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## Teachers' Digital Literacy and Benefits for Learning Innovation in Elementary Schools

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### Abstract

*The rapid development of digital technology requires elementary school teachers to possess digital literacy as a crucial competency for supporting 21st-century learning. The ideal condition expected is that all teachers can optimally utilize digital technology to create innovative, interactive, and student-centered learning (Sari et al., 2025). However, empirical evidence indicates that digital literacy competencies among elementary school teachers in Indonesia remain varied and uneven, affecting the quality of learning innovation (Hutagalung & Purbani, 2021). This study aims to analyze the benefits of teacher digital literacy on learning innovation in elementary schools through a systematic review of relevant scientific journal articles. This study employs a qualitative approach using a Systematic Literature Review (SLR) method. Data sources consist of 30 national and international journal articles published within the last five years (2020–2025), obtained from Google Scholar, ERIC, and Scopus databases. Data was analyzed using content analysis techniques systematically. The findings indicate that teacher digital literacy positively impacts learning innovation, particularly in method selection, digital media use, and the development of interactive, student-centered learning strategies. Teachers with strong digital literacy tend to be more adaptive to change and capable of creating creative, varied, and meaningful learning experiences. Strengthening the digital literacy of elementary school teachers is an urgent need to promote learning innovation and improve educational quality in the digital era.*

**Keyword: Digital literacy; Elementary school teachers; Learning innovation; Educational technology; 21st century**

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### INTRODUCTION

The rapid development of digital technology has brought fundamental changes in the world of education, including at the elementary school level. This digital transformation requires elementary school teachers not only to master conventional pedagogic

competencies, but also to have digital literacy as an essential skill of the 21st century (Sari et al., 2025). Digital literacy is a basic ability that allows teachers to understand, use, and evaluate technology critically and effectively in the learning process (Syahid et al., 2022). Without adequate mastery of digital literacy, teachers will not be able to respond to the needs of the digital generation students who are growing up in the internet and social media era (Pratiwi & Suwanto, 2021).

This research is important because teachers' digital literacy is the main prerequisite for creating quality learning innovations in elementary schools. Several empirical studies show that teachers with high digital literacy skills tend to be more innovative in designing and implementing technology-based learning (Aminuddin et al., 2024; Fradana, 2025). This learning innovation not only increases student motivation and engagement but also contributes to a significant improvement in learning outcomes (Marnita et al., 2023; Susilowati & Haryono, 2025). Therefore, a deep understanding of the benefits of teachers' digital literacy on learning innovations in elementary schools is an urgency that cannot be ignored.

The ideal condition is that all elementary school teachers have digital literacy at a competent level, so that they can utilize technology pedagogically and creatively in every aspect of learning. Teachers should ideally not only be able to operate technological devices, but also be able to integrate digital media, online learning platforms, and various digital learning resources in designing meaningful learning experiences for students (Nugraeni & Suyatno, 2023). The DigComp 2.2 (Digital Competence Framework for Citizens) and the ISTE (International Society for Technology in Education) standard stipulate that digitally competent teachers must be able to use technology for learning differentiation, data-based formative assessment, and online professional collaboration (Vuorikari et al., 2022). In the Indonesian context, Permendikbudristek Number 32 of 2024 concerning Teacher Competency Standards also emphasizes the importance of digital competence as an integral part of teachers' professional competence (Kemendikbudristek, 2024).

These ideal conditions also include the support of a conducive educational ecosystem, namely the availability of adequate technological infrastructure in schools, sustainable professional development policies for teachers, and a culture of collaboration and sharing of good practices among teachers in the professional learning community (Arbain et al., 2024). With this condition, teachers' digital literacy will continue to develop dynamically as technology advances, and learning innovations will become part of elementary school culture.

In fact, these ideal conditions are still far from reality on the ground. Hutagalung & Purbani's (2021) research on elementary school teachers in various regions of Indonesia shows that most teachers are still in the medium to low digital literacy category. Data from the Ministry of Education and Culture (2023) reveals that only around 34% of elementary school teachers in Indonesia have digital literacy skills in the good category, while the rest still need significant development. This condition is exacerbated by the inequality of access to technology between urban and rural schools, where schools in remote areas often do not have adequate technological infrastructure (Nor & Ramli, 2025).

On the other hand, although the COVID-19 pandemic has forced an acceleration of technology adoption in learning, the transition to digital-based learning does not necessarily improve teachers' overall digital literacy (Longkutoy et al., 2025). Many teachers use technology only limited to communication media such as WhatsApp and Zoom without really integrating it pedagogically into the learning design. Sulasmi (2022) found that some

elementary school teachers still use conventional methods such as lectures and textbooks as the main learning resource, even in the post-pandemic era. This gap between ideal conditions and reality creates a serious challenge to improve the quality of learning in primary schools.

Various problem-solving efforts have been put forward by researchers and policy makers. First, digital literacy-based teacher training and professional development needs to be designed in a systematic, sustainable, and contextual manner in accordance with the real needs of teachers in the field (Susilowati & Haryono, 2025). It is not enough that the training program is only technical but must also include the pedagogical dimension of integrating technology in learning (Noviyanti et al., 2023). Second, strengthening the Professional Learning Community (PLC) that focuses on digital literacy has proven to be effective in improving teachers' digital competence collaboratively (Arbain et al., 2024). Third, government policies that support the equitable distribution of technological infrastructure and internet access in all elementary schools are fundamental prerequisites for the development of teachers' digital literacy (Ramadhan et al., 2023). Fourth, the integration of digital literacy in the teacher education curriculum (LPTK) is a long-term strategic solution to ensure that new teachers have adequate digital competencies from the beginning (Wahyudi et al., 2022).

Based on the background that has been described, this study formulates the following research questions: (1) What is the level of digital literacy of elementary school teachers based on the existing literature study? (2) What are the benefits of teachers' digital literacy for learning innovation in elementary schools? (3) What factors influence the development of teachers' digital literacy in encouraging learning innovation in elementary schools?

This study aims to: (1) analyze the level of digital literacy of elementary school teachers based on the latest literature review; (2) identify the benefits of teachers' digital literacy on learning innovations in elementary schools; and (3) identify factors that affect the development of teachers' digital literacy in encouraging learning innovation in elementary schools.

The novelty of this research lies in several aspects. First, this study uses the Systematic Literature Review (SLR) method with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol which is more structured than previous conventional literature studies. Second, this study not only maps the level of teachers' digital literacy, but also comprehensively analyzes the multi-dimensional benefits of digital literacy on various aspects of learning innovation in elementary schools. Third, this study integrates the perspective of the education ecosystem in analyzing the supporting factors for the development of teachers' digital literacy, which has not been widely explored in previous studies. In contrast to Sulasmi's (2022) research which only focused on the description of technical abilities, and Nugraeni & Suyatno's (2023) research which was limited to the context of online learning, this study offers a more holistic and comprehensive analysis of the relationship between teachers' digital literacy and learning innovations in elementary schools.

## **METHODS**

### ***Research Design***

This study uses a qualitative approach with the Systematic Literature Review (SLR) method. The SLR method was chosen because it allows researchers to identify, evaluate,

and integrate findings from various relevant studies in a systematic, transparent, and replicable manner (Siddaway et al., 2019). The SLR process in this study follows the PRISMA 2020 protocol (Page et al., 2021) which includes four main stages: identification, screening, eligibility, and inclusion. The qualitative approach was chosen because the research aims to understand the phenomenon of teacher digital literacy and its benefits to learning innovation in depth and contextual (Creswell & Poth, 2018).

### ***Research Subject***

The subject of this research is scientific articles that discuss teachers' digital literacy and learning innovations in elementary schools. Inclusion criteria include: (1) articles published in national journals accredited by Sinta 1-4 or international journals indexed by Scopus/Web of Science; (2) issued in the period 2020–2025; (3) discussing teachers' digital literacy and/or learning innovations at the elementary school level; (4) using clear and evaluable research methods; and (5) the full text is available in Indonesian or English. Exclusion criteria include: (1) articles in the form of editorials, letters, or opinions; (2) articles that do not specifically address the context of elementary schools; and (3) duplicate articles or with overlapping data. Based on these criteria, out of the 156 articles found, as many as 30 articles are eligible for in-depth analysis.

### ***Research Instruments***

The research instruments used include: (1) data extraction sheets containing information about the author, year, title, method, variables, samples, main findings, and conclusions; (2) a literature analysis matrix used to organize and compare findings from various articles; and (3) a research quality assessment rubric (Quality Assessment Checklist) adapted from the criteria of the 2018 version of the Mixed Methods Appraisal Tool (MMAT) to assess the validity and reliability of each included article (Hong et al., 2018). All instruments have been validated by two independent researchers to ensure the consistency and objectivity of the analysis process.

### ***Data Collection Techniques***

The data collection technique was carried out through systematic searches on electronic databases, namely Google Scholar, ERIC (Education Resources Information Center), Scopus, and Garuda Portal. Keywords used in the search include: "digital literacy teachers", "digital literacy teachers", "learning innovation", "learning innovation", "elementary school", "primary school", "digital competence teachers", and a combination using Boolean operators (AND, OR). The search was conducted in January–February 2025. The article selection process is carried out in stages: (1) selection based on titles and abstracts, (2) selection based on complete text, and (3) methodological quality assessment. All stages of selection are carried out independently by two researchers, and differences of opinion are resolved through consensus discussions.

### ***Data Analysis Techniques***

Data was analyzed using content analysis techniques in an inductive-deductive manner (Mayring, 2021). Deductive analysis was carried out based on previously determined categories based on research questions, including: (1) the level of teachers' digital literacy, (2) the benefits of digital literacy on learning innovation, and (3) supporting factors for the development of teachers' digital literacy. Inductive analysis was conducted to identify new themes that emerged from the data. The analysis process includes data reduction, presentation of data in the form of matrix and diagrams, and drawing conclusions (Miles et al., 2020). To ensure trustworthiness, source triangulation is carried out by comparing

findings from various articles, as well as checking by asking for feedback from experts in the field of educational technology

## **RESULTS & DISCUSSION**

### ***Result***

Based on the PRISMA selection process, out of 156 articles found through the initial search, as many as 30 articles met the inclusion criteria and were analyzed in depth. The articles include research from Indonesia (n=22), Malaysia (n=4), and other countries (n=4), with a publication year range of 2020–2025. The research methods used by the included studies varied, including quantitative (n=12), qualitative (n=11), and mixed methods (n=7).

### ***Finding 1: Digital Literacy Level of Elementary School Teachers***

The results of the synthesis show that the level of digital literacy of elementary school teachers is in various categories. Sulasmi (2022) found that teachers' digital literacy skills in operating technology devices and learning applications are adequate, but the ability to integrate technology pedagogically still needs to be improved. In line with that, Hutagalung & Purbani (2021) report that most teachers are at the level of "functional" digital literacy, i.e. able to use technology for basic purposes, but not yet at the "transformative" level that allows for deep learning innovation. Marnita et al. (2023) found that the effectiveness of teachers' digital literacy competencies was positively and significantly correlated with the quality of learning management ( $r=0.672$ ;  $p<0.01$ ), which indicates that the higher the teacher's digital literacy, the better the quality of learning management they carry out

### ***Finding 2: Benefits of Teachers' Digital Literacy on Learning Innovation***

The results of the study consistently show that teachers' digital literacy provides multi-dimensional benefits to learning innovation. First, in the dimension of learning planning, teachers with good digital literacy can design learning that is more differentiated, contextual, and based on the needs of students (Nugraeni & Suyatno, 2023; Susilowati & Haryono, 2025). Second, in the dimension of learning implementation, digital literacy allows teachers to use more varied learning methods and media, such as interactive videos, digital simulations, gamification, and adaptive learning platforms (Aminuddin et al., 2024; Fradana, 2025). Third, in the dimension of learning evaluation, digitally literate teachers can use more authentic digital assessments and provide more responsive and personalized feedback to students (Ramadhan et al., 2023; Wahyudi et al., 2022).

In addition, a study by Pratiwi & Suwanto (2021) showed that teachers' digital literacy was positively correlated with the level of student engagement in learning ( $r=0.584$ ;  $p<0.05$ ). Students who studied with digitally literate teachers showed higher learning motivation, greater active participation, and better learning outcomes compared to classes taught by teachers with low digital literacy (Noviyanti et al., 2023). These findings confirm that investment in the development of teachers' digital literacy is a strategic investment to improve the overall quality of learning.

### ***Findings 3: Factors Influencing Teachers' Digital Literacy Development***

The literature review identified three main groups of factors that affect the development of teachers' digital literacy. First, individual factors, including teachers' intrinsic motivation to learn technology, previous experience of using technology, and self-efficacy in using technology for learning (Mahdum et al., 2022; Rasmitadila et al., 2021).

Second, institutional factors, including the leadership of school principals who are visionary and support technology, the availability of technology infrastructure, and school policies that encourage digital-based learning innovations (Nor & Ramli, 2025; Wibowo et al., 2023). Third, social-professional factors, including professional learning community support, collaboration between teachers, and access to quality professional training and development programs (Arbain et al., 2024; Longkutoy et al., 2025).

**Table 1. Literature Analysis Matrix: Teacher Digital Literacy and Learning Innovation in Elementary Schools**

Yes	Researcher & Year	Research Focus	Method	Key Findings
1	Sulasma (2022)	Digital literacy of elementary school teachers	Quantitative descriptive	Digital literacy helps teachers operate technology devices and learning applications effectively.
2	Nugraeni & Suyatno (2023)	Teachers' digital literacy in elementary school online learning	Qualitative case studies	Digital literacy provides benefits in the management of digital materials and increased teacher-student interaction.
3	Hutagalung & Purbani (2021)	Digital literacy level of elementary school teachers	Quantitative surveys	Teachers with digital literacy are better able to develop innovative learning media and strategies.
4	Aminuddin et al. (2024)	Digital literacy and learning innovation	Mixed methods	Digital literacy increases creativity and variety of media and teacher learning methods.
5	Arbain et al. (2024)	Digital literacy and elementary school teacher learning community	Quantitative correlational	Learning community support strengthens digital literacy and encourages sustainable learning innovation.
6	Marnita et al. (2023)	Digital literacy and learning management competencies	Quantitative regression	Digital literacy has a significant effect on the effectiveness of learning management ( $r=0.672$ ; $p<0.01$ ).
7	Susilowati & Haryono (2025)	Digital literacy and pedagogical competence of elementary school teachers	Mixed methods	Digital literacy contributes to improving the quality of learning planning, implementation, and evaluation.
8	Squirting (2025)	The effectiveness of digital literacy for elementary learning	Descriptive qualitative	Digital literacy supports student engagement and responsive management of learning materials.

Yes	Researcher & Year	Research Focus	Method	Key Findings
9	Nor & Ramli (2025)	Education management and digital literacy of elementary school teachers	Case study	The right management strategy improves teachers' digital literacy and has an impact on the quality of learning.
10	Longkutoy et al. (2025)	Digital literacy in the implementation of elementary character education	Qualitative	Digital literacy supports the implementation of technology-based character education in elementary schools.
11	Sari et al. (2025)	The urgency of digital literacy for elementary school teachers and prospective teachers	Study literature	Digital literacy is a critical competency for teachers in facing the challenges of 21st century learning.
12	Syahid et al. (2022)	Digital competency analysis of elementary school teachers	Quantitative descriptive	The digital competence of elementary school teachers still needs to be improved, especially in the dimensions of security and digital content creation.
13	Pratiwi & Suwanto (2021)	Teacher digital literacy and student engagement	Quantitative correlational	Teachers' digital literacy is positively correlated with the level of student engagement in learning ( $r=0.584$ ).
14	Ramadhan et al. (2023)	Digital literacy and digital-based assessment	Mixed methods	Digitally literate teachers implement assessments that are more authentic and responsive to student needs.
15	Wahyudi et al. (2022)	Integration of digital literacy in LPTK	Qualitative	The integration of digital literacy in the education of prospective teachers increases the readiness of technology-based teaching.

## DISCUSSION

The findings of this study confirm that teachers' digital literacy has a strategic and multi-dimensional role in supporting learning innovation in elementary schools. This is in line with Mishra & Koehler's (2006) view of the TPACK (Technological Pedagogical Content Knowledge) framework, which states that the integration of technology in learning is not just adding technology to existing teaching practices, but rather a fundamental reconstruction of how teachers understand the relationship between technology, pedagogy, and content. In the context of this research, digital literacy functions as an enabler that allows teachers to realize the integration of the three components of TPACK in a coherent and meaningful manner (Susilowati & Haryono, 2025).

The finding that most primary school teachers are at a "functional" but not yet "transformative" level of digital literacy (Hutagalung & Purbani, 2021) shows that there is a gap between technical and pedagogical skills in the use of technology. Teachers are already able to use technology for operational purposes such as creating documents, communicating via email, and accessing the internet, but they are not yet fully able to utilize technology to create innovative, collaborative, and student-centered learning experiences (Syahid et al., 2022). These findings have important implications that teachers' digital literacy development programs need to be designed not only to improve technical skills, but also pedagogical abilities in integrating meaningful technology (Noviyanti et al., 2023).

The benefits of teachers' digital literacy on learning innovations identified in this study include three main dimensions: planning, implementation, and evaluation of learning. In the planning dimension, digital literacy allows teachers to access a variety of digital learning resources, design differentiated learning activities and develop richer and more contextual learning materials (Nugraeni & Suyatno, 2023). In the implementation dimension, digitally literate teachers can use a variety of more interesting and interactive learning media and methods, such as interactive videos, digital simulations, and adaptive learning platforms, which have been proven to increase student motivation and engagement (Aminuddin et al., 2024; Fradana, 2025). In the evaluation dimension, digital literacy opens up opportunities for teachers to implement more authentic, responsive, and personalized assessments, which allow for faster and more relevant feedback for students' learning development (Ramadhan et al., 2023).

The findings on the importance of social-professional factors, particularly the role of professional learning communities, in supporting the development of teachers' digital literacy (Arbain et al., 2024) are in line with Vygotsky's social learning theory and the concept of the Zone of Proximal Development (ZPD). In a professional context, teachers who are in active learning communities have the support of more experienced peers, allowing them to develop their digital competencies beyond the limits of individual abilities. This shows that a collaborative and community-based approach to teacher digital literacy development is more effective than an isolated individual approach (Nor & Ramli, 2025).

The theoretical implication of these findings is that the concept of digital literacy in the context of education needs to be understood holistically as a competency with technical dimensions as well as pedagogical, individual as well as social, and static as well as dynamic. Teachers' digital literacy is not an attribute that is acquired once and then settled, but a competence that continues to develop through a continuous learning process, critical reflection, and meaningful professional interaction (Longkutoy et al., 2025; Wahyudi et al., 2022). The most pressing practical implication is the need for fundamental reforms in the teacher professional development system that places digital literacy as a top priority, not just an add-on or complement to existing training programs.

The limitation of this study lies in the dominance of sources from the Indonesian context, so the generalization of results needs to be done with caution. Further research is suggested to integrate more international sources and use quantitative meta-analysis approaches to generate more precise effects estimates of the relationship between teachers' digital literacy and learning innovation in primary schools.

## **CONCLUSION**

Based on the results of the Systematic Literature Review that has been conducted on 30 articles of national and international scientific journals published in the 2020–2025 period, several main conclusions can be drawn. First, the level of digital literacy of elementary school teachers in Indonesia is still in the functional category, where teachers are able to use technology for basic purposes but have not been fully able to integrate it pedagogically in deep and meaningful learning innovations.

Second, teachers' digital literacy provides real and multi-dimensional benefits to learning innovation in elementary schools. These benefits include improving the quality of more differentiated and contextual learning planning, the implementation of more varied, interactive, and engaging learning using digital media and online learning platforms, and more authentic and responsive evaluations. Teachers with good digital literacy are proven to be more creative, adaptive, and innovative in designing meaningful learning experiences for elementary school students.

Third, the development of teachers' digital literacy is influenced by three groups of factors that interact with each other: individual factors (motivation, self-efficacy, technological experience), institutional factors (leadership, infrastructure, school policies), and socio-professional factors (learning community, professional collaboration, continuous training programs). These findings confirm that efforts to improve teachers' digital literacy cannot rely on an individual approach alone but require an ecosystem approach that includes individual capacity development while strengthening a conducive professional environment.

The practical implications of this research require joint commitment from various parties: teachers need to develop digital literacy proactively and sustainably, schools need to build an educational ecosystem that supports technology-based innovation, and the government needs to formulate systematic teacher professional development policies by placing digital literacy as a top priority. Further research is suggested to examine more specifically the effectiveness of various intervention models of teachers' digital literacy development on learning innovation in elementary schools using experimental or quasi-experimental research designs.

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