School 19 Palembang across four dimensions: planning, organizing, implementation, and evaluation. This study fills a significant research gap regarding ICT management at the elementary school level, contributes to theoretical development on ICT-supported educational leadership and digital pedagogy, and offers practical strategies for strengthening digital learning ecosystems in Indonesia.

B. Methods

This study used a qualitative case-study design to examine how ICT-based learning management is implemented at State Elementary School 19 Palembang. A case study is suitable for exploring ICT practices in their natural school context where pedagogical, organizational, and technological factors intersect (Schmid Brianza, E., & Petko, D., 2021). Five teachers were selected purposively as information-rich cases: selection criteria were (1) consistent, active classroom use of ICT; (2) demonstrated capacity to prepare digital lesson materials (e.g., PowerPoint, digital lesson plans); and (3) nomination by the principal as representative implementers of the school's ICT strategy. Purposive selection for in-depth qualitative study is appropriate when the aim is analytic rather than statistical generalization (Bond, 2020). Data collection combined in-depth interviews, classroom observations, and document analysis. Observations focused on specific hardware and media (laptops, LCD/projector, PowerPoint slides, Word lesson documents, and video clips) and on how an internal school guideline encouraged standardized use of these media across classrooms an example of school-level digital structuring (Pöntinen Dillon, P., & Väisänen, P., 2022). Data were analyzed via Miles, Huberman, and Saldaña's interactive model (data reduction, data display, conclusion drawing): open coding identified units of meaning, codes were clustered into themes aligned with planning, organizing, implementation, and evaluation, and iterative triangulation and member checking were used to ensure credibility (Daniela Visvizi, A., & Gutiérrez-Brun, J., 2021).

C. Results and Discussion

The results indicate that ICT-based learning management at SD Negeri 19 Palembang begins with structured planning involving collaborative preparation of digital lesson plans, media alignment, and adaptation to students' developmental needs. The study found that ICT-based learning management at State Elementary School 19 Palembang was implemented through well-coordinated planning, implementation, and evaluation processes. In the planning stage, teachers collaborated with the principal to design digital lesson plans aligned with the curriculum and used multimedia tools such as PowerPoint and online learning resources. This finding supports (Kurniawan et al., 2021), who emphasize that structured lesson planning is essential for effective ICT integration.

During implementation, teachers applied a blended learning model combining traditional and digital strategies, supported by laptops, projectors, smartphones, and Wi-Fi networks. Interactive applications such as *Wordwall* and *Quizizz* increased student motivation and engagement, similar to findings by (O'Byrne & Pytash, 2022) that digital tools enhance learner participation. Teachers routinely design RPP using Word and modify PPT slides, Quizizz questions, and Wordwall activities to suit elementary learners. One teacher noted that "*digital lesson plans are easier to revise and share,*" reflecting the school's collaborative culture. Such planning aligns with findings that ICT preparation must integrate curriculum fit, media appropriateness, and learner readiness (Nikolopoulou, 2022). Planning meetings held biweekly reinforce intentional digital management, echoing literature emphasizing that structured planning enhances teacher readiness and lesson coherence (Ifenthaler & Yau, 2020); (Schmid et al., 2020).

ICT resource organization at the school is also collaborative. Teachers share digital materials via Google Drive and rely on informal ICT coordinators for troubleshooting. The

principal provides infrastructural oversight and liaises with the Education Office for internet maintenance. This aligns with studies stressing distributed digital leadership and shared responsibility as key to sustainable ICT adoption (Aldosemani, 2020). Shared repositories reduce duplication and increase consistency, supporting previous findings that collaborative digital ecosystems strengthen school-wide digital culture (Tondeur et al., 2020).

Implementation practices show active integration of tools such as PPT, Quizizz, and Wordwall to support interactive learning. Classroom observations demonstrated high engagement, with students responding enthusiastically to gamified tasks. Teachers reported that digital tools allowed faster diagnosis of learning needs and supported multisensory instruction. These findings align with research showing that Quizizz and other interactive platforms promote immediate feedback and strengthen motivation, particularly in primary education (Wang, 2020). The use of PowerPoint for concept introduction also reflects multimodal learning principles that have been shown to enhance focus and comprehension. Internet instability occasionally disrupted learning, but teachers mitigated this by preparing offline backups an adaptive practice consistent with evidence that flexible implementation is crucial in resource-constrained schools (Daniela Visvizi, A., & Gutiérrez-Brun, J., 2021).

Evaluation of ICT-based learning involves both digital assessment and reflective review of media effectiveness. Evaluation was conducted using digital tools such as online quizzes and portfolios, providing feedback for teaching improvement in line with (Mishra et al., 2020). Teachers rely on Quizizz scores for formative feedback and analyze digital submissions through Google Forms or WhatsApp. Reflective discussions help refine the suitability of tools. This reflects contemporary evaluation frameworks that emphasize iterative improvement and dual-focus assessment on learning outcomes and tool performance (Tondeur et al., 2020). Fast feedback loops enabled by digital platforms support adaptive instruction, consistent with recent findings on data-supported decision-making in ICT-rich classrooms.

Challenges encountered include uneven teacher digital competence, internet instability, and limited devices. The school addressed these through peer-mentoring, offline content preparation, and collaboration with the Education Office. Teachers also conducted informal digital training after school, consistent with Indonesian evidence that peer-supported learning accelerates teachers' digital competence development (Hidayat et al., 2022).

Institutional support strengthened ICT implementation, aligning with findings that multi-level collaboration is essential for digital transformation in Indonesian schools (Suhartono et al., 2023). These adaptive strategies echo models of collaborative digital literacy improvement documented in recent Indonesian research (Satriawan & Azis, 2021) and are further supported by studies showing that teacher readiness improves through sustained professional development and contextual training ((Pratama et al., 2022); (Fikri et al., 2023). Additionally, the importance of infrastructure support and adaptive content delivery in low-resource schools has been highlighted in Indonesian ICT integration studies (Sari & Wahyuni, 2021), while collaborative technology planning at the school level is shown to significantly improve digital learning sustainability (Wahyudi et al., 2022). Together, these findings reinforce that effective ICT management in

elementary schools relies on collaboration, flexibility, and continuous improvement under real-world constraints.

D. Conclusions

This study found that ICT-based learning management at State Elementary School 19 Palembang operates effectively through three key dimensions: planning, which involves collaborative digital lesson design using standardized templates; implementation, which integrates interactive tools such as Quizizz, Wordwall, and multimedia presentations; and evaluation, which uses digital assessments and reflective feedback to monitor student progress. These findings show that ICT integration is strengthened by adaptive management, strong teacher collaboration, and continuous capacity building.

The results highlight important policy implications. Sustainable ICT integration requires consistent budget allocation for infrastructure upgrades, device maintenance, and reliable internet access. Education offices should also design long-term professional development programs that combine formal training with peer mentoring to ensure ongoing improvement of teachers' digital competence. Strengthening coordination between schools and local authorities is crucial for building resilient digital learning ecosystems.

Future research should examine a wider range of schools to compare ICT management practices and identify broader patterns. Quantitative or mixed-methods studies are also recommended to measure the impact of ICT-based management on student achievement, digital literacy, and classroom engagement, providing stronger evidence for policy and practice.

E. Acknowledgement

The author would like to express sincere gratitude to Universitas PGRI Palembang for the academic support provided throughout the research process. Special appreciation is extended to the principal, teachers, and students of State Elementary School 19 Palembang who participated and contributed valuable information to this study. The author also acknowledges the guidance and constructive suggestions from Dr. Alhadi Yan Putra, S.E., S. Sos., M.Si, and Dr. Heri Setyo Nugroho, M.A.P., which greatly enhanced the quality of this research.

References

- Aldosemani, T. (2020). Digital leadership in schools. *Education and Information Technologies*, 25(3), 2109–2138. <https://doi.org/10.1007/s10639-019-10020-7>
- Ariyanti & Wong, L., D. (2023). ICT for flexible digital learning. *Computers & Education*, 184, 104935. <https://doi.org/10.1016/j.compedu.2023.104935>
- Bond, M. (2020). Facilitating student engagement through educational technologies: A systematic review. *Educational Psychology Review*, 32(1), 1–30. <https://doi.org/10.1007/s10648-019-09486-3>
- Daniela, L., Visvizi, A., & Gutiérrez-Brun, J. (2021). Teacher digital literacy and its impact on learning effectiveness. *Computers in Human Behavior*, 120, 106769. <https://doi.org/10.1016/j.chb.2021.106769>

- Fikri, M., Rahmawati, D., & Putra, A. (2023). Digital Literacy Practices Among Elementary Teachers in Indonesia. *Jurnal Pendidikan Profesi*, 16(2), 201–214. <https://doi.org/10.24036/jpp.v16i2.124321>
- Ghavifekr & Amrullah, M. F., S. (2020). ICT use in primary education. *Interactive Learning Environments*, 28(1), 1–15. <https://doi.org/10.1080/10494820.2020.1734631>
- Hasibuan et al., A. (2021). Digital transformation in Indonesian schools. *Education and Information Technologies*, 26(3), 2101–2115. <https://doi.org/10.1007/s10639-021-10555-6>
- Hidayat, R., Sutrisno, A., & Hilman, I. (2022). Digital Competence Improvement Through Peer-Learning Among Indonesian Teachers. *Jurnal Penelitian Dan Pengembangan Pendidikan*, 9(3), 345–355. <https://doi.org/10.23887/jppp.v9i3.52356>
- Ifenthaler, D., & Yau, J. Y. K. (2020). Utilising learning analytics for study success. *Computers & Education*, 146, 103751. <https://doi.org/10.1016/j.compedu.2019.103751>
- Kurniawan, A., Nugraha, E., & Rahman, D. (2021). ICT-based learning management in junior high schools. *Journal of Educational Management*, 9(1), 33–44.
- Mishra, S., Gupta, R., & Shree, A. (2020). Digital assessment and technology integration. *Education and Information Technologies*, 25(6), 5041–5056. <https://doi.org/10.1007/s10639-020-10135-8>
- Nikolopoulou, K. (2022). Tablet integration in primary education. *Education and Information Technologies*, 27(4), 5239–5260. <https://doi.org/10.1007/s10639-021-10841-3>
- O’Byrne, W. I., & Pytash, K. E. (2022). Digital Tools and Student Engagement: Enhancing Participation in Blended Learning Environments. *Computers and Education*, 180, 104446. <https://doi.org/10.1016/j.compedu.2022.104446>
- Ottenbreit-Leftwich et al., A. (2022). Elementary teachers’ ICT practices. *Computers & Education*, 184, 104524. <https://doi.org/10.1016/j.compedu.2022.104524>
- Pöntinen Dillon, P., & Väisänen, P., S. (2022). School leadership and ICT integration. *Technology, Pedagogy and Education*, 31(3), 345–360. <https://doi.org/10.1080/1475939X.2022.2055257>
- Pratama, R., Widodo, S., & Yuliani, N. (2022). Teacher Readiness for Digital Learning in Indonesian Basic Education. *Jurnal Pendidikan Dan Pembelajaran*, 27(1), 11–22. <https://doi.org/10.21831/pep.v27i1.45925>
- Sari, P., & Wahyuni, S. (2021). ICT Integration Challenges in Indonesian Primary Schools. *Jurnal Komunikasi*, 9(1), 41–52. <https://doi.org/10.33369/jk.v9i1.16241>
- Satriawan, A., & Azis, A. (2021). Empowering Teachers’ Digital Literacy in Indonesian Schools. *Komposisi: Jurnal Pendidikan Bahasa, Sastra, Dan Seni*, 22(1), 55–67. <https://doi.org/10.24036/komposisi.v22i1.112347>
- Schmid Brianza, E., & Petko, D., R. F. (2021). Effects of digital tools on learning. *Computers & Education*, 168, 104204. <https://doi.org/10.1016/j.compedu.2021.104204>
- Schmid, M., Brianza, E., & Petko, D. (2020). Developing a short assessment instrument for Technological Pedagogical Content Knowledge (TPACK.xs) and comparing the factor structure of an integrative and a transformative model. *Computers & Education*, 157, 103967. <https://doi.org/10.1016/j.compedu.2020.103967>
- Suhartono, E., Nurhayati, L., & Ramadhan, M. (2023). Multi-Level Collaboration in Supporting School Digital Transformation. *Jurnal Penelitian Pendidikan Profesional*, 12(1), 112–124. <https://doi.org/10.36706/jppp.v12i1.24059>
- Syahputra et al., R. (2022). ICT management alignment with curriculum. *Interactive*

- Learning Environments*, 30(4), 451–468.
<https://doi.org/10.1080/10494820.2021.2007157>
- Tondeur, J., Aesaert, K., Prestridge, S., & Consuegra, E. (2020). What matters in the training of teachers' ICT competencies. *Computers & Education*, 157, 103971. <https://doi.org/10.1016/j.compedu.2020.103971>
- Wahyudi, A., Setiawan, D., & Fadilah, N. (2022). School-Level Digital Learning Planning and Sustainability. *Jurnal Basicedu*, 6(3), 4229–4239. <https://doi.org/10.31004/basicedu.v6i3.2530>
- Wang, Y. (2020). Digital transformation and teacher learning. *International Journal of Educational Research*, 99. <https://doi.org/10.1016/j.ijer.2019.101528>