



Principal Strategies in Improving Information and Communication Technology Competence in Teachers

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ABSTRACT

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Developing teachers' information and communication technology (ICT) competence requires strategic leadership at the school level. This study explores the principal's strategies for enhancing ICT competence among rural public junior high school teachers. Using a qualitative descriptive approach, data were collected through interviews, observation, and documentation at school. The findings reveal that most teachers demonstrate basic to intermediate ICT skills, with tools such as PowerPoint and LCD projectors being the most common. Supporting factors include the availability of ICT facilities, regular training, strong principal leadership, peer collaboration, and partnerships with the Education Office. However, limited funding, unstable internet, low teacher confidence, and heavy workloads hinder progress. The principal's strategic responses include organizing training programs, involving teachers in external technical guidance, optimizing existing ICT tools, promoting peer learning through MGMP forums, and providing recognition to innovative teachers. This study contributes to the discourse on digital leadership and teacher capacity-building in resource-constrained contexts.

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INTRODUCTION

Education plays a crucial role in preparing human resources to be competent, adaptive, and responsive to the challenges of the digital age. In the 21st century, the rapid advancement of information and communication technology (ICT) has significantly influenced educational practices, requiring schools to adopt innovative learning strategies and develop teachers' digital competence (Gökdaş et al., 2024; Prado-Medel, 2024; Rasdiana et al., 2024). Schools can no longer rely solely on traditional methods; instead, the integration of ICT has become necessary to enhance learning effectiveness, teacher

productivity, and student engagement (Apostu et al., 2022; Li et al., 2023; Sharma et al., 2023). In this regard, the school principal's leadership becomes a key factor in directing, facilitating, and sustaining the transformation towards ICT-integrated education.

In practice, many schools, particularly those in semi-rural or developing areas, still face various obstacles in improving the ICT competence of their teaching staff. These challenges include limited teacher confidence in using technology, resistance to change, inadequate training, and unstable infrastructure (Feijóo et al., 2023; Hartle et al., 2022). Although schools may have digital tools, such access does not automatically translate into practical use. Not adequately trained or supported teachers often revert to conventional teaching methods, thereby limiting the potential benefits of digital innovation in the classroom (Brglez et al., 2024; Khan et al., 2024). This situation requires school leaders to formulate effective strategies to empower teachers and overcome systemic and individual barriers.

One concrete example is SMPN Satu Atap 12 Sarolangun, a public junior high school with sufficient ICT infrastructure and internet connectivity. Despite these resources, the school continues to struggle with limited teacher readiness to adopt digital tools in teaching and learning (Amar & Eleyan, 2022; Almufarreh et al., 2023; Sain, 2025). Some teachers lack confidence, while others are sceptical about the relevance of digital approaches, choosing to stay within the comfort of traditional pedagogy (Asad et al., 2023; Yurionova et al., 2022). These conditions are exacerbated by technical issues such as unstable internet connections and the absence of a structured professional development system. As a result, efforts to integrate ICT are often inconsistent and lack long-term impact.

The role of the school principal is vital in addressing these issues. Leadership strategies must focus on providing facilities and building a school culture that supports innovation, continuous learning, and collaboration (Amar & Eleyan, 2022; Suwanto et al., 2022). School principals must act as change agents who promote the benefits of ICT, design capacity-building programs, engage stakeholders, and evaluate implementation progress systematically. However, studies exploring the specific strategies principals use to enhance ICT competence in teachers remain limited, especially in the Indonesian context (Gil-Flores et al., 2024; Makrakis, 2024; Xu & Zhu, 2023). This gap highlights the need for further investigation into the leadership approaches that can effectively transform teacher behaviour and improve the quality of learning through ICT.

Several previous studies have highlighted that while the use of ICT in education is gaining traction, successful implementation relies heavily on the

leadership capacity of school principals (Almaghrabi et al., 2022; Molla & Seyoum, 2022; Rocha et al., 2024). Many principals, however, are still unfamiliar with ICT integration strategies, lack professional training in digital leadership, or cannot align school development plans with technology-based learning goals. Moreover, without ongoing mentoring, monitoring, and evaluation, ICT implementation becomes unsustainable (Ghavifekr & Wong, 2022; Yusuf, 2022). Therefore, it is critical to explore the challenges and strategies principals employ to foster ICT competence among teachers.

The novelty of this study lies in its focus on exploring leadership strategies specifically aimed at enhancing ICT competence in teachers. While many existing studies discuss ICT integration broadly, few emphasize the principal's strategic role as an enabler of teacher digital transformation. This study examines how the principal of SMPN Satu Atap 12 Sarolangun navigates the digital transformation process by addressing infrastructure, mindset, skill development, and institutional support systems. The findings are expected to contribute to the discourse on educational leadership and offer a practical model for schools facing similar challenges in enhancing teacher ICT competencies.

The central problem of this study is how the principal of SMPN Satu Atap 12 Sarolangun formulates and implements strategies to enhance teachers' ICT competence. The core assumption is that principals with visionary, collaborative, and data-driven leadership are better positioned to foster digital competence among teachers. Unlike many studies focusing solely on infrastructure or policy, this research argues that meaningful transformation must begin internally through school-based leadership tailored to contextual challenges. The novelty of this study lies in its focus on a rural public junior high school where ICT facilities exist, but digital teaching practices remain underutilized. By examining this context, the study contributes original insights into leadership dynamics often overlooked in ICT integration research. The findings will enrich leadership theory and inform practical models for schools with similar conditions.

RESEARCH METHOD

This research employed a qualitative approach with a descriptive method, aiming to explore and deeply understand the strategies implemented by the principal in enhancing teachers' information and communication technology (ICT) competence at SMPN One Roof 12 Sarolangun. This approach was chosen because it provides a comprehensive depiction of phenomena that occur naturally within the school environment. According to Tabroni & Wishal Luthfikha (2023), qualitative descriptive research aims to systematically and factually describe actual conditions in the field. Similarly, Adatara et al. (2023)

emphasize that the qualitative approach focuses on understanding meaning within specific social contexts rather than testing hypotheses or making generalizations.

The subjects of this study included the school principal, teachers, and students at SMPN One Roof 12 Sarolangun. The research was conducted during the second semester of the 2024/2025 academic year. To collect valid and relevant data, the researcher used three main instruments: in-depth interviews, participatory observation, and documentation analysis related to instructional tools and activities supporting ICT integration. Triangulation techniques were applied to ensure the validity of data from multiple sources, enabling a more objective and holistic understanding.

The collected data were analyzed using the qualitative data analysis technique proposed by Miles and Huberman, which includes three main stages: data reduction, data display, and conclusion drawing. Data reduction involved sorting and filtering information relevant to the research focus, discarding irrelevant data, and grouping information into meaningful categories. Data display was conducted narratively and systematically to enhance comprehension. The final stage was drawing conclusions, which remained tentative and subject to change if new significant data emerged. This process was continuous and interrelated throughout the research.

RESULT AND DISCUSSION

Result

Foundational Patterns of ICT Integration in Teaching Practice

Foundational patterns of ICT integration refer to how teachers initially adopt digital tools in their pedagogical practices, ranging from basic presentation aids to limited use of online platforms. The integration at this stage is often shaped by familiarity, infrastructure reliability, and the absence of formalized digital competency frameworks. Teachers tend to rely on tools they are most comfortable with, rather than innovating with broader, interactive digital platforms. This foundational phase reflects not only the current skill levels of educators but also highlights the systemic readiness of schools in embracing ICT-based instruction.

The results of in-depth interviews and classroom observations indicate that most teachers demonstrate ICT competence at a basic to intermediate level. The most commonly used tools are PowerPoint and LCD projectors for presenting lesson materials. Only 3 of 15 teachers actively use Google Classroom, and even fewer explore interactive tools such as Quizizz or Kahoot. According to one teacher, "I use PowerPoint because it's simple and doesn't depend on internet stability, unlike online platforms." A few younger teachers have taken

initiative by using applications like Canva to make learning visuals more appealing, though their use remains sporadic and not institutionalized.

Observational data supports these findings. Teachers primarily utilize ICT in passive ways, displaying information rather than creating interactive, two-way engagement. Students stated they appreciate lessons supported by digital visuals, but also voiced frustration about frequent internet disruptions. "Sometimes we get excited about using the platform, but then the connection drops, and everything stops," noted one student. This shows that even where tools are available, weak internet infrastructure remains a major limiting factor. Moreover, there is no formal system in place to assess or certify ICT competencies. Evaluations tend to rely on informal observations or principal feedback, with no standardized metrics or digital portfolios being maintained.

These findings suggest that the school is still in an early phase of ICT integration. While some promising initiatives exist, especially among younger teachers, the overall digital competence landscape is fragmented and lacks institutional support. There is a visible gap between available technology and its meaningful use in classrooms. For ICT to move beyond basic use, it must be embedded into the school's professional development agenda. This includes designing structured training programs, ensuring stable digital infrastructure, and developing formal evaluation tools. Without addressing these foundational issues, efforts to integrate ICT will remain uneven and unsustainable.

Structural Supports and Systemic Barriers in ICT Development

Supportive factors include the availability of basic ICT tools such as laptops, computers, and internet access. The principal's consistent efforts in organizing internal workshops and motivating staff contribute significantly to progress. A collaborative teaching culture where experienced teachers mentor others enhances peer learning, while cooperation with the Education Department through external training programs further strengthens professional development. However, key barriers persist. Budget constraints hinder equitable ICT resource distribution. Unstable internet, particularly during weather disruptions, limits effective technology use. In addition, several teachers lack confidence or skills, and their heavy workloads prevent regular participation in training sessions.

In response, the school has implemented flexible training schedules to accommodate teaching responsibilities. Skilled teachers act as internal mentors, and efforts are made to secure grants or external donations for technological infrastructure. Partnerships with the Education Department continue to be expanded to ensure sustainable and targeted ICT training. Local government support, particularly from the Education Department, plays a critical role.

Regular ICT training opportunities allow teachers to upgrade their skills. Outreach programs and campaigns help to build awareness of digital learning's benefits. This strengthens the school's ecosystem in adapting to digital transformation in education.



Figure 1. Structural Supports and Systemic Barriers in ICT Development

Based on these observation findings in Figure 1, it can be concluded that the school environment possesses several supporting factors in the effort to improve teachers' ICT competence, although some limitations remain. The availability of a computer lab reflects the school's commitment to providing adequate facilities, even though the number of devices is still limited. Some teachers have already used laptops and LCD projectors in the teaching process, indicating an initial integration of technology into instructional activities. The availability of internet connectivity also supports access to information and digital learning resources, although network stability remains an issue during adverse weather conditions or power outages. Additionally, the presence of an ICT training schedule posted in the teachers' lounge suggests a structured effort to develop teachers' digital skills. The principal's active role in regularly monitoring teaching and ICT usage further strengthens a positive atmosphere for integrating technology into the educational process.

Principal's Strategies for Enhancing ICT Competence

The principal's primary strategies include regular internal training sessions and assigning teachers to participate in external technical training (Bimtek). These sessions are well-received and contribute to improved digital literacy. Observation indicated that while ICT tools such as projectors and computers are utilized, internet instability in several classrooms remains a limiting factor. Nonetheless, digital media like PowerPoint, videos, and online quizzes are being increasingly incorporated into classroom activities, enhancing student engagement and creativity.

Teacher Subject Forum (MGMP) meetings serve as key platforms for collaborative learning. Teachers acknowledge these forums as effective in accelerating collective ICT skills acquisition. The principal also provides recognition for innovative teachers, such as certificates and incentives, which serve as motivation.

Evaluation of ICT implementation is conducted periodically through classroom observations and student feedback surveys. Findings are used to address challenges and provide additional training. This systematic review process ensures that ICT use is not merely superficial but delivers tangible improvements in learning outcomes.

Table 1. Findings on School-Supported ICT Development Initiatives

No.	Observed Aspect	Description	Interpretation
1	Internal Training Documentation	ICT Training activities were documented; more ICT-proficient teachers acted as peer facilitators.	Indicates a peer-learning approach and internal capacity-building strategy.
2	External Training Participation	Teachers were officially assigned to attend external ICT training held by the Education Office.	Shows the school's proactive efforts in upgrading teacher competence through formal institutional channels.
3	ICT Facility Utilization System	ICT facilities were distributed through a rotation-based loan mechanism.	Reflects efficient resource management to ensure equal access despite limited equipment.
4	Support for MGMP (Subject Teacher Forum)	The principal enabled teachers to collaborate and share ICT practices via regular MGMP sessions.	Fosters a culture of professional learning and collaborative improvement.
5	Principal's Direct Involvement	The principal monitored training implementation and encouraged teachers to apply ICT in classrooms.	Demonstrates instructional leadership and active engagement in teacher development.
6	Proposal Submission for Equipment Procurement	A formal proposal was submitted to the Education Office for additional ICT resources.	Shows strategic planning and advocacy to expand infrastructure.

The observation findings from Table 1 above indicate that the school has conducted internal ICT training by involving more skilled teachers as facilitators for their colleagues, as evidenced by the documentation of the activity. In addition, assignment letters were available confirming teacher participation in external training organized by the Education Office, as part of the effort to enhance professional development. The use of ICT facilities has also been

managed effectively through a rotating borrowing system, ensuring fair access for all teachers. The principal's support is seen in facilitating the MGMP forum, which serves as a platform for teachers to share knowledge and experiences in utilizing ICT, fostering a culture of collaboration and continuous learning. The principal's active involvement in monitoring training implementation and providing motivation to teachers further encourages the integration of technology in teaching. Moreover, the existence of a proposal for ICT equipment submission to the Education Office shows that the school is proactively seeking to enhance its technological infrastructure to support digital transformation in the educational environment.

Discussion

The integration of ICT into teaching practices at SMPN Satu Atap 12 Sarolangun reflects a foundational stage characterized by limited but growing adoption. The findings indicate that teachers predominantly use basic tools such as PowerPoint and LCD projectors, with minimal engagement in more interactive digital platforms like Google Classroom or Kahoot. This aligns with previous studies by M Mohd Siraj et al. (2023), which suggest that early phases of ICT adoption often prioritize accessibility and teacher familiarity over innovation. The reliance on tools that do not require internet connectivity, driven by concerns over network stability, shows that infrastructural limitations still significantly influence pedagogical choices (Ma & Sun, 2022; Yakut & Maya, 2022). Teachers' preferences for conventional tools and the lack of formal assessment or certification systems hinder the transition toward a more participatory and technology-driven learning environment.

Despite these limitations, internal peer-led training and increasing experimentation among younger teachers point to emerging positive trends. Observations confirm that teachers' use of ICT is still essentially passive, focused more on presentation than interaction. However, students' responses reveal enthusiasm and frustration: they are motivated by digital tools yet often hindered by slow internet or device unavailability (Graham et al., 2024; Kim & Park, 2024; Marte, 2024). This mismatch between student expectations and classroom realities highlights the urgency for structural improvements. The school's ICT development thus rests not only on individual teacher competence but also on the systemic readiness of the institution, including infrastructure, policy, and leadership support.

The school has taken proactive measures to address these challenges. As illustrated in Table 1, several strategic initiatives have been implemented under the principal's leadership. Internal training sessions led by skilled teachers, participation in external training, and the rotational use of ICT devices reflect a

practical approach to resource management and professional development. The principal's role as a facilitator, motivator, and evaluator is central to these efforts. His active involvement in supporting MGMP forums and monitoring classroom ICT implementation demonstrates an instructional leadership style that prioritizes teacher empowerment and collaborative learning. These actions align with the findings of Elsayah and Hill (2023) on the critical role of school leadership in successful technology adoption.

However, significant barriers remain. Unstable internet, lack of confidence among some teachers, and heavy workloads that limit training participation all contribute to the slow progress in digital integration. While the school has tried to overcome these constraints, such as proposing additional ICT equipment to the Education Office and implementing flexible training schedules, these initiatives require consistent follow-through and external support. The absence of standardized ICT competency evaluations also means that progress cannot be systematically tracked or celebrated, potentially dampening teacher motivation and institutional learning.

Integrating ICT at SMPN Satu Atap 12 Sarolangun represents a transitional phase where foundational practices coexist with emerging innovations. The school's efforts to provide structural support through internal capacity building, institutional collaboration, and leadership initiatives are commendable and lay the groundwork for a more profound transformation. Achieving sustainable digital integration requires technological access and systemic alignment between leadership vision, professional development, infrastructure reliability, and formal assessment. Future strategies should focus on creating a comprehensive digital competence framework, strengthening evaluation mechanisms, and ensuring equitable access to ICT resources. With these components, the school can shift from basic technology use to meaningful, student-centred digital learning experiences.

CONCLUSION

This study concludes that the integration of ICT in teaching practice remains at a foundational level, with most teachers demonstrating fundamental to intermediate competence, mainly using PowerPoint and projectors. Although a few younger teachers have initiated using creative tools such as Canva and Google Classroom, overall integration remains limited. Supporting factors include the availability of basic infrastructure, peer-led internal training, external collaborations, and strong principal leadership. Conversely, limited budgets, unstable internet, lack of teacher confidence, and heavy workloads act as inhibiting factors. The principal plays a crucial role by implementing structured training, facilitating collaborative learning through MGMP forums, and

recognizing innovative teaching efforts. These strategies illustrate a context-responsive leadership model that supports gradual ICT adoption. The strength of this study lies in its contribution to understanding how school leadership can drive digital transformation in under-resourced contexts. However, given its limited scope to a single rural school, broader research is needed to generalize findings and inform scalable ICT competence development models.

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