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Teachers' Digital Literacy in Supporting the National Assessment and Deep Learning in Pesantren

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Abstract:
This study analyzes the role of teachers' digital literacy in supporting the National Assessment and deep learning at TMI Al-Amien Prenduan, an Islamic boarding school (pesantren) that restricts the use of electronic devices in the classroom. A descriptive qualitative approach with a case study design was employed. Data were collected through semi-structured in-depth interviews, participant observation, and document analysis involving teachers, institutional leaders, and the Quality Assurance Agency responsible for educational quality management. Informants were selected purposively, and data were analyzed through data reduction, data display, and conclusion drawing, while validity was ensured through source and technique triangulation. The findings reveal that teachers' digital literacy contributes most strongly during the lesson-preparation phase, when teachers use digital resources to enrich materials, master multiple references, and design effective teaching strategies. Digital literacy also supports deep learning by enabling teachers to present content in meaningful and contextual ways, and it strengthens institutional readiness for the National Assessment, particularly the Learning Environment Survey. The study concludes that in pesantren, digital literacy functions strategically as an indirect, behind-the-scenes support mechanism for learning and quality assurance without requiring intensive classroom technology use.

Keywords: *Teachers' Digital Literacy; National Assessment; Deep Learning; Pesantren; Islamic Education*

Abstrak *:*
Penelitian ini menganalisis peran literasi digital guru dalam mendukung Asesmen Nasional dan pembelajaran mendalam (deep learning) di TMI Al-Amien Prenduan, sebuah pesantren yang membatasi penggunaan perangkat elektronik di dalam kelas. Penelitian menggunakan pendekatan kualitatif deskriptif dengan desain studi kasus. Data dikumpulkan melalui wawancara mendalam semiterstruktur, observasi partisipatif, dan analisis dokumen yang melibatkan guru, pimpinan lembaga, dan Lembaga Penjaminan Mutu yang bertanggung jawab atas pengelolaan mutu pendidikan. Informan dipilih secara purposif, dan data dianalisis melalui reduksi data, penyajian data, serta penarikan simpulan, sementara keabsahan data dijaga melalui triangulasi sumber dan teknik. Hasil penelitian menunjukkan bahwa literasi digital guru paling berperan pada tahap persiapan pembelajaran, ketika guru memanfaatkan sumber digital untuk memperkaya materi, menguasai beragam rujukan, dan merancang strategi pembelajaran yang efektif. Literasi digital juga menunjang deep learning dengan memungkinkan guru menyajikan materi secara bermakna dan kontekstual, serta memperkuat kesiapan lembaga menghadapi Asesmen Nasional, khususnya Survei Lingkungan Belajar. Penelitian menyimpulkan bahwa di pesantren, literasi digital berfungsi strategis sebagai mekanisme penunjang pembelajaran dan penjaminan mutu yang bekerja secara tidak langsung, tanpa menuntut penggunaan teknologi secara intensif di kelas.

Kata Kunci*:* *Literasi Digital Guru; Asesmen Nasional; Deep Learning; Pesantren; Pendidikan Islam*

INTRODUCTION

In the contemporary educational landscape, the integration of technology has driven a significant transformation that has redefined the role of teachers. Whereas educators previously

focused primarily on delivering content, they are now required to adapt to digital dynamics that reshape how learning is planned, delivered, and evaluated. In line with this shift, digital literacy is increasingly positioned as a crucial pillar within the structure of teachers' professional competencies (Ng, 2012; Redecker, 2017). This transformation indicates that digital literacy is no longer merely about the ability to operate technology in the classroom; it has also become an essential requirement for supporting a range of digital-based educational policies. One clear manifestation of this demand is the implementation of the National Assessment, which requires teachers' readiness to navigate a technology-based educational evaluation system.

The National Assessment aims to map the quality of education through three main instruments: the Minimum Competency Assessment (AKM), a character survey, and a Learning Environment Survey. The Learning Environment Survey is used to assess the quality of learning, the school climate, and teaching practices from the perspectives of teachers and school principals. Consequently, teachers' ability to access and use digital tools becomes a crucial component in carrying out this evaluation and in interpreting its results for continuous quality improvement.

In reality, however, the implementation of digital literacy in Islamic boarding schools (pesantren) still faces various limitations. The use of technology in learning has not been fully optimized because the learning culture in many pesantren continues to rely on conventional methods. One shortcoming of relying solely on such methods is a limited capacity to produce varied outcomes in terms of educational quality and character development (Fadli & Dwiningrum, 2021). Furthermore, teachers' digital literacy skills remain uneven, both in terms of utilizing educational technology and in handling digital-based assessments. Nevertheless, teachers still make indirect use of technology, particularly during the lesson-preparation phase, such as searching for references, deepening their understanding of subject matter, and developing instructional strategies before the teaching-learning process begins.

Ideally, teachers at pesantren are expected to possess adequate digital literacy to support the implementation of the National Assessment and deep learning. Such literacy encompasses not only the ability to operate technology but also the ability to effectively access, evaluate, and utilize digital information in the planning, implementation, and evaluation of learning. With these skills, teachers are expected to create contextual, critical, and relevant learning experiences aligned with educational developments in the digital age, without compromising the values that characterize pesantren education (Reksiana, 2024).

In the context of pesantren education, the use of technology in learning has distinct characteristics. As a pesantren-based educational institution, TMI Al-Amien Prenduan imposes restrictions on students' use of electronic devices, thereby ensuring that the learning process takes place within the classroom (Documentation, 2026). Despite these restrictions, the institution has attained accreditation from the Majelis Masyayikh with a mumtaz (excellent) rating (Documentation, 2026). This demonstrates that the quality of learning is not solely determined by the direct use of technology in the classroom, but also by teachers' ability to design and manage learning effectively.

Although technology is not always used directly in the classroom, its utilization still contributes to improving the quality of learning. Several studies nonetheless indicate that a gap persists in teachers' digital literacy, particularly in integrating technology into learning and in meeting the demands of digital-based assessment (Tondeur et al., 2017). In Indonesia, this challenge is especially evident in educational institutions that remain dominated by conventional teaching methods (Wiwik & Murniyati, 2025). Given these conditions, this study is important because it addresses a gap between the demands of digital-based education policies and the reality of learning in pesantren: on the one hand, teachers are required to possess digital literacy competencies, while on the other hand, the use of technology in that environment is deliberately limited.

This urgency is heightened by the broader policy environment in Indonesian education, in which technology-based evaluation has become a structural feature rather than an occasional supplement. The National Assessment shifted the paradigm of quality measurement away from standardized cognitive testing of individual students toward a systemic diagnosis of the learning ecosystem, encompassing literacy, numeracy, character, and the learning environment. In such a framework, teachers are simultaneously the objects and the agents of evaluation: their perceptions are captured in the Learning Environment Survey, and their competencies shape the very quality that the assessment seeks to measure. This dual position makes teachers' digital literacy strategically important, because the credibility of the data and the institution's capacity to respond to it both depend on teachers who can operate, interpret, and act upon digital information.

For pesantren, this policy environment produces a distinctive tension. Many pesantren deliberately regulate students' access to electronic devices in order to protect a learning culture grounded in discipline, adab, and direct engagement with classical texts. This regulation is not a symptom of technological backwardness but a pedagogical and moral choice, consistent with the national recognition of pesantren as a distinct educational subsystem (Republik Indonesia, 2019; Mustakim, 2020). The challenge, therefore, is not how to maximize the visible presence of technology in the classroom, but how teachers can harness digital resources in ways that respect these boundaries while still meeting the demands of a digital, evidence-based accountability system. Understanding how teachers negotiate this tension is the central concern of the present study.

METHOD

This study employed a descriptive qualitative approach in order to understand and describe phenomena in depth based on real-world conditions in the field (Sandelowski, 2000; Creswell & Poth, 2018). The research was designed as a case study conducted at TMI Al-Amien Prenduan, a pesantren-based educational institution in Sumenep, Madura (Yin, 2018). The site was selected purposively because it represents a pesantren that restricts classroom technology use while maintaining a high standard of learning quality, as evidenced by its mumtaz (excellent) accreditation from the Majelis Masyayikh. In this study, the researcher served as the primary instrument and was directly involved in the data-collection process; as a teacher engaged in community service at the institution, the researcher was well positioned to understand the learning conditions and culture of the pesantren while maintaining objectivity through critical reflection throughout the research process.

The research subjects comprised teachers and members of the Quality Assurance Agency (Lembaga Penjaminan Mutu, LPM) at Al-Amien Prenduan who were competent in and actively involved in curriculum policy development and the implementation of learning. Informants were selected using purposive sampling based on specific criteria, namely direct involvement in lesson preparation, teaching, or quality assurance, and willingness to share their experiences in depth (Etikan et al., 2016). The key informants included classroom teachers and LPM officers responsible for maintaining and improving learning quality.

Data were collected through three complementary techniques. First, semi-structured in-depth interviews were used to obtain focused yet flexible data regarding teachers' digital literacy practices, guided by an interview protocol developed systematically to ensure consistency and depth (Kallio et al., 2016). Second, participant observation was conducted during weekly Educational Field Teachers' Group (KGBE) sessions and daily teaching-preparation activities in the teachers' lounge. Third, document analysis was carried out on institutional records such as i'dad tadris (lesson-preparation documents), accreditation documents, and quality-assurance reports.

Data analysis followed the interactive model of data reduction, data display, and conclusion drawing, applied iteratively so that emerging themes could be refined against the research focus (Miles et al., 2014; Braun & Clarke, 2006). To ensure the validity and credibility of the findings, the study employed source triangulation (comparing information across teachers, institutional leaders, and LPM officers) and technique triangulation (comparing interview, observation, and documentary data). Reflective field notes were maintained throughout to reduce researcher bias and to strengthen the trustworthiness of the interpretation.

Data collection took place over the course of the researcher's community-service placement at the institution, allowing for prolonged engagement and repeated observation rather than a single snapshot. Interviews were conducted with classroom teachers of Islamic education and with LPM officers, and were recorded and transcribed with the informants' consent. Observations focused on the settings where lesson preparation actually occurs, namely the teachers' lounge and the weekly KGBE forum, while documentary evidence included i'dad tadris files, accreditation records, and internal quality-assurance reports. Triangulating these three streams allowed claims derived from interviews to be checked against observed practice and institutional records, reducing reliance on self-report alone.

RESULT AND DISCUSSION

Result

The Role of Teachers' Digital Literacy in Lesson Preparation

Field data indicate that teachers at TMI Al-Amien Prenduan utilize digital literacy primarily during the lesson-preparation phase. This utilization involves searching for references, instructional videos, and supplementary materials before teaching and learning activities take place. The learning tradition at the pesantren emphasizes creativity and depth in teaching. One distinctive aspect observed is that teachers do not rely on a single primary reference when conducting lessons; to ensure that the material presented is comprehensive, in-depth, and contextual, teachers are expected to master at least five maraji' (teaching sources) before entering the classroom (Hapsari, interview, 2026). Mastery of these diverse sources is regarded as part of academic professionalism, as it enables teachers to enrich the material, compare different viewpoints, and provide broader explanations to students.

Reinforcing this point, one teacher explained that digital competence is essential for locating materials relevant to the subject taught. Through digital literacy, teachers can search for and utilize information from the internet to support learning; digital literacy, in this sense, is not merely the ability to operate devices but the capacity to use technology to make learning materials easier for students to understand (Amrina, interview, 2026).

Technology is indeed used more frequently at TMI Al-Amien Prenduan when teachers prepare materials before teaching. Teachers use the internet to find additional references, watch explanations through educational videos, use Google Scholar to search for journals relevant to the material, and use AI-based tools to clarify vocabulary and phrasing before summarizing the material for students (Observation, 2026). These interview findings were corroborated by observations during the weekly KGBE sessions, in which teachers discuss teaching methods, lesson readiness, and assessment strategies with the Master Teacher. The researcher also found documentation of i'dad tadris, indicating that lesson preparation is conducted in a structured manner prior to instruction (Observation, 2026). These activities demonstrate that digital literacy is embedded within the process of lesson preparation and the enhancement of teaching quality.

Observations at the pesantren further show that digital literacy has become an integral part of teachers' professional activities in preparing lessons. The majority of teachers utilize computers and the internet to design instructional materials, process teaching resources, and access various references. This is evident in the use of laptops in the teachers' lounge, the use of word-processing and presentation applications, and the use of the institution's internet network

to search for relevant learning resources. Although the use of electronic devices is strictly regulated, teachers' use of digital technology continues as a means of supporting improvements in the quality of learning.

Interview results also revealed that digital technology is highly beneficial during preparation. As one teacher observed: "Now it is easier for us to find learning resources through journals, e-books, and scientific articles available online. Whereas in the past learning resources were limited to printed books in the library, now learning materials can be enriched with a variety of more up-to-date sources" (Imron, interview, 2026). These findings indicate that the pesantren can keep pace with developments in modern education without abandoning its distinctive teaching characteristics; technology is not the primary focus but serves as a learning support that aids teachers' preparation before instruction begins.

Table 1. Summary of Findings on the Role of Teachers' Digital Literacy in Lesson Preparation

Focus of Findings	Description of Findings
Digital literacy in lesson preparation	Teachers utilize digital technology to search for references and teaching materials before teaching.
Strengthening professionalism through multiple references	Teachers master at least five teaching resources (*maraji'*) to enrich and deepen learning materials.
Technology as a learning aid	Teachers use digital devices and applications such as laptops, the internet, Google Scholar, and AI tools to support the development of learning materials.
Adapting technology to pesantren culture	Technology is used selectively to support learning without undermining pesantren traditions.

A closer reading of the preparation practices reveals a division of digital labor that is largely invisible from the classroom. Teachers described a routine in which the search for materials, the comparison of sources, and the distillation of complex explanations all take place before instruction, so that what students encounter is a carefully curated synthesis rather than raw digital content. This curation is itself a literacy practice: it requires teachers to evaluate the credibility of online sources, to reconcile differing scholarly viewpoints, and to translate academic language into forms accessible to students. The requirement to master multiple maraji' thus functions as an informal standard of quality that pushes teachers to exercise higher-order digital-literacy skills even in the absence of classroom devices.

The weekly KGBE forum emerged as a key mechanism through which individual preparation is socialized into collective practice. In these sessions, teachers share the digital resources they have found, critique one another's lesson plans, and receive guidance from the Master Teacher on how to align materials with the pesantren's pedagogical expectations. In this way, digital literacy is not merely an individual attribute but is continually refined through peer review and mentoring. The forum also serves as a safeguard against the uncritical adoption of digital content, since materials drawn from the internet are examined collectively before they inform instruction, reinforcing the pesantren's emphasis on verifying knowledge before transmitting it.

Digital Literacy in Supporting Deep Learning

In this study, deep learning is understood as a learning process oriented not toward memorization but toward conceptual understanding, critical thinking, and the relevance of the material to daily life. Teachers' digital literacy encompasses technical, cognitive, and pedagogical

aspects that enable them to design adaptive learning experiences tailored to students' needs; teachers with a high level of digital literacy can utilize technology to develop learning that is more personalized, collaborative, and student-centered (Reksiana, 2024). Digital literacy competencies thus enable teachers to integrate technology into learning, develop digital learning materials, and enhance the effectiveness of communication and interaction with students (Rohmiati, 2025; Saerang et al., 2023).

Interview findings show that teachers strive to encourage students to understand the content of the material rather than merely memorize lessons. During the learning process, teachers relate the material to daily life and use discussion and question-and-answer methods to encourage students to be more active in understanding the lessons (Hapsari, interview, 2026). References obtained from various digital sources help teachers provide broader and more contextual explanations, making it easier for students to grasp the material. This resonates with studies showing that digital literacy can help teachers enhance students' critical thinking through more active and contextual learning (Saridudin, 2025).

The findings further indicate that the National Assessment and deep learning are interrelated, since both are oriented toward the holistic development of students' competencies. Deep learning rests on three principles — meaningful learning, mindful learning, and joyful learning — which encourage students to engage actively, connect knowledge to real-life contexts, and develop critical and reflective thinking (Akmal et al., 2025). Its implementation requires support from authentic assessment and from the use of technology that enables richer and more meaningful learning experiences, as well as teachers with adequate pedagogical and digital competencies (Adnyana, 2024; Huda et al., 2025).

At the same time, the data indicate that technology need not be physically present in the classroom. One teacher noted that the most important factors in learning are the teacher's own readiness, the quality of the instructional materials, and the teaching methods employed, so that technology serves only as a support for learning (Amrina, interview, 2026). Consequently, the quality of learning remains dependent on how teachers deliver the material and manage the learning process in the classroom, consistent with the conception of deep learning that emphasizes conceptual understanding, active engagement, and real-life connection (Fullan et al., 2018).

The data further suggest that digital literacy contributes to deep learning by expanding the range of representations teachers can offer. Because teachers arrive in class having consulted journals, e-books, videos, and other digital sources, they are able to present the same concept through multiple examples and analogies, to anticipate students' misconceptions, and to connect abstract material to concrete, everyday experience. Students, in turn, are invited to discuss, question, and relate the material to their own lives rather than simply memorize it. This resonates with the principles of meaningful, mindful, and joyful learning, and indicates that the depth of learning achieved in class is, in part, a downstream product of the richness of teachers' digital preparation.

Digital Literacy in Supporting the National Assessment

Field findings indicate that learning at the pesantren can still adapt to current educational developments even while relying on traditional methods, because teachers incorporate digital literacy into their lesson preparation. The Quality Assurance Agency (LPM) plays a crucial role in maintaining and improving the quality of learning at TMI Al-Amien Prenduan, functioning not only as a supervisor but also as a driver of a culture of quality within the pesantren environment (Imron, interview, 2026).

To maintain learning quality, the LPM employs a PPEP approach — Penetapan (Establishment), Pelaksanaan (Implementation), Evaluasi (Evaluation), and Pengendalian (Control) — in managing educational quality (Document analysis, 2026). When teaching methods

are found to lack variety, the institution conducts an evaluation followed by workshops and teacher mentoring. The pesantren has also begun to focus on strengthening teachers' digital competencies, which is one of the critical needs in Islamic education today, particularly for readiness to interpret and act upon the Learning Environment Survey component of the National Assessment (Kusmilawati, 2024). Strengthening digital competence in this setting is understood not merely as technical training but as cultivating the wise use of technology in accordance with the values of Islamic education (Saridudin, 2025).

Taken together, the three findings describe a coherent pattern rather than isolated practices. Digital literacy enters the pedagogical process upstream, at the point of preparation, and its effects flow downstream into classroom instruction and, ultimately, into institutional quality. Teachers first use digital resources to build a robust base of references and to deepen their command of the material; they then translate this preparation into contextual, discussion-rich instruction that aligns with deep learning; and the institution, through the LPM, converts these individual practices into a sustained culture of quality that underpins readiness for the National Assessment. This upstream-to-downstream flow explains why the visible scarcity of classroom technology does not translate into low learning quality.

The findings also reveal a consistent normative framing among informants. Teachers repeatedly emphasized that technology is a tool subordinate to pedagogical and moral aims, and that its value lies in how it is used rather than in its mere presence. This framing was echoed at the institutional level, where the strengthening of digital competence was described as part of a broader commitment to quality that remains anchored in pesantren values. The convergence of individual and institutional accounts, corroborated by observation and documents, strengthens confidence in the finding that digital literacy operates as a values-guided, preparation-centered practice at TMI Al-Amien Prenduan.

DISCUSSION

Digital Literacy as Behind-the-Scenes Support in Pesantren

The findings confirm that, in the context of TMI Al-Amien Prenduan, the use of technology occurs more frequently before the learning process begins than during classroom instruction. Digital literacy plays its greatest role during the lesson-preparation phase, particularly in helping teachers expand their references and deepen their understanding of the material, which in turn makes them better prepared when explaining content to students. This pattern extends prior conceptions of digital literacy as a directly observable classroom practice (Ng, 2012; Eshet-Alkalai, 2004) by showing that, in technology-restricted environments, digital literacy can operate as a form of behind-the-scenes support that remains consequential for learning quality even when it is invisible in the classroom itself.

This interpretation helps explain how a pesantren that restricts classroom technology can nonetheless attain a mumtaz accreditation. The quality of learning is sustained not by the physical presence of technology in the classroom but by teachers' capacity to convert digital resources into rich, well-structured, and contextual instruction. The finding is consistent with the argument that the relationship between teachers' beliefs and their technology use is mediated by pedagogical purpose rather than by the mere availability of tools (Tondeur et al., 2017), and it demonstrates that a strong preparation culture can compensate for deliberate constraints on classroom technology.

Aligning Digital Literacy with Deep Learning and Islamic Values

The results also indicate that digital literacy supports deep learning by enabling teachers to present content in meaningful, mindful, and joyful ways (Akmal et al., 2025). By drawing on diverse digital references and mastering multiple maraji', teachers can relate material to daily life, encourage discussion, and cultivate critical thinking, which are hallmarks of deep learning (Fullan

et al., 2018; Hattie, 2009). Importantly, the pesantren context adds a normative dimension: digital literacy is exercised in a manner that upholds Islamic educational values, so that technology is adopted selectively and wisely rather than uncritically (Huda et al., 2025; Saridudin, 2025). This reflects a distinctive model in which digital competence and religious character formation are pursued simultaneously rather than in tension.

With respect to the National Assessment, the study shows that institutional readiness is strengthened less through classroom devices than through quality-assurance mechanisms. The LPM's PPEP cycle situates digital-competence development within a broader culture of quality, linking teacher mentoring and evaluation to the demands of the Learning Environment Survey. This suggests that, in pesantren, readiness for national, technology-based evaluation is best understood as an institutional capacity supported by teachers' digital literacy, rather than as an individual, classroom-level technology skill alone (Reksiana, 2024; Saerang et al., 2023).

This institutional reading also clarifies the meaning of the Learning Environment Survey within a pesantren. Because the survey captures teachers' and leaders' perceptions of learning quality, school climate, and teaching practices, an institution's performance depends on whether its teachers can accurately understand, respond to, and act upon such digital instruments. At TMI Al-Amien Prenduan, the LPM's mentoring and evaluation routines effectively prepare teachers to engage with this kind of reflective, data-informed self-assessment. In this sense, teachers' digital literacy is not only a resource for lesson preparation but also a precondition for meaningful participation in the National Assessment's diagnostic logic, linking the individual and institutional levels of analysis.

Implications and Limitations

Theoretically, the study contributes a context-sensitive account of digital literacy that foregrounds preparation and institutional quality assurance rather than classroom technology use. Practically, it suggests that pesantren seeking to improve learning quality and National Assessment readiness may prioritize strengthening teachers' preparation-stage digital literacy and embedding it within quality-assurance routines, while preserving their distinctive pedagogical traditions (Yunus, 2016). As a single-site qualitative case study, however, the findings are not intended to be statistically generalizable; rather, they offer transferable insights that future research could examine across other pesantren or through mixed-methods designs that measure the relationship between preparation-stage digital literacy and learning outcomes.

These implications also speak to policy. If national accountability systems assume that quality is primarily produced through visible classroom technology, they risk misreading institutions such as pesantren, whose quality is produced through preparation and institutional culture. A more nuanced policy stance would recognize multiple legitimate pathways to digital-age quality and would support pesantren in strengthening teachers' preparation-stage literacy and quality-assurance capacity, rather than pressing for uniform classroom technology adoption that may conflict with their educational philosophy. Such recognition would allow pesantren to engage the National Assessment on their own terms while preserving the distinctive character that underpins their legitimacy.

CONCLUSION

This study concludes that teachers' digital literacy at TMI Al-Amien Prenduan functions strategically as a behind-the-scenes support mechanism for learning and quality assurance, even though the pesantren restricts the direct use of technology in the classroom. Digital literacy contributes most strongly during the lesson-preparation phase, where teachers use digital resources to enrich materials, master multiple references, and design effective, contextual teaching strategies. It also supports deep learning by helping teachers present content in meaningful and contextual ways, and it strengthens institutional readiness for the National

Assessment, particularly through the quality-assurance work of the LPM and its relevance to the Learning Environment Survey.

These findings imply that, in pesantren, the quality of learning is determined not by the intensity of classroom technology use but by teachers' ability to design and manage learning effectively with the aid of digital resources, in accordance with Islamic educational values. Future studies are encouraged to examine this behind-the-scenes model of digital literacy across a wider range of Islamic educational institutions and to explore how preparation-stage digital competence can be systematically strengthened without compromising the distinctive character of pesantren education.

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