

Analysis of Teacher' Digital Literacy Competencies as Support for Teachers' Skills at SDN 7 Gunung Agung

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Abstract

Analysis of teachers' digital literacy competencies in elementary schools is an important factor in efforts to strengthen the quality of learning. This study aims to assess the extent to which teachers at SDN 7 Gunung Agung have digital literacy and the extent to which that literacy impacts the development of their abilities in digital teaching. The methodology used was quantitative with a cross-sectional survey design; all teachers at the school were the research population, and the sample was determined using total sampling techniques to ensure comprehensive representation. The research instrument was a standard questionnaire that measured three dimensions of digital literacy (technical, cognitive, social) plus a measurement of digital teaching skills covering the aspects of planning, implementation, and evaluation. Data analysis was performed using descriptive statistics to describe the profile of digital literacy and teaching skills, as well as linear regression (simple and hierarchical) to evaluate the relationship between digital literacy and teachers' digital teaching abilities. The findings show that most teachers have moderate to high levels of digital literacy, especially in the technical and social dimensions, while the cognitive dimension shows variation between individuals. The regression results prove that digital literacy contributes significantly to improving digital teaching skills ($p < 0.05$), with a coefficient of determination indicating that digital literacy explains a significant portion of the variance in teaching skills. The study concludes that strengthening teachers' digital literacy is a crucial strategy for supporting technology-based pedagogical skills. Practical recommendations include implementing structured and continuous digital literacy training so that teachers not only master technological devices but are also able to design, implement, and evaluate digital learning processes effectively.

Keywords: *competence, digital literacy, teacher skills*

Introduction

Basic education plays a strategic role in shaping students' initial competencies. Teachers play an important role as facilitators and managers of the learning process that determines the quality of education. With rapid technological advances, the demands on teacher competencies have expanded significantly. One competency that has now become crucial is digital literacy. Digital literacy includes the ability to access, evaluate, and create digital-based information. This competency is not only technical in nature but also requires pedagogical skills in its application (Ningsih et al., 2021). Teachers with strong digital literacy skills can effectively integrate technology to improve the quality of learning. The appropriate use of technology supports the development of 21st-century skills in students. Therefore, strengthening digital literacy among teachers is an urgent need. Each school has a local context that uniquely influences the application of digital literacy. At SDN 7 Gunung Agung, factors such as the availability of facilities, school culture, and teacher characteristics are important

elements. This study aims to analyze how teachers' digital literacy competencies contribute to improving teaching skills.

Digital literacy competency is understood as a multidimensional concept in modern educational studies. These dimensions include technical skills, understanding of the ethics of digital technology use, and information literacy skills. In addition, there is also a pedagogical aspect that emphasizes teachers' ability to integrate technology into learning design (Nurlaili et al., 2024). Communication skills in the digital space are also an important component of digital literacy. At the elementary school level, the application of a child-friendly and digitally safe approach is a primary need. Teachers are required to be able to select applications and learning resources that are appropriate for the characteristics and development of their students. In addition, teachers' readiness to deal with security risks and student data privacy is an important factor. Therefore, the development of digital literacy must include both technical and non-technical aspects. Training based on real learning practices will have a more significant impact on teachers (Yamin & Fakhrunnisaa, 2022). The evaluation of digital literacy competencies needs to use indicators that are relevant to the school context. These indicators should describe the actual ability of teachers to support the learning process. This study attempts to formulate contextual indicators to assess the level of teachers' digital literacy competencies.

Teachers' skills are a set of competencies reflected in classroom learning practices. These competencies include the ability to plan, implement, evaluate, and reflect on the learning process. The use of digital technology can enrich teaching strategies and expand the variety of learning media. Examples include the use of multimedia, online learning platforms, and open learning resources (Haryanti & Purbojo, 2024). Meaningful integration of technology can foster active participation among students. However, the application of technology without a strong pedagogical foundation has the potential to become merely a supplement without educational value. Therefore, teachers' digital literacy skills need to be directed towards strengthening their pedagogical abilities. Teaching skills supported by digital literacy include the ability to manage a digital-based classroom and conduct online assessments. In addition, the ability to utilize digital learning outcome data is also part of modern competencies. In the context of SDN 7 Gunung Agung, these abilities are believed to improve the quality of learning interactions. This study seeks to examine the relationship between digital literacy competencies and teacher skills through analysis of actual practices in the school environment.

The local context of SDN 7 Gunung Agung requires a deep understanding of the actual conditions of the available digital facilities. The availability of devices, network stability, and technical support have a significant influence on the application of technology in learning. In addition to infrastructure aspects, school culture and leadership attitudes towards innovation also determine the success of its implementation. Common obstacles include resistance to change and teachers' limited time. Teachers' motivation and perceptions of the benefits of using technology are also determining factors in the adoption process. Training that does not meet the real needs in the field often fails to change teaching practices (Prayoga & MURYANTI, 2021). Therefore, field research that can describe the actual situation is very important. This study focuses on SDN 7 Gunung Agung as the research location to understand the dynamics of learning practices. Empirical data is expected to reveal the relationship between digital literacy competencies and teachers' teaching skills. The results of this study are expected to produce policy recommendations based on factual school findings. In addition, the findings are also useful for formulating teacher professionalism improvement programs that are appropriate to the context. Through a qualitative approach, this study seeks to explore in depth the experiences of teachers in utilizing digital technology.

Theoretical studies form the main basis for understanding the concepts of digital literacy and teacher teaching skills. Constructivist learning theory highlights the importance of the active role of students and the function of teachers as learning facilitators. The modern

pedagogical paradigm requires the integration of technology that can support the process of meaning construction in learning (Az Zahrawaani Purba & Siti Quratul Ain, 2024). The TPACK (Technological Pedagogical Content Knowledge) model is used as the appropriate conceptual framework in this study because it emphasizes a balance between subject matter knowledge, pedagogy, and technology. In the context of basic education, the application of the TPACK model needs to be adjusted to the developmental stage of the students. In addition, the theories of information literacy and media literacy are also used as important conceptual foundations in this analysis. This theoretical framework serves as a reference in the preparation of observation instruments and field interviews. This approach helps researchers interpret data related to teachers' learning practices. With a solid theoretical foundation, it is hoped that the results of the analysis will produce valid and accountable conclusions. A review of literature from both local and international sources further strengthens the argument of this study. This study attempts to integrate theory and practice to gain a deeper understanding of the dynamics of digital literacy among teachers at SDN 7 Gunung Agung.

This study aims to reveal the level of digital literacy competence possessed by teachers. The focus of the analysis includes technical skills and the ability to integrate technology with pedagogical approaches. In addition, the study will also identify various obstacles faced by teachers in applying technology in the learning process. Supporting factors such as training, technical assistance, and school policies will also be analyzed comprehensively. An in-depth study is expected to present various examples of good practices that can be used as references (Handiyani & Yunus Abidin, 2023). These practices have the potential to become implementation models for other elementary schools with similar characteristics. This study also seeks to explore the contribution of digital literacy to the development of teachers' skills. Aspects that receive special attention include increasing creativity, evaluating learning, and managing the learning process. The results are expected to illustrate the interpretive relationship between digital literacy and pedagogical skills (Kuncoro et al., 2022a). The findings will be compiled in the form of thematic narratives accompanied by quotes from field informants. Furthermore, the analysis results will be compared with previous studies to see the consistency of the findings, and ultimately, applicable recommendations for the development of teacher professionalism at the elementary school level will be compiled.

This study has significant practical and theoretical implications for the development of basic education. From a practical perspective, the findings can be used as a basis for designing digital literacy training programs for teachers, including recommendations for school policies related to the provision of digital facilities and ongoing professional assistance. At the curriculum level, the integration of technology needs to be directed in line with the learning objectives in elementary schools (Kuncoro et al., 2022b). Theoretically, this study contributes to the development of TPACK literature in the local context, while enriching studies on the adaptation of digital literacy in primary education. In addition, the results of this study open up opportunities for further studies using quantitative and mixed approaches and serve as a reference for education policy makers and teacher training program managers. The implementation of the recommendations is expected to improve teachers' teaching skills in a tangible way, which in turn will have a positive impact on student learning outcomes. Thus, this research has practical relevance that can be tested and developed further on a broader scale, based on empirical evidence obtained in the field.

Previous studies relevant to this study include one conducted by Aminuddin et al. (2024) entitled "Digital Literacy of Elementary School Teachers: Challenges and Opportunities in 21st Century Learning." This study focused on identifying the obstacles faced by teachers in developing digital literacy in general, without discussing its relationship to pedagogical skills.

Meanwhile, Andriyani et al. (2023), in their study entitled "The Influence of Digital Competence on the Teaching Skills of Elementary School Teachers in the Industry 4.0 Era," applied a quantitative approach to analyze the relationship between digital competence and teachers' teaching skills, but did not highlight empirical practices in the field in depth. Meanwhile, Suartana et al. (2024), through their study "Implementation of Digital Literacy Training to Improve Elementary School Teacher Competence," focused more on the effectiveness of workshop-based digital literacy training programs. Unlike the three studies mentioned above, this study adopts a qualitative approach using case study methods, which aims to explore in depth how the digital literacy competencies of teachers at SDN 7 Gunung Agung play a role in improving teaching skills in a real learning context. The focus of this study is not only on measuring variables, but also on analyzing teachers' experiences, strategies, and challenges in a contextual manner, thereby producing empirical findings that are more applicable and reflective in the development of teacher professionalism at the elementary school level.

Method

This study applied a quantitative approach with a cross-sectional survey design aimed at obtaining an empirical description of teachers' digital literacy competency levels and their relationship to teaching skills at SDN 7 Gunung Agung. This approach was chosen because it allowed researchers to collect numerical data from the population at a specific point in time to analyze the relationship between variables objectively and measurably. The population in this study included all active teachers at SDN 7 Gunung Agung, both classroom teachers and subject teachers. To ensure comprehensive representation, the sampling technique used was total sampling, in which all members of the population were made respondents in the study. This method was considered appropriate because the population size was relatively small, allowing for complete and in-depth data collection. The focus of the study was on identifying teachers' digital literacy levels and their contribution to the development of digital technology-based teaching skills (Drivoka Sulistyaningrum et al., 2022). Thus, the results of the study are expected to present accurate empirical data and serve as a basis for designing programs to improve teachers' professional competencies in elementary schools.

The main instrument in this study was a standardized questionnaire developed based on indicators of teachers' digital literacy competencies and teaching skills. The instrument consists of two main components, namely (Hikmawati et al., 2021): (1) measurement of digital literacy competencies covering three main dimensions: technical, cognitive, and social; and (2) measurement of digital-based teaching skills covering the aspects of planning, implementing, and evaluating learning with the support of technology. The technical dimension focuses on teachers' ability to operate digital devices and utilize learning applications effectively. The cognitive dimension assesses teachers' ability to critically understand, analyze, and manage digital information. The social dimension focuses on the ethics of technology use, professional collaboration, and communication in the digital education ecosystem. Meanwhile, digital teaching skills are evaluated through indicators of teachers' abilities in designing online learning activities, managing technology-based classroom interactions, and assessing learning outcomes with digital media. All questionnaire items use a five-point Likert scale, enabling accurate statistical analysis of respondents' perceptions and competencies quantitatively.

The data obtained in this study were analyzed using descriptive and inferential statistical approaches to answer the research objectives. Descriptive analysis was used to present an overview of teachers' digital literacy levels, including the distribution of average scores for each dimension and the level of digital-based teaching skills. Through this analysis, an initial understanding of the factual conditions of teachers at SDN 7 Gunung Agung was

obtained. Furthermore, simple linear regression was used to identify the direct relationship between digital literacy competence and teachers' teaching skills. To obtain more in-depth results, hierarchical linear regression analysis was applied to assess the relative contribution of each dimension of digital literacy to digital teaching skills. Before the analysis was conducted, classical assumption tests were applied to ensure the validity of the statistical model, including testing for normality, multicollinearity, and heteroscedasticity (Sulistyarini & Fatonah, 2022). Data processing was carried out using the latest version of SPSS software, and the results were interpreted in the empirical context of basic education to provide a strong foundation for strategic policy-making in improving the digital competence of teachers at SDN 7 Gunung Agung.

Result and Discussion

This study involved all 28 teachers at SDN 7 Gunung Agung, consisting of classroom teachers and subject teachers. Data collection was conducted using a standardized questionnaire that assessed three dimensions of digital literacy: technical, cognitive, and social, as well as digital teaching skills covering planning, implementation, and evaluation of learning. The results of the descriptive analysis show that the teachers' digital literacy levels are in the moderate to high category, indicating that most teachers are quite competent in utilizing digital technology to support teaching and learning activities. The technical and social dimensions show the highest scores, while the cognitive dimension shows variation among respondents. These findings suggest that although teachers are already capable of operating digital devices and interacting in a digital ecosystem, their critical thinking and digital information reliability assessment skills still need to be strengthened in order to improve the overall quality of digital literacy.

In more detail, the results of the descriptive analysis of the average scores for each dimension of digital literacy and digital teaching skills of teachers are shown in Table 1. The highest average scores were found in the technical ($M = 4.21$) and social ($M = 4.08$) dimensions, while the cognitive dimension received the lowest score ($M = 3.67$). For digital teaching skills, the implementation aspect of learning ($M = 4.15$) had the highest score compared to planning ($M = 3.89$) and evaluation ($M = 3.77$). These findings indicate that teachers are more confident and proficient in carrying out digital-based learning activities, but still face challenges in the planning and assessment stages of learning outcomes using technology. Overall, these data show that teachers have adequate abilities in utilizing digital technology, but still need reinforcement in systematic learning design and digital data-based evaluation to improve teaching effectiveness.

Table 1. Average Scores for Digital Literacy and Digital Teaching Skills of Teachers at SDN 7 Gunung Agung

Variabel / Dimension	Average (M)	Category
Technical Digital Literacy	4,21	High
Cognitive Digital Literacy	3,67	Moderate
Social Digital Literacy	4,08	High
Teaching Skills in Planning	3,89	Moderate-High
Teaching Skills in Implementation	4,15	High
Teaching Skills in evaluation	3,77	Moderate

The results of simple linear regression analysis show that digital literacy has a positive and significant effect on teachers' digital teaching skills, with a significance level of $p < 0.05$. The coefficient of determination ($R^2 = 0.48$) shows that digital literacy explains about 48% of the variation in teachers' digital teaching skills at SDN 7 Gunung Agung, while the rest is influenced by other factors outside the research model. A positive regression coefficient of $\beta = 0.69$ indicates that an increase in digital literacy competence is followed by an increase in teachers' ability to apply technology in learning. These findings confirm that digital literacy mastery is not only related to the ability to use technological devices, but also includes the ability of teachers to design, implement, and evaluate digital-based learning effectively and structurally.

The results of the hierarchical linear regression analysis further show that each dimension of technical, cognitive, and social digital literacy contributes differently to digital teaching skills. In the first model, which only included the technical dimension, an R^2 value of 0.36 was obtained, indicating that technical abilities are the main factor supporting teachers' teaching skills. With the addition of the cognitive dimension in the second model, the R^2 value increased to 0.44, showing that critical thinking skills regarding digital information also strengthen teaching competencies. Furthermore, the third model, which added the social dimension, produced an $R^2 = 0.48$, indicating that the ability to collaborate and communicate digitally strengthens the relationship between digital literacy and teaching skills. These findings confirm that the development of teachers' digital literacy must be carried out comprehensively, with an emphasis not only on technical aspects but also on reflective thinking skills and social interaction in a digital context.

The interpretation of the data indicates that teachers with high levels of digital literacy tend to apply more diverse and innovative learning strategies. Teachers who have good technological mastery are able to design multimedia-based learning activities, utilize online learning platforms, and carry out digital evaluations through interactive assessment applications. Conversely, teachers with low cognitive literacy still face difficulties in assessing and selecting reliable digital learning resources. This confirms that the successful integration of technology in learning does not solely depend on technical abilities, but also on the capacity of teachers to analyze and reflect on the digital information used. Therefore, efforts to improve digital competence need to focus on developing a balance between technical, cognitive, and social skills so that digital-based learning at SDN 7 Gunung Agung can be more effective, innovative, and sustainable.

Overall, the findings of this study indicate that digital literacy competencies play an important role in supporting the teaching skills of teachers at SDN 7 Gunung Agung. The three dimensions of digital literacy, namely technical, cognitive, and social, show a positive contribution to teachers' ability to plan, implement, and evaluate technology-based learning. Mastery of digital literacy not only improves the effectiveness of the learning process but also opens up opportunities for innovation in teaching and learning activities. These results provide an empirical basis for schools to design teacher professional development strategies through more focused and sustainable digital training. Thus, this study emphasizes the importance of improving digital literacy as one of the main factors in strengthening teachers' pedagogical competencies in an era of digital education that continues to evolve and demands a high level of adaptability.

Teachers' Digital Literacy Level

This study reveals that most teachers at SDN 7 Gunung Agung have moderate to high levels of digital literacy, especially in the technical and social dimensions. This indicates that teachers are quite skilled in using digital devices and are able to communicate and collaborate effectively in a digital environment (Ramadhan, 2021). Good technical literacy enables teachers to operate learning applications, online platforms, and multimedia smoothly to support the teaching and learning process. Meanwhile, high social literacy indicates teachers' ability to maintain ethical and constructive interactions, both with students and colleagues. This ability reflects teachers' readiness to face technology-based learning professionally. In addition, the combination of technical and social mastery strengthens the effectiveness of learning activities that utilize digital technology. Teachers who are technically competent can more easily integrate various digital media into their teaching methods. At the same time, social literacy helps teachers create a collaborative and digitally safe learning environment. These findings indicate that the development of digital literacy in both dimensions is a key factor in supporting teachers' teaching skills. Thus, technical and social digital literacy play an important role in improving the quality of teaching and learning interactions at SDN 7 Gunung Agung.

Although most teachers demonstrate good digital literacy competencies, the cognitive dimension still varies between individuals, indicating that not all teachers are able to critically assess, evaluate, or manage digital information. This is an important aspect because cognitive abilities support teachers in making learning decisions based on accurate digital data and information. These findings are in line with research (Erwani et al., 2023) which confirms that digital literacy not only includes technical skills but also the ability to think critically about digital information. Thus, the development of cognitive literacy needs to be made a strategic priority in teacher professionalism improvement programs. This improvement is expected to strengthen teachers' capacity to design and implement effective learning. Critical thinking skills also enable teachers to select credible learning resources. In addition, cognitive literacy supports the targeted use of technology. Strategies for developing cognitive literacy can include practice-based training, group discussions, and digital learning case studies. This will improve the quality of teaching and teachers' readiness to face the challenges of digital education. Finally, strengthening the cognitive dimension is the foundation for the comprehensive integration of digital literacy in the teaching and learning process.

The Relationship Between Digital Literacy and Teaching Skills

The results of the analysis using simple and hierarchical linear regression show that digital literacy has a significant effect on teachers' digital teaching skills with a significance value of $p < 0.05$. The coefficient of determination value indicates that digital literacy explains most of the variance in teaching skills, confirming the importance of mastering digital competencies in planning, implementing, and evaluating technology-based learning (Fauziah et al., 2023). In other words, teachers with high digital literacy tend to be more innovative, systematic, and efficient in carrying out teaching and learning activities. Mastery of digital literacy not only facilitates the use of learning devices and applications, but also enables teachers to develop more adaptive learning strategies according to student needs. This shows that improving teachers' digital literacy is a key factor in improving the quality and effectiveness of the teaching and learning process. These findings are in line with previous literature that emphasizes the role of digital literacy in supporting modern pedagogical practices (Hendratno et al., 2025). Therefore, the development of teachers' digital literacy

needs serious attention from schools and education policymakers. Optimal integration of digital literacy is believed to encourage pedagogical innovation and continuous improvement of teachers' professional competencies.

In addition, the results of hierarchical regression analysis show that the three dimensions of technical, cognitive, and social digital literacy make different but complementary contributions to improving teachers' teaching skills. The technical dimension serves as the main foundation, while the cognitive and social dimensions function to strengthen teachers' abilities to adjust learning strategies and interact effectively with students (Solih & Julianto, 2025). These findings are in line with the results of research by Nugraeni & Suyatno (2023), which emphasizes that teachers' digital competencies have a significant effect on teaching quality. However, this study adds a perspective of real-world practice in elementary schools, providing a more contextual picture of the application of digital literacy in daily teaching and learning activities. These results underscore the importance of comprehensive digital literacy development so that teachers can effectively optimize the planning, implementation, and evaluation of technology-based learning.

Practical Implications for Teacher Professional Development

The results of this study provide an empirical basis for SDN 7 Gunung Agung in formulating more effective teacher professional development strategies. Improving digital literacy competencies can be achieved through practice-based training, mentoring programs, and support for the use of technology in daily learning activities (Naila et al., 2021). With comprehensive strengthening of digital literacy, teachers will not only master digital devices and applications, but also be able to design innovative learning activities, conduct digital-based learning assessments, and guide students in a more effective and interactive manner. This development enables teachers to increase their creativity and adaptability in managing digital classrooms. In addition, mastery of digital literacy strengthens teachers' ability to integrate technology with pedagogical strategies, making learning more relevant to the needs of the 21st century. School support and collaboration among teachers are important factors in ensuring the consistent implementation of digital literacy. These results confirm that improving digital literacy is not just a matter of technical skills, but also strengthens the professional and pedagogical aspects of teachers. With a systematic approach, schools can create a more dynamic, participatory, and technology-based learning environment (Kurniadi et al., 2023). Therefore, teacher development strategies need to be designed considering the context, needs, and real challenges in the field so that the impact of improving digital literacy is maximized.

Furthermore, strengthening the cognitive and social dimensions of digital literacy is crucial so that teachers are able to critically assess and evaluate digital learning resources and maintain safe, ethical, and productive interactions in the digital world. These findings are in line with Riady's (2021) research, which emphasizes that digital literacy training should not only focus on technical skills but also develop critical thinking and collaboration skills among teachers. Thus, the application of professional development strategies based on these research findings is expected to improve teachers' pedagogical competencies, expand creativity in designing digital learning, and strengthen teachers' ability to adapt to the ever-evolving and dynamic demands of digital education (Judijanto, 2024). This approach emphasizes that the development of teachers' digital literacy must be comprehensive and contextual in order to have a real impact on the quality of learning in schools.

Conclusion

Based on the research findings, it can be concluded that teachers' digital literacy competencies play an important role in supporting technology-based teaching skills at SDN 7 Gunung Agung. The three dimensions of digital literacy—technical, cognitive, and social—show a positive contribution to teachers' ability to plan, implement, and evaluate digital learning. Teachers' moderate to high levels of digital literacy, particularly in the technical and social dimensions, reflect that teachers are quite skilled in operating digital devices and maintaining effective and collaborative digital interactions. However, variations in the cognitive dimension indicate the need to strengthen critical thinking skills in assessing and utilizing digital information appropriately. These findings confirm that mastery of digital literacy not only improves the effectiveness of the learning process but also encourages innovation in pedagogical strategies, enabling teachers to develop more creative and adaptive teaching methods in the era of digital education.

As a practical step, this study emphasizes the importance of systematic and continuous digital literacy training for teachers. The training is designed so that teachers are not only able to operate technological devices, but also to effectively plan, implement, and evaluate the digital learning process. This approach is expected to improve teachers' pedagogical competence, while strengthening their ability to adapt to the ever-evolving demands of digital education. In addition, comprehensive training will encourage teachers to create innovations in learning strategies in elementary schools. Thus, strengthening teachers' digital literacy is a key factor in improving the quality of education and developing teacher professionalism in the dynamic era of digital education that demands high flexibility.

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