

Principal Management Strategies for Enhancing Teachers' Digital Literacy and the Quality of Instruction

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Abstract

The transformation of education in the digital era requires elementary schools to no longer focus solely on conventional academic achievement but also on strengthening the digital competencies of all school members, especially teachers as the primary implementers of the learning process. This study aims to analyze the principal's management strategies in improving teachers' digital literacy and the quality of learning at SD Negeri 2 Purwojati Kertek Wonosobo. The study used a qualitative approach with a descriptive type. The research subjects included the principal, teachers, and related parties at the school. Data collection techniques were carried out through observation, interviews, and documentation, while data analysis used an interactive model that includes data reduction, data presentation, and drawing conclusions. The results showed that the principal's strategies were implemented through planning digital literacy improvement programs, implementing teacher training and mentoring, providing supporting facilities, and supervising and evaluating technology-based learning. The implementation of teacher digital literacy was evident in the use of digital learning media, the use of online learning resources, a variety of learning methods, and technology-based evaluations that contributed to improving the quality of learning. Supporting factors for the principal's strategies included leadership commitment, collaboration between teachers, and the availability of digital resources, while inhibiting factors included teachers' digital skill gaps, limited time, and suboptimal ongoing training. This study concluded that a planned, adaptive, and sustainable principal management strategy plays a significant role in improving teachers' digital literacy and the quality of learning in elementary schools.

Keywords

Learning Quality, Management Strategy, Principal, Teacher Digital Literacy.



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INTRODUCTION

The transformation of education in the digital era requires elementary schools to no longer focus solely on conventional academic achievement but also on strengthening the digital competencies of all school members, especially teachers as the primary implementers of the

learning process. Teacher digital literacy is an urgent need because teachers are required to access, evaluate, utilize, and produce digital information critically and responsibly to support effective learning. In the elementary school context, digital literacy is not simply related to technical skills in using devices or applications, but also involves pedagogical skills in designing interactive, adaptive learning that is tailored to student characteristics. This situation has become increasingly evident since the rapid development of technology-based learning, requiring schools to prepare human resources capable of adapting to these changes. Therefore, the success of strengthening teacher digital literacy is greatly influenced by the principal's leadership through targeted, systematic, and sustainable managerial strategies (Diputra et al., 2020; Agustini et al., 2020).

The principal holds a strategic position as an educational leader, organizational manager, and driver of change in the school. To improve teacher digital literacy, principals need to develop a management strategy that encompasses program planning, resource organization, coaching, supervision, and follow-up evaluation. This strategy is crucial because improving teacher digital literacy cannot occur spontaneously; it requires the support of school policies, the provision of infrastructure, training, academic supervision, and a work culture that encourages innovation. Research shows that effective principal leadership is linked to improved teacher professionalism, including in the use of digital technology for learning. Therefore, a principal's management strategy is a key factor in building a school ecosystem that supports the sustainable development of teachers' digital competencies (Marmoah et al., 2023; Johanes et al., 2022).

The importance of teacher digital literacy is also directly related to the quality of learning. Teachers with good digital literacy tend to be better able to select credible learning resources, utilize interactive media, manage digital classrooms, develop technology-based evaluations, and adapt learning strategies to student needs. Conversely, low teacher digital literacy can lead to monotonous learning, lack variety, and the inability to maximize the potential of technology as a means of improving learning outcomes. At the elementary school level, the quality of learning is crucial for establishing the foundation of students' knowledge, skills, and character. Therefore, strengthening teachers' digital literacy is inseparable from efforts to improve the quality of learning. From an educational management perspective, principals need to ensure that teachers' mastery of technology is truly integrated with learning objectives, not merely limited to the administrative or technical use of digital devices (Nugraeni & Suyatno, 2023; Badawi et al., 2020).

On the other hand, the reality on the ground shows that the digital literacy levels of elementary school teachers still vary. While some teachers have successfully integrated technology into their learning, others still face challenges such as limited skills, minimal training, low confidence in using digital media, and limited supporting facilities at school. This situation requires the principal to act as a problem solver through contextual strategies tailored to the school's needs. Principal management strategies can be realized through analyzing teacher needs, developing capacity-building programs, implementing internal training, mentoring in the use of digital platforms, providing internet access and devices, and periodically evaluating

the implementation of digital learning. With the right strategies, principals not only improve individual teacher competencies but also build a school culture that adapts to technological developments and learning innovations (Rochmah et al., 2023; Nurilahi et al., 2022).

SD Negeri 2 Purwojati Kertek Wonosobo, as an elementary education unit, certainly faces similar challenges in meeting the demands of 21st-century learning. Elementary schools in the region need to ensure that digital transformation is not merely a discourse but is actually implemented in daily learning practices. In this context, the principal plays a central role in formulating management strategies that bridge the gap between the need to improve teachers' digital literacy and the target of improving the quality of learning. This strategy is crucial because the quality of learning is determined not only by the curriculum and facilities, but also by the principal's ability to motivate teachers to continue their professional development. Through visionary, participatory, and adaptive leadership, the principal can create a school climate conducive to digital learning innovation, encouraging teachers to improve their competencies and students to experience more meaningful learning (Marmoah et al., 2023; Erwani et al., 2023).

Based on this description, research on the principal's management strategies for improving teachers' digital literacy and the quality of learning at SD Negeri 2 Purwojati Kertek, Wonosobo, is crucial. This research is relevant because it can provide a concrete picture of how the principal designs, implements, and evaluates strategies for developing teachers' digital literacy in an elementary school context. Furthermore, this research is expected to uncover the supporting and inhibiting factors faced by schools in their efforts to improve the quality of digital literacy-based learning. The research results will not only benefit the schools studied but can also serve as a reference for other elementary schools in formulating educational management policies and practices that are responsive to the challenges of digitalization. Therefore, focusing on principal management strategies is highly relevant in efforts to achieve quality, innovative, and modern learning (Agustini et al., 2020; Johanes et al., 2022; Nugraeni & Suyatno, 2023).

METHODS

The research method used in the study entitled "The Principal's Management Strategy in Improving Teacher Digital Literacy and Learning Quality at SD Negeri 2 Purwojati Kertek Wonosobo" is a qualitative research method with a descriptive approach. This approach was chosen because the research focuses on efforts to deeply understand the principal's management strategy in improving teacher digital literacy and its impact on the quality of learning in the elementary school environment. The research location is SD Negeri 2 Purwojati Kertek Wonosobo, with research subjects including the principal, teachers, and related parties involved in the implementation of learning. Research data was obtained through observation techniques, in-depth interviews, and documentation to gather information regarding the planning, implementation, evaluation, as well as supporting and inhibiting factors of the management strategy implemented by the principal. Data analysis was carried out interactively through the

stages of data reduction, data presentation, and drawing conclusions, while the validity of the data was tested using source and technique triangulation so that the research results have a high level of credibility. With this method, the research is expected to be able to provide a comprehensive picture of the principal's management practices in building teacher digital literacy and improving the quality of learning in a sustainable manner.

FINDINGS AND DISCUSSION

Principal Management Strategies for Improving Teacher Digital Literacy

Research results indicate that the principal of Purwojati Kertek 2 Elementary School, Wonosobo, prioritizes improving teacher digital literacy as part of the school's quality development program. This strategy begins with mapping teacher needs related to the ability to use digital devices, learning applications, technology-based administrative management, and utilizing the internet as a learning resource. Based on interviews and observations, the principal plays a role not only as a policymaker but also as a driving force, encouraging teachers to adapt to developments in educational technology. From a management perspective, this step demonstrates a clear planning function, as the principal first identifies the actual conditions of teachers before establishing a competency improvement program. Theoretically, this finding aligns with the view that a principal's managerial strategy for improving digital literacy must begin with a needs analysis, mapping teacher capabilities, and determining development targets appropriate to the school context so that the program is not generalized but rather targeted and impacts teacher learning practices (Rochmah, Hidayati, & Mubarak, 2023; Safitri, Marsidin, & Subandi, 2020).

Based on the research results, the principal's concrete strategy is evident in the development of teacher capacity building programs through internal training, mentoring in the use of digital learning media, and fostering the habit of using online platforms in school academic activities. The principal utilizes meeting forums, Teacher Working Groups, and supervisory activities as spaces to guide teachers to become more accustomed to using technology in learning. Furthermore, teachers are encouraged to share good practices in the use of presentation applications, learning videos, digital assessments, and searching for teaching materials online. These findings demonstrate that the principal's management strategy goes beyond administrative policies, but also moves toward organizing and implementing programs that enable teachers to learn collaboratively. Theoretically, this condition confirms that principal leadership in the context of digital literacy is closely linked to the instructional function, namely the principal's ability to mentor teachers, create a professional learning climate, and direct learning innovation through structured programs. When the principal actively facilitates training and mentoring, teachers' digital literacy develops not only due to modern demands, but also because of a school system that encourages tangible competency changes (Nurilahi, Hidayati, Hidayat, & Usmar, 2022; Erwani, Witarsa, & Masrul, 2023).

The research also shows that the principal's strategy at SD Negeri 2 Purwojati is inseparable from efforts to provide supporting facilities and infrastructure for digital literacy. The principal strives to maximize available facilities, such as the school's internet network, computers or laptops, teachers' use of smartphones, and the use of easily accessible learning applications. In elementary schools where technological facilities are not always complete, the principal implements an adaptive strategy by optimizing existing resources while still encouraging teachers to utilize simple but relevant technology for learning. These findings demonstrate the role of resource organization in principal management, as improving digital literacy is impossible without infrastructure support, even if limited. Theoretical analysis shows that teachers' digital literacy in schools is significantly influenced by organizational support, including the availability of internet access, digital devices, and school policies that facilitate the use of technology in learning activities. Therefore, principals are tasked not only with motivating teachers but also with ensuring a supportive school ecosystem that enables teachers to practice their digital competencies in daily teaching and learning activities (Naila, Ridlwan, & Haq, 2021; Safitri et al., 2020).

Interviews with teachers revealed that the principal's strategies also focused on motivation, role modeling, and supervision. The principal strived to raise teachers' awareness that digital literacy is not merely an additional skill, but rather an integral part of teacher professionalism in the modern learning era. The principal provided guidance for teachers to use technology not only for administration but also to design more engaging, interactive learning that meets the needs of elementary school students. On several occasions, the principal also supervised the learning tools and media used by teachers, as well as teacher involvement in digital competency development. Theoretically, these findings suggest that the principal's management strategy encompasses both transformational and instructional leadership dimensions, as the principal serves as both a motivator who fosters awareness of change and a supervisor who ensures that change is truly implemented. The relationship between the principal's leadership style and teachers' digital literacy is also supported by research showing that principal leadership contributes to improving teachers' digital competence and performance, as teachers tend to develop when they receive encouragement, role models, and consistent academic control from their leaders (Johanes, Suroyo, & Budiastira, 2022; Guniarti, Nyoman, & Nurgrahani, 2025).

Furthermore, the research findings show that the principal's strategy for improving teachers' digital literacy at SD Negeri 2 Purwojati still faces several obstacles, such as differences in digital proficiency levels among teachers, limited time for intensive training, and unequal teacher confidence in utilizing technology as a learning medium. However, the principal responded to these obstacles with a phased approach, providing repeated learning opportunities, encouraging collaboration between teachers, and adjusting technology mastery targets to the learning needs of the elementary school. From the perspective of educational management theory, these steps demonstrate that the principal's strategy is contextual and adaptive, as it does not force instant digital transformation but rather fosters change through

continuous development. This is important because the success of teachers' digital literacy is not only determined by the availability of technology, but also by psychological readiness, work culture, and school organizational support. Thus, the research results confirm that the principal's management strategy in improving teachers' digital literacy at SD Negeri 2 Purwojati Kertek Wonosobo has reflected the educational management function which includes planning, organizing, implementing, motivating, and evaluating, although it still requires strengthening in aspects of program sustainability and equalizing digital competencies among teachers so that its impact on learning quality becomes more optimal (Hulwana, 2024; Yuliana, Nirmala, & Ardiasih, 2023).

Implementation of Teacher Digital Literacy to Improve Learning Quality

Research results show that teachers at SD Negeri 2 Purwojati Kertek Wonosobo have begun integrating digital literacy into the learning process through the use of digital devices, presentation applications, learning videos, online learning resources, and internet-based communication media to support learning interactions. This implementation is evident in teachers' activities when compiling teaching materials, searching for learning references, presenting material through visual media, and utilizing simple digital platforms for assignments and evaluations. In practice, teachers' digital literacy is evident not only in their ability to operate devices but also in their ability to select relevant information, create more engaging materials, and adapt learning media to the characteristics of elementary school students. These findings indicate that digital literacy has become part of the pedagogical process, not merely a technical skill. Theoretically, this situation confirms that teacher digital literacy is closely related to pedagogical digital competence, namely the teacher's ability to combine technological knowledge, pedagogy, and teaching materials to produce effective, engaging, and relevant learning tailored to the needs of students in the digital era (Pratiwi & Puspito, 2021; Cahyani & Sulastri, 2022).

Research also shows that teachers' implementation of digital literacy has resulted in increased variety of classroom learning methods. Before utilizing digital technology, learning tended to be conventional, with lectures, question-and-answer sessions, and the use of textbooks as the primary learning resource. However, after teachers began implementing digital literacy, learning became more varied through the use of educational videos, interactive images, digital-based quizzes, and assignments that encouraged students to seek information from safe and age-appropriate learning sources. This change created a more lively learning environment because students not only listened to teacher explanations but also engaged visually, auditorily, and actively in learning activities. Theoretical analysis indicates that teachers' use of digital literacy contributes to improving the quality of learning by creating more active, creative, and student-centered learning. Digitally literate teachers tend to be more able to innovate in their teaching methods, thus preventing monotony and providing students with more meaningful learning experiences (Rahmawati, Hidayat, & Minsih, 2021; Lestari, 2023).

In their teaching, teachers at SD Negeri 2 Purwojati also demonstrate digital literacy skills by utilizing the internet as a supplementary learning resource to enrich the material being taught. Teachers not only rely on textbooks but also explore articles, instructional videos, educational images, and digital teaching materials relevant to the learning topic. This finding is important because it demonstrates that teachers' digital literacy impacts the quality of learning content, particularly in terms of the breadth of material, the topicality of information, and the ease with which students understand abstract concepts. Teachers become more flexible in delivering material because they have a wide range of alternative learning resources that can be tailored to the students' developmental levels. Theoretically, teachers' ability to select and utilize digital information is at the core of digital literacy, as teachers are required not only to be able to access information but also to evaluate the validity, relevance, and educational value of that information before using it in learning. Thus, the quality of learning improves because the material provided becomes richer, contextual, and appropriate to the learning needs of elementary school students (Ningsih & Mulyono, 2021; Kurniati, 2022).

In addition to enriching materials and methods, teachers' implementation of digital literacy also improves student interaction and motivation. Observations show that the use of digital media such as videos, images, and visual presentations makes students more enthusiastic about learning, easier to understand teacher explanations, and more active in responding to questions or assignments. Teachers also utilize digital devices to provide faster feedback and present more engaging lessons compared to lecture-based learning. This demonstrates that teachers' digital literacy serves not only as a teaching aid but also as a means to create a more participatory and enjoyable learning experience. Theoretical analysis confirms that quality learning is characterized by active student engagement, positive interactions between teachers and students, and the use of media that enhance motivation and understanding. In this context, teachers' digital literacy is a crucial factor because their ability to utilize technology directly influences learning designs that are more interactive and responsive to student needs (Sari & Yuniarto, 2021; Mulyati, 2024).

Further research indicates that teachers' implementation of digital literacy at SD Negeri 2 Purwojati is also evident in the learning evaluation process, albeit in a rudimentary form. Several teachers have used digital applications or media to create questions, create interactive exercises, and manage assignments more practically. This step helps teachers expedite the assessment process and facilitate documentation of student learning outcomes. Although not all teachers are optimally utilizing digital evaluation, this trend indicates a shift toward learning that is more adaptive to technological developments. Theoretically, the use of technology in evaluation is a crucial component of learning quality because it can improve the efficiency, accuracy, and variety of assessments. Teachers with better digital literacy will find it easier to develop assessments that not only measure learning outcomes but also foster students' independence and skills in using technology responsibly (Fitriyani & Santosa, 2022; Handayani, 2023).

Overall, the research findings confirm that the implementation of digital literacy by teachers at SD Negeri 2 Purwojati Kertek Wonosobo has significantly contributed to improving the quality of learning, both in terms of method variety, richness of learning resources, classroom interaction, student motivation, and the efficiency of learning evaluation. Although implementation is still developing and not evenly distributed among all teachers, the direction of change indicates that digital literacy has become a crucial instrument in elementary school learning. From a theoretical perspective, this situation demonstrates that the quality of learning in the digital era is significantly influenced by teachers' ability to meaningfully integrate technology into pedagogical practices. Therefore, teachers' digital literacy implementation cannot be understood solely as technical skills, but as professional competencies that directly influence the effectiveness, innovation, and quality of the teaching and learning process. Therefore, the better teachers' digital literacy implementation, the greater the opportunity for active, engaging, relevant, and high-quality learning for elementary school students (Fauziah & Nuryana, 2021; Wulandari, 2024).

Supporting and Inhibiting Factors of Principal Strategies to Improve Digital Literacy and Learning Quality

Research at Purwojati Kertek 2 Elementary School in Wonosobo shows that the success of the principal's strategy is determined not only by the principal's ability to develop programs, but also by the internal conditions of the school that support their implementation. The most prominent supporting factor is the principal's commitment to making digital literacy part of teacher professional development, coupled with the teachers' openness to technology-based learning. The principal plays an active role in encouraging teachers to participate in training, share good practices, and utilize digital tools in learning. This supportive leadership attitude creates a work climate that encourages teachers to be unafraid to try new media and applications. Theoretically, these conditions indicate that the success of improving digital literacy is greatly influenced by the principal's instructional leadership, which is able to build a shared vision, motivate teachers, and foster a culture of learning within the school environment. From an educational management perspective, such leadership support is crucial for learning transformation because teachers are more prepared to change when they experience direction, role models, and tangible support from the school leadership (Devisa, Matin, & Ahmad, 2022; Rosita & Iskandar, 2022).

In addition to leadership support, research also shows that another supporting factor lies in collaboration between teachers in the process of improving digital literacy. At SD Negeri 2 Purwojati, teachers who are more familiar with technology tend to help colleagues who are still experiencing difficulties, whether in using presentation media, searching for digital learning resources, or operating simple applications for teaching and administration. This collaboration is a school strength because the process of improving digital competence does not rely solely on formal training but also develops through peer learning in daily activities. This situation indicates that a collegial work culture and teacher learning community are significant supporting factors for the implementation of the principal's strategy. Theoretically,

the development of teacher digital competence will be more effective if it is built through a professional learning community that allows teachers to share experiences, solve problems together, and reflect on their digital learning practices. Therefore, the principal's strategy will be more successful if it is supported by a collaborative culture that encourages teachers to learn continuously within their own school environment (Septiana & Hidayati, 2022; Siswadi, 2023).

Another supporting factor is the availability of digital infrastructure, even if it is still in a rudimentary form. The research findings show that school internet access, teacher smartphone ownership, personal laptop use, and the availability of easily accessible learning applications are crucial for implementing digital-based learning. Although the facilities at the elementary school are not yet fully ideal, the presence of basic facilities is sufficient to help teachers begin implementing digital literacy in their learning. The principal also strives to optimize existing facilities so that teachers can utilize them optimally. These findings demonstrate that infrastructure support is a crucial prerequisite for strategies to improve digital literacy. Theoretical analysis confirms that digital transformation in schools will be easier when schools have adequate access to technology, as teachers' digital competencies cannot develop optimally without practical opportunities and supporting facilities that enable routine technology use. Therefore, the availability of digital resources, even if limited, remains a crucial supporting factor in improving the quality of learning (Ansar & Marzuki, 2022; Zubaidah & Putra, 2022).

On the other hand, research results also indicate a number of inhibiting factors in implementing principals' strategies. The main obstacle lies in the differing levels of technology proficiency among teachers. Some teachers have adapted sufficiently to the use of digital media, while others are still at a basic level and require more intensive mentoring. This difference in ability results in uneven implementation of digital literacy and a less consistent quality of technology-based learning across classes. Furthermore, some teachers still lack confidence when using new applications or developing more innovative, technology-enabled lessons. Theoretically, this situation demonstrates that human resource readiness is a key challenge in schools' digital transformation. The success of principals' strategies depends not only on policy but also on individual teachers' readiness to learn, adapt, and change previously conventional teaching practices. When the digital competency gap among teachers remains large, principals are required to implement a gradual, personalized, and sustainable coaching strategy to ensure that changes are accepted by all teachers proportionately (Kurniawan, Solehan, & Lazwardi, 2025; Johanes, Suroyo, & Budiastra, 2022).

Other obstacles include time constraints, teacher administrative burdens, and suboptimal ongoing training programs. Research shows that teachers often have to juggle their time between teaching, learning administration, and other school activities, limiting the opportunity to deepen their digital skills. Furthermore, available training is not always intensive and structured enough to meet each teacher's needs. This situation results in gradual improvements in digital literacy, sometimes dependent on individual teacher initiative. Theoretically, these obstacles demonstrate that digital transformation in learning cannot be

achieved through just one or two training sessions; instead, it requires a consistent coaching system, ongoing supervision, and more proportionate management of teacher workloads. Otherwise, digital literacy will develop only at the administrative level, rather than becoming a pedagogical competency truly integrated into learning. Therefore, principals need to develop more systematic strategies, such as regular mentoring, needs-based supervision, and realistic scheduling of digital literacy strengthening programs tailored to school conditions (Rosmini, Ningsih, Murni, & Adiyono, 2024; Siswadi, 2023). Overall, the research results indicate that the principal's strategy for improving teacher digital literacy and learning quality at SD Negeri 2 Purwojati Kertek Wonosobo is influenced by a combination of interrelated supporting and inhibiting factors. Supporting factors include the principal's visionary and supportive leadership, collaboration among teachers, and the availability of basic digital infrastructure. Meanwhile, inhibiting factors include the gap in teachers' digital competencies, limited time and training, and unequal teacher confidence in utilizing technology for learning. From the perspective of educational management theory, these findings emphasize that the success of a principal's strategy is not solely measured by the existence of a program, but by the principal's ability to manage resources, build an adaptive school culture, and gradually overcome implementation obstacles. Thus, the strategy for improving teacher digital literacy must be understood as a process of school organizational change that requires leadership, system support, a collaborative culture, and ongoing coaching to significantly and sustainably improve learning quality (Nurilahi et al., 2022; Devisa et al., 2022).

CONCLUSION

The principal's management strategy at SD Negeri 2 Purwojati Kertek Wonosobo plays a crucial role in improving teachers' digital literacy and the quality of learning. This strategy is realized through the planning of teacher digital competency development programs, the implementation of training and mentoring, the provision of supporting facilities, and the supervision and evaluation of technology-based learning. The implementation of teacher digital literacy has been proven to contribute to improving the quality of learning through the use of digital media, a variety of teaching methods, the utilization of online learning resources, and more effective and engaging learning evaluations for students. The success of the principal's strategy is supported by leadership commitment, collaboration between teachers, and the availability of digital facilities, although still faced with obstacles such as differences in teachers' digital competencies, limited time, and suboptimal ongoing training. Thus, improving teacher digital literacy and the quality of learning requires a planned, adaptive, collaborative, and sustainable principal management strategy so that the digital learning transformation in elementary schools can run optimally.

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