DIGITAL LITERACY-BASED EDUCATIONAL MANAGEMENT AS A PILLAR OF NATIONAL DEVELOPMENT

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Abstract

This study investigates the development of digital technology literacy within the management of educational institutions. It focuses on identifying the outcomes generated when digital literacy is integrated into institutional management, as well as the strategies employed to develop technologically advanced schools. Adopting a descriptive qualitative approach, data were collected through observation, interviews, and documentation. Data analysis was guided by Miles and Huberman's framework, encompassing five stages: exploring, sorting, describing, explaining, and predicting. The findings reveal that digital technology literacy significantly contributes to the creation of various educational innovations. These include the establishment of technology-based learning systems, enhanced access to educational resources for both teachers and students, and the implementation of digital infrastructure such as Wi-Fi and digital laboratories. These advancements foster student engagement, satisfaction, and skill development. The strategies identified to cultivate technologically superior schools involve two primary approaches: (1) training educators and students in digital literacy, and (2) continuously organizing digital-based competitions to ensure ongoing skill development and adaptation to emerging challenges. The novelty of this research lies in its emphasis on institutional management through the lens of digital technology integration.

Keywords: *digital technology literacy, education management, national development*

Abstrak

Penelitian ini bertujuan untuk menelaah pengembangan literasi teknologi digital dalam pengelolaan lembaga pendidikan. Fokus penelitian ini tertuju pada produk apa yang dihasilkan ketika literasi teknologi digital digunakan dalam pengelolaan lembaga pendidikan. Strategi untuk mewujudkan sekolah unggul di bidang teknologi. Pendekatan penelitian ini diskriptif kualitatif, data-data akan diimput dengan observasi, interview, dan dokumentasi. Sementara analisis data menggunakan teori Milles dan Hubberman dengan lima langkah, mengeksplorasi, mengurutkan, mendiskripsikan, menjelaskan, dan mempredikisi. Hasil penelitian menunjukkan bahwa literasi teknologi digital berjasa besar dalam mewujudkan sejumlah produk dalam lembaga pendidikan, antara lain, terbentuknya sistem pembelajaran berbasis

teknologi, memberikan kemudahan- kemudahan kepada pendidik dan peserta didik dalam mengakses sumber belajar, sejumlah alat (tool) digital seperti wifi dan laboratorium digital, memberikan kepuasan dan memotivasi peserta didik untuk mengembangkan skil yang dimiliki. Sementara strategi untuk mewujudkan sekolah unggul ditempuh 2 jalan, pertama, training pendidik dan peserta didik untuk menguasasi literasi digital, dan kedua, arena kompetisi berbasis digital terus dilakukan sehingga skil pendidik dan peserta didik dapat dipastikan akan selalu mendapat tantangan baru. Kebaruan penelitian ini adalah pengelolaan lembaga pendidikan dengan teknologi digital.

Kata Kunci: *Literasi teknologi digital, Pengelolaan Pendidikan, Pembangunan Nasional*

A. Introduction

The integration of digital technology literacy in the management of educational institutions must be continuously enhanced, as it serves as a foundational pillar for national development. This emphasis is timely, given the emergence of new opportunities shaped by technological advancements. In an era where digital technology is rapidly transforming how individuals think, communicate, and engage— particularly within educational settings— institutions are increasingly expected to adapt and innovate. Digital tools offer promising pathways to improve learning efficiency, facilitate broader access to educational resources, and equip students with essential skills for the digital age. This raises a fundamental question: how can digital technology literacy be effectively cultivated in the management of educational institutions?

Several persistent challenges hinder the effective implementation of digital literacy in education management. The first is the gap between technological advancements and the capabilities of teaching staff. Raman et al. highlighted a significant disparity between teachers' knowledge, skills, and communication in using digital tools. They recommended that the Malaysian Ministry of Education strengthen teacher training in digital competencies to address this shortfall (Raman et al. 2019).

The ability of educators to leverage digital technologies can significantly enhance the teaching and learning process. For instance, when teachers can guide students in using devices such as computers and tablets for reading, research, or educational games, learning becomes more interactive and accessible. Cloud computing further expands learning opportunities, enabling students to access materials both in school and remotely. Likewise, virtual classrooms supported by video conferencing tools have become effective means for delivering distance education (Mkhize et al. 2024).

A second critical factor is the absence of a clear and future-oriented vision among school leaders. Lim argued that institutions lacking a vision that embraces technology are unlikely to thrive in an increasingly digital education landscape (Lim 2017). Vision serves as a motivational and strategic anchor, outlining the values to be nurtured and the direction to be pursued (Patmawati, et al 2023).

A strong and technology-driven vision empowers school leaders to optimize available resources, foster conducive learning environments, and align institutional goals with the demands of the digital era. Sarnoto et al. reinforced this by noting that digital technology enhances learning efficiency, enriches content, and facilitates essential learning skills (Sarnoto et al. 2023). However, they also warned of potential downsides, such as overreliance on technology and possible attention-related challenges. Hence, the implementation of digital tools must be thoughtfully managed and accompanied by balanced pedagogical support.

The third challenge lies in the limited perception of educational institution managers regarding the strategic role of technology in school administration. Despite the potential of digital tools—including computers, internet access, mobile devices, and interactive applications—to enhance engagement and personalize learning, some school leaders fail to recognize their transformative capacity. Modern technologies, such as the Internet of Things (IoT), can revolutionize educational infrastructure by enabling real-time data collection for facility management, automating processes, and reducing energy and operational costs (Yusuf and Sodik 2023).

Addressing these challenges requires concrete actions and strategic frameworks to embed digital literacy within education management. Antoniou and Ioannou offer a relevant theoretical perspective, suggesting that: (1) the intentional use of technology in schools can drive social change by influencing student behavior and attitudes; and

(2) technological interventions should be designed with a strong theoretical foundation and clear objectives, targeting school-aged students, documenting long-term impacts, facilitating technology-mediated perspective-taking, and understanding how digital mediation functions in learning environments (Antoniou and Ioannou 2018).

B. Research Method

Research Method This study adopts a qualitative research design, employing a descriptive approach with process-oriented analysis. Emphasis is placed on understanding processes and meanings from the perspective of the research subjects. Theoretical frameworks are used not only to guide the research focus in alignment with empirical realities but also to contextualize the background of the study and support the interpretation of findings.

The research was conducted at several Madrasah Aliyah (Islamic senior high schools) in Nganjuk Regency, East Java, namely: Madrasah Aliyah Al

Khidmah Ngronggot, Madrasah Aliyah Al Manar Prambon, and Madrasah Aliyah Al Hidayah Baron. These institutions were selected based on their classification as large and well- established madrasahs within the region, and for their ongoing efforts in integrating digital technology into both communication systems and instructional media.

To achieve the research objectives, the researcher served as the primary instrument, functioning as both a full participant and observer. Data were collected through three main techniques: observation, interviews, and document analysis. Observations focused on the availability and management of technological infrastructure, its use in administrative processes, classroom learning systems, and digitization initiatives. Interviews were conducted to gather insights into the design and development of technology-based madrasah programs, the management of digital tools, and their application in both administrative and instructional contexts. Documentation analysis was carried out to collect data related to digital learning designs, evaluation tools, student assignments, and instructional resources.

Data analysis followed the five-step framework proposed by Miles, Huberman, and Saldan˜a (2014), which includes: (1) exploring, (2) sorting, (3) describing, (4) explaining, and (5) predicting. This analytical approach enables a comprehensive interpretation of qualitative data, ensuring depth and rigor in the research findings (Miles et al. 2014).

C. Results And Discussion

1. Digital-Based Educational Institution Management Products

a. Development of a Technology-Based Learning System

The implementation of technology-based learning in Islamic senior high schools (Madrasah Aliyah) in Nganjuk Regency varies by institution, reflecting different stages of digital integration. At Madrasah Aliyah Al Manar Prambon, the school is still in the applying stage of digital integration. This phase is characterized by the initial introduction of digital tools, such as a limited number of computers added to the school's infrastructure. Classroom learning at this level remains largely teacher-centered, with computers primarily serving administrative functions and supporting school management. Nevertheless, the gradual introduction of computer use in classroom instruction has begun.

In contrast, Madrasah Aliyah Al Khidmah Ngronggot has progressed to what can be described as the infusing stage. Although ICT tools such as computers have not yet been fully integrated into every classroom, several teachers conduct monthly sessions in the school’s computer lab. Plans are underway to equip all classrooms with computers and to provide additional technological resources for teachers, laboratories, and the library. At this level, teachers collaborate with colleagues to help students utilize digital tools effectively, aligning technology use with educational objectives.

The traditional expository model of classroom instruction is slowly being replaced by more modern, digital-based approaches. Three primary models of digital learning are evident in these institutions, as identified by Saregar et al.: (1) Web Course – A fully online model where all learning activities (assignments, materials, discussions, consultations, and assessments) are conducted via the internet. (2) Web Centric Course – A blended approach that combines online components with traditional face-to-face sessions. (3) Web Enhanced Course – A model that emphasizes traditional in-person learning but is supplemented by internet-based resources. (Saregar et al. 2019). Of the schools studied, MA Al Manar Prambon predominantly employs the web enhanced course model. Although face-to-face instruction remains the norm, the school is steadily incorporating digital tools. The integration is further encouraged by the Ministry of Religious Affairs in Nganjuk Regency, which mandates the use of Computer-Based Testing (CBT). All examination materials, including questions and responses, are administered via computer.

At Madrasah Aliyah Al Khidmah Ngronggot, the use of computers in education serves multiple functions: (1) Intranet Usage: A localized network system with password protection is employed to safeguard institutional data and learning materials from external breaches. (2) Mobile Devices: Smartphones are utilized as learning tools, supporting independent student activities such as composing formal letters, designing posters, and accessing multimedia content. (3) Flash Drives: USB flash drives are used for storing and transferring digital content, including assignments and teacher- provided materials. This supports seamless communication and resource sharing between students and teachers.

The need for internet-based learning has become increasingly urgent as students seek to broaden their knowledge and technical skills. However, a notable challenge remains: the reliability and accuracy of online information. Pow and Li found that students' perceptions of the quality of internet-sourced information significantly influence how that information is applied in real-world academic and professional contexts (Pow and Li 2015). This finding suggests that the credibility of online content directly impacts the quality of students' academic work and highlights the need for critical literacy in navigating digital resources.

b. Procurement of Wi-Fi Infrastructure in Madrasahs

All madrasahs involved in this study have implemented Wi-Fi technology to support internet connectivity. This infrastructure serves as a fundamental component for facilitating communication among administrators, teachers, and students. The availability of Wi-Fi is perceived to significantly enhance both communication and learning processes within the school environment. Stronger signal strength is directly correlated with smoother communication and improved technology-based learning

experiences; conversely, weak signals tend to hinder these processes (Maulana and Sulistyo 2024).

In the research sites, Wi-Fi serves several purposes: (1) providing internet access; (2) enabling file sharing between electronic devices without the use of cables; (3) connecting PCs and smartphones; (4) using smartphones as modems via hotspots; (5) increasing internet speed; and (6) facilitating the transfer of photos and videos to laptops (Pahlavan and Krishnamurthy 2021). Overall, Wi-Fi in the madrasahs studied primarily functions to enhance connectivity and communication, aligning with the schools' educational needs.

c. Establishment of Computer Laboratories

In addition to Wi-Fi access, madrasahs have established digital laboratories to facilitate technology-based learning. These facilities are intended to familiarize students with modern digital systems and tools. All three madrasahs observed in the study have functioning computer laboratories. The integration of computer technology is believed to have transformed various aspects of education, particularly in how students learn and interact with information. Students are granted access to a range of digital tools and programs that support more engaging and interactive learning experiences.

The presence of computer laboratories has shifted instructional methods away from traditional approaches—such as textbooks, chalkboards, and handwritten notes— toward digital learning environments that are more dynamic and flexible. These laboratories allow the use of computers, tablets, and other smart devices to access educational content through platforms such as e-books, instructional videos, and learning applications. This transformation enables students to learn at their own pace and according to their individual learning styles (Muhajarah and Sulthon 2020).

Furthermore, computer laboratories support the implementation of the madrasah curriculum across various subjects. In mathematics and science, for instance, students utilize software for data analysis and visualizing graphs. In English and social studies, digital tools are used for research and completing practical assignments. Such integration promotes interactive learning and equips students with essential academic tools.

A major advantage of computer laboratories is the improvement of students' digital literacy. Through guided instruction, students acquire skills in using software, conducting effective internet searches, and understanding digital security fundamentals. These competencies are essential in today's increasingly technology- driven world.

Additionally, computer laboratories offer students opportunities to develop creativity. They can engage in multimedia projects, graphic design,

and even basic programming. These activities foster innovation and problem-solving abilities (Hauriyah et al. 2019).

Finally, computer labs serve as preparatory spaces for students to develop workplace-relevant skills. Mastery of software applications and familiarity with digital tools are crucial in modern industries. As a result, madrasahs that emphasize digital training help students become more competitive and adaptable in the contemporary job market.

2. Strategies for Developing Technologically Advanced Madrasah

a. Implementing Digital Literacy Training for Educators and Students

The study revealed that all three madrasahs have conducted digital literacy training programs targeting both educators and students. These initiatives aim to enhance teachers' digital competencies and prepare students with the necessary skills to meet the demands of 21st-century education. A core objective of these trainings is to cultivate Higher-Order Thinking Skills (HOTS), which consist of four essential components: critical thinking, problem-solving, creative thinking, and the ability to communicate and collaborate effectively (Tang et al. 2020).

Although each madrasah adopts its own strategies for instilling these competencies, a common approach involves forming collaborative teams. For example, at Madrasah Aliyah Al Khidmah Ngronggot, students established a podcast team that successfully interviewed the organizing committee of the 2025 Boyong Notoprojo event in Nganjuk Regency. Their contribution was later recognized with an award for producing a video documenting the ceremony.

The digital training provided encompasses several key areas:

1. Mastery of Internet Functions

   Workshops were organized to introduce participants to fundamental software applications and internet usage. These sessions familiarized both teachers and students with digital tools and platforms, focusing on practical skills such as navigating internet networks, using email, and conducting effective online searches. Proficiency in these areas is essential for ensuring the continuity and efficiency of the learning process.

   Students, in particular, benefit from enhanced data exploration skills, enabling them to gather relevant information more efficiently. This access to reliable digital content fosters scientific reasoning and strengthens motivation. Empirical findings have shown that integrating internet-sourced arguments into learning can improve students' scores in scientific literacy assessments such as PISA (Tsai 2015).

2. Utilization of Digital Libraries

   Training sessions also introduced teachers to the development of digital libraries, which include curated collections of e-books, scholarly articles, and academic journals. Students were guided on how to access

and critically evaluate these sources. By incorporating digital libraries into their learning process, students are encouraged to expand their knowledge base and strengthen their basic research skills. Digital libraries offer numerous advantages, such as cloud-based storage, overcoming spatial limitations, and ensuring ease of access to a wide array of information. These platforms enable users to retrieve, store, and share educational content conveniently. Moreover, their implementation has been linked to improved academic performance among student (Soeprijanto et al. 2022).

3. Integration of Social Media in the Learning Process

   As part of the training, participants were divided into groups tasked with identifying safe social media platforms, exchanging learning resources, and providing constructive peer feedback. Teachers received instruction on how to secure digital content using passwords to maintain internal confidentiality within the school. In practice, social media has proven effective in facilitating flexible learning and fostering peer interaction.

   Furthermore, social media enhances students' ability to expand their social networks, build cooperative relationships, and reduce interpersonal conflicts (Pratidina and Mitha 2023). Beyond saving time, these platforms allow students to connect with peers from different regions or even other countries, thereby enriching their cultural and academic perspectives. With the development of digital literacy, students can also engage in more efficient and targeted learning by using applications and educational websites to access the information they seek.

4. Digital Content Creation

   In this component of the training, students are guided in creating various forms of digital content such as blogs, videos, and multimedia presentations. This activity not only enhances students' creativity but also develops their technical proficiency. Through this process, students learn to gather and organize information, utilize digital tools and software, edit multimedia content, and publish their work online. The training places a strong emphasis on ethical and responsible content creation in the digital space.

   Participants are instructed on key ethical guidelines, which include avoiding the creation or dissemination of: (1) content containing moral violations, insults, or defamation; (2) false information or hoaxes, especially those that may provoke issues of ethnicity, religion, race, or inter-group conflict; (3) threatening or bullying messages; and (4) content that violates intellectual property rights by using others' material without permission (UU, tentang Media sosial, RI 2021).

5. Digital Security and Ethics

This segment of the training addresses the increasing prevalence of misinformation and online threats. Students are taught how to safeguard personal data, identify online scams, and respect digital copyrights. The goal is to instill ethical behavior in cyberspace and reduce risks associated with digital technology use.

Particular focus is given to developing students' skills in evaluating the credibility of online information. Tutors emphasize four key fact-checking strategies:

(1) verifying the source, (2) confirming factual accuracy, (3) evaluating the authenticity of images, and (4) checking publication dates (Santoso et al. 2024). These skills are considered essential in combating the spread of misinformation and enhancing students' information literacy.

6. Using Online Collaboration Tools

   Students and teachers are also introduced to various online collaboration platforms such as Google Drive, Trello, and Slack. These tools are taught to facilitate group work and enhance project-based learning. For instance, when students are assigned group projects, these platforms allow them to collaborate virtually, manage tasks, track progress, and communicate effectively in real time.

   This collaborative approach not only builds digital fluency but also promotes essential soft skills such as project management, problem-solving, and teamwork. Moreover, collaborative learning is recognized as an effective strategy across disciplines and learning environments, both formal and informal. It fosters a culture of generosity, friendliness, and democratic values while minimizing conflict and hostility (Norman, 2022.).

7. Strengthening Evaluation and Feedback Mechanisms

   The final component of the training emphasizes the importance of continuous evaluation and constructive feedback. Both teachers and students are encouraged to engage in formative assessments to monitor progress in digital literacy. Evaluation serves multiple purposes: it verifies learning outcomes, clarifies understanding, negotiates meaning, and stimulates further improvement. Peer feedback, in particular, is highlighted as a valuable learning activity. It not only helps students reflect on and regulate their own learning but also enhances the evaluative and writing skills of those providing the feedback. When effectively implemented, peer evaluation fosters reciprocal learning and creates a supportive academic environment (Zhu and To 2022).

3. Facilitating Digital-Based Competition Arenas

Madrasahs have initiated digital literacy competitions as a strategic approach to enhance students' competence in creating and engaging with digital content. These competitions include categories such as photography,

poster design, educational TikTok videos, short instructional videos, and poetry creation. All submissions are made online, and finalists are required to present their work to a panel.

This model of digital competition has a significant impact on both students and teachers. Research indicates that digital game-based competitions positively influence learning outcomes, with direct forms of competition yielding greater benefits than indirect ones (Soeprijanto et al. 2022). Thus, incorporating competitive elements into digital skill development proves to be an effective strategy in educational settings.

UNESCO (2011) defines digital literacy not merely as the ability to operate technological and communication tools but also as a vital life skill encompassing social interaction, critical thinking, creativity, and the capacity to inspire others. Furthermore, digital literacy includes the ability to read, write, and apply new knowledge effectively within digital contexts.

Through digital literacy, students gain the ability to access and process information rapidly and efficiently. During workshops, students are introduced to practical digital tools such as train and flight schedule apps, video conferencing platforms like Zoom, cloud-based storage (Google Drive), and educational games. These tools are essential in fostering independent, technology-enhanced learning.

In the digital era, students are expected to navigate a range of online tools. For example, instead of visiting train stations, they can now access up-to-date departure schedules via apps or websites. More broadly, digital competition encourages students to embrace digital transformation, allowing madrasahs to evolve in a globally connected world (Lea˜o and da Silva 2021). Exposure to international information and digital platforms opens up new opportunities for learning. For instance, students can watch YouTube tutorials to learn baking techniques or practice other skills, illustrating the internet's role in supporting practical, self-directed learning.

Another significant benefit of digital-based competitions is the development of time-efficient learning practices. Students become proficient in searching for academic references and resources anytime and anywhere, demonstrating that digital literacy is not only empowering but also time-saving.

D. Conclusion

This study concludes that digital technology literacy plays a critical role in shaping innovation within educational institutions. First, the development of technology-integrated learning systems has facilitated access to educational resources for both teachers and students. Second, digital infrastructures such as Wi-Fi and computer laboratories enhance student engagement and skill development.

To build technologically advanced and competitive madrasahs, two primary strategies have been adopted: (1) continuous digital literacy training for educators and students, and (2) the establishment of digital-based competition arenas that challenge and motivate learners to continuously improve. Together, these approaches ensure that madrasahs are not only adapting to but also thriving in the digital era.

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