

Teacher Strategies for Integrating Digital Technology into Learning at MAN 1 Surakarta

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ABSTRACT

The integration of digital technology in education has become increasingly important in the era of the Fourth Industrial Revolution. This study aims to explore teachers' strategies in integrating digital technology into the learning process at MAN 1 Surakarta. The research employed a descriptive qualitative approach using a single case study design. Data were collected through semi-structured interviews and non-participatory observations involving teachers who had implemented digital technology in teaching activities for at least two years. The data were analyzed using the interactive model of Miles, Huberman, and Saldana. The findings indicate that teachers utilize various digital applications such as PowerPoint, Canva, Google Spreadsheet, Padlet, and Kahoot to enhance learning effectiveness and student engagement. The use of digital technology makes learning more interactive and efficient. However, several challenges remain, including unstable internet connections, limited infrastructure, and varying levels of digital readiness among teachers and students. Continuous training and institutional support are essential to strengthen sustainable digital learning implementation.

Keywords: digital technology integration, digital learning, teacher strategies, blended learning, educational technology.

Introduction

In the era of the Fourth Industrial Revolution, the development of digital technology has become a global trend that is transforming almost every aspect of life, including education. The urgency of applying digital technology in learning has become increasingly apparent in order to respond to the needs of a fast-paced and dynamic era (Saripudin, 2024). Digital technology provides great opportunities to streamline the teaching and learning process through interactive methods and personalized learning that can accommodate various student learning styles (Yudistira, 2024). Therefore, strengthening the integration of digital technology in education is a priority to improve the quality and competitiveness of human resources in the future (Prasetiyo, 2025).

The ideal state of digital technology integration in education is when the entire teaching and learning process can take place interactively, flexibly, and is easily accessible to all students. The use of advanced technologies such as online platforms, augmented reality, and artificial intelligence allows students to learn independently and collaboratively without being limited by space and time (Yudistira, 2024). Teachers who are highly competent in utilizing technology are able to deliver innovative learning that is relevant to the needs of the 21st century. A complete technological infrastructure and adequate managerial support are determining factors for the success of this integration (Saripudin, 2024).

However, there is still a significant gap in the implementation of digital technology in education in Indonesia. Limited access to stable internet, especially in remote areas, is a major obstacle to technology-based learning (Dwidjo, 2021). In addition, differences in the level of digital literacy among teachers and students have led to imbalances in the optimal mastery and utilization of technology. Uneven infrastructure and limited human resources have widened the gap in the quality of education between regions and between educational institutions within the country (Wulandari, 2025).

As a potential solution, ongoing training and mentoring for teachers is a key strategy for improving digital competence and the effective use of technology in the learning process (Wulandari, 2025). In addition, education management needs to optimize the provision of adequate technology facilities and internet access to support sustainable digital learning (Radenintan, 2023). The implementation of blended learning methods that combine online and face-to-face learning also offers flexibility that can overcome technical barriers and improve the quality of learning (Prasetyo, 2025). Synergistic support from various stakeholders is key to the successful integration of technology in schools and madrasas.

Observations at MAN 1 Surakarta show that most teachers have successfully integrated digital technology into their teaching activities, particularly through the use of multimedia teaching materials and blended learning methods. However, a number of obstacles remain, such as unstable internet connections and limited mastery of technological tools and applications by some teachers, which affect the smooth running of online learning. These findings emphasize the need for adaptive and innovative strategies that can overcome technical and non-technical barriers to maximize the sustainable integration of digital technology in the school.

Method

This study uses a descriptive qualitative approach that aims to describe in depth the strategies used by teachers in integrating digital technology at MAN 1 Surakarta. The qualitative approach allows for a comprehensive understanding of social phenomena from the perspective of participants and the natural context of the study (Sugiyono, 2019). The type of research chosen is a single case study to focus on the context of school that combine traditional and modern methods in technology-based learning.

The research was conducted at MAN 1 Surakarta, a religious-based secondary education institution that began adopting digital technology in 2022.

The research took place in 2025, when the school was actively developing the integration of technology into its daily learning practices.

The research subjects were innovative teachers at MAN 1 Surakarta who had been implementing digital technology for at least the past two years. Informants were selected using purposive sampling, which is selection based on criteria of significant experience in the use of digital technology, willingness to provide in-depth information about digital learning strategies and obstacles, and active participation in technology training (Palinkas et al., 2015). This technique was chosen to obtain rich and relevant data related to the research object

Data was collected through semi-structured interviews and non-participatory observation. In-depth interviews focused on teachers' experiences with digital technology integration, strategies implemented, obstacles encountered, and solutions found. Observations were conducted to examine the implementation of technology in learning and teacher-student interactions, as well as to address technical obstacles that arose.

The data were analyzed using the interactive model of Miles, Huberman, and Saldana (2014) through the stages of data reduction, data presentation, and conclusion drawing. Data reduction served to filter and focus on relevant information, while data presentation was carried out using descriptive narratives that grouped the findings based on main themes. Conclusions were drawn based on patterns and relationships between themes and verified through member checking to ensure the accuracy and validity of data interpretation.

To ensure validity, this study used member checking techniques by confirming the findings directly with teachers as the main source. Triangulation was carried out by comparing data from interviews and observations to increase the credibility of the results. Although documentation was not used, triangulation of these methods helped reduce bias and ensure the validity of the data and integrity of the study.

Results

Based on an interview with one of the teachers at MAN 1 Surakarta, it is known that the use of digital technology in the school has been going on for the last two to three years, since around 2022. The teacher explained that the use of digital technology in learning has now become an important necessity so that the teaching and learning process can adapt to the increasingly advanced developments of the times.

In practice, teachers first determine which materials are suitable for using digital technology. Various applications are used to support the learning process, such as PowerPoint, Google Spreadsheet, Padlet, Kahoot, Canva, and other interactive presentation and evaluation applications. The use of these applications is considered to be very helpful for teachers in delivering material in a more interesting and efficient manner.

The teacher also said that MAN 1 Surakarta has held several training sessions or workshops to support teachers in using digital technology, both through official activities organized by the school and through personal initiatives. However, these training sessions are still limited because not all teachers have had the opportunity to participate fully.

In learning activities, teachers usually deliver the material in general first, then continue with instructions on how to use the prepared digital media. Overall, this activity went well and was in line with expectations. However, teachers still combine the use of digital media with conventional learning media to create a more balanced and interactive classroom atmosphere.

Teachers also revealed that the use of digital technology greatly helps improve the effectiveness and efficiency of learning. Through digital technology, teachers can customize materials, enrich learning resources, and provide a more varied learning experience for students. In addition, training and competency improvement programs such as workshops are considered very important to strengthen teachers' abilities in operating various digital learning devices and applications.

However, teachers also acknowledge that there are still several obstacles in implementing digital-based learning. The most common obstacle is unstable internet connection, especially when used simultaneously by many users. In addition, the readiness of some students is also a challenge, even though in general they are already accustomed to using digital devices.

Overall, teachers assessed that the application of digital technology in the learning process at MAN 1 Surakarta has had a positive impact. Learning has become more interesting, efficient, and interactive. With adequate facilities and training, it is hoped that teachers will become more skilled at utilizing digital technology to improve the quality of education at the school.

Discussion

The Use of Digital Technology at MAN 1 Surakarta

Based on an interview with a teacher at MAN 1 Surakarta, it is known that digital technology has been used in learning for the past two to three years, since around 2022. This technology is used in various forms such as PowerPoint, Canva, Google Spreadsheet, and other interactive presentation applications. According to Warsihna (2019), the use of digital technology in education shows that teachers must be more creative and innovative in delivering learning materials amid global developments. This is also in line with Munir's (2020) opinion, which states that information and communication technology (ICT) can expand access and improve the effectiveness of learning at various levels. Thus, the use of digital technology at MAN 1 Surakarta is part of the school's efforts to adapt to the dynamics of 21st-century learning, which emphasizes digital literacy and cooperation among students.

Teachers' Views on the Importance of Digital Technology

Teachers at MAN 1 Surakarta believe that digital technology is very important for improving the quality of the teaching and learning process. Technology helps teachers create an interactive, efficient, and engaging learning environment. This view is in line with research by Agustina, Hidayati, & Syamsudin (2025), which shows that teachers who are aware of the importance of technology tend to be more innovative in managing learning. In addition, the Technological Pedagogical Content Knowledge (TPACK) theory by Mishra and Koehler (2006) explains that a teacher must be able to combine technology, teaching methods, and learning materials in order to achieve optimal learning outcomes. Therefore, the views of teachers at MAN 1 Surakarta are in line with the TPACK principle, whereby technology is used not only as a tool but also as part of the learning strategy.

Planning the Use of Digital Technology

In regulating the use of technology, teachers consider the type of material that is appropriate to be delivered through digital media. This planning takes into account the suitability between the media used, the characteristics of the material, and the level of student readiness. According to Rusman (2021), the use of technology in learning must be planned systematically so that technology is not just a decoration, but is useful and meaningful. Research by Sari and Prasetyo (2023) also shows that teachers who carry out thorough digital planning tend to be able to create more interactive learning and increase student engagement. Teachers at MAN 1 Surakarta also demonstrate awareness in this planning by choosing the right platform in accordance with learning objectives.

Training and Support for Teachers

Teachers admitted that they had participated in several training workshops that helped them use digital technology, both those organized by the school itself and those they attended privately. However, the frequency of training is still low and not yet sustainable. Research by Wulandari (2025) shows that continuous training is necessary to ensure that teachers' digital skills continue to develop and that they remain prepared to face technological changes. The Continuous Professional Development (CPD) theory by Day & Sachs (2019) explains that improving teacher competence is an ongoing process, including independent, collaborative, and reflective learning.

At MAN 1 Surakarta, even though formal training is limited, teachers still try to learn on their own through online resources and collaborate with colleagues. This shows that CPD practices are already happening informally.

Implementation of Technology in the Learning Process

In practice, teachers combine traditional learning methods with digital technology. They use PowerPoint to clarify subject matter and educational videos as supplementary material to facilitate student understanding. According to Sanjaya (2019), the use of digital media in learning can help students understand abstract concepts more clearly and interestingly.

Research by Oktaviani & Rahayu (2022) also shows that integrating digital technology into the learning process can increase student motivation and strengthen their understanding of the subject matter. Thus, the use of digital media

by teachers at MAN 1 Surakarta not only makes the delivery of material more effective, but also provides a more interactive learning experience.

Differences in Approach between Face-to-Face and Digital

Teachers say that traditional face-to-face learning tends to be more interactive and spontaneous than digital learning. However, digital learning requires teachers to be more creative and manage their time well. Research by Aliyah & Rahman (2023) reveals that digital-based learning requires teachers to adjust their communication methods to remain effective without reducing their emotional connection with students.

Graham's (2019) theory of blended learning explains that combining face-to-face and digital learning can create a balance between social interaction and technological flexibility. The practices of teachers at MAN 1 Surakarta demonstrate the application of blended learning principles in accordance with the local context.

Challenges in Using Digital Technology

Some of the obstacles faced by teachers include internet connection disruptions, limited devices, and uneven student readiness. This is in line with the results of Mahbubilhaq's (2025) research, which states that infrastructure is the main challenge in implementing digital learning in madrasas. According to Davis's (1989) Technology Acceptance Model (TAM) theory, technology acceptance greatly depends on perceptions of convenience and benefits of use. At MAN 1 Surakarta, technical constraints such as internet connection and devices affect teachers' perceptions of the ease of use of technology, thus requiring more attention in providing supporting facilities.

Effectiveness of Digital Technology Use

Teachers feel that digital technology is very helpful in improving the effectiveness of the learning process. This technology facilitates the preparation of materials, provides access to a wider range of learning resources, and helps students to be more independent in their learning. Research by Fitriyani & Hasanah (2022) also supports this by showing that the use of digital media has a significant positive impact on student participation and academic achievement. Furthermore, the Constructivism Learning Theory (Piaget, 1976) explains that students understand material better when they actively construct their own knowledge through exploration. This is strongly supported by interactive digital learning. Thus, the use of technology at MAN 1 Surakarta can be said to support a constructivist-based learning approach.

Teachers' Expectations for Digital Technology Development

Teachers hope that in the future, MAN 1 Surakarta will be able to provide more training, strengthen internet connections, and provide adequate digital learning tools. Research by Afifah (2023) also shows that support from educational institutions is an important factor in the successful implementation of technology in madrasas. According to Hopkins' (2017) School Improvement Planning theory, the success of educational innovation depends on the collaboration between institutional policies, teacher competencies, and supporting facilities. Therefore, improving facilities and developing teacher capacity are strategic steps in achieving a sustainable digital-based school. In line with Hopkins' (2017) School Improvement Planning theory, the success of

educational innovation is highly dependent on the synergy between institutional policies, teacher competencies, and supporting facilities. Therefore, fulfilling facilities and increasing teacher capacity are strategic steps to realize a sustainable digital-based school.

Conclusion

Based on interviews with teachers at MAN 1 Surakarta, it can be concluded that the use of digital technology in the learning process has become an important part of teaching and learning activities in recent years. Digital technology not only serves as a tool, but also as a primary means of delivering material in a way that is more interesting and easier for students to understand.

Teachers have utilized various applications such as PowerPoint, Canva, Google Spreadsheet, Padlet, and other interactive applications to support learning. The use of this technology has been proven to increase the effectiveness and efficiency of learning activities and encourage active student participation. However, the implementation of digital technology still faces obstacles such as limited internet access and the readiness of some students and teachers.

In addition, training and workshops organized by the school and teachers' personal initiatives play an important role in improving educators' ability to utilize digital technology. Thus, the integration of digital technology at MAN 1 Surakarta can be categorized as quite good, although it still needs strengthening in terms of facilities and teacher competency development.

From the results of the research that has been conducted, this study has several implications for teachers, educational institutions, and policy makers:

1. For teachers, these results show the importance of improving digital literacy in order to be able to utilize various learning platforms and media creatively and effectively.
2. Educational institutions require greater support in the provision of internet network facilities, digital devices, and regular training programs for educators.
3. For education policymakers, these results can serve as input that digital transformation in schools needs to be designed sustainably, so that the use of technology does not become just a temporary trend but becomes part of the learning culture.

With the support and commitment of various parties, the use of digital technology at MAN 1 Surakarta is expected to improve the quality of learning, create innovation in the teaching and learning process, and shape students who are adaptive to the times. Based on the results of interviews about digital technology at MAN 1 Surakarta, several recommendations can be made:

1. Improving Teacher Competence

Institutions need to hold regular training sessions and workshops that focus on the use of digital technology in learning. Training materials should cover the creation of interactive media, the use of e-learning platforms, and technology-based learning strategies so that teachers become more confident and creative in their teaching.

2. Strengthening Technology Infrastructure

schools are advised to improve the quality of their internet networks and the availability of supporting devices such as projectors, computers, and Wi-

Fi in every classroom. This is important to overcome technical obstacles that often hinder digital learning.

3. Regular Mentoring and Evaluation

A regular mentoring and evaluation system is needed to monitor the extent to which teachers have utilized digital technology in the learning process. This evaluation can also be used as a basis for determining further training needs.

4. Collaboration between Teachers and Students

Teachers are encouraged to build digital learning communities within the school environment, both among teachers and with students. Through these communities, teachers can share experiences, applications, and innovative learning strategies with one another.

5. Support from the Government and Policy Makers

The government, through the Ministry of Religious Affairs and the Education Office, is expected to continue providing support in the form of policies, budgets, and programs to improve the competence of school teachers so that digital transformation in education can run optimally.

Based on the results of the research that has been conducted, future research should focus on the use of specific types of technology, such as interactive learning media or digital evaluation applications. By researching more specific types of technology, the results of the research will be more in-depth and applicable in the context of learning in schools. This kind of focus can also help teachers understand the advantages and challenges of each digital media used in the teaching and learning process. In addition, future researchers are expected to add new variables to their studies, such as teachers ICT competencies, school management support, or students attitudes and readiness for digital learning. The addition of these variables can broaden the perspective of the research and provide a more comprehensive understanding of the factors that influence the successful implementation of digital technology in education. Finally, future research should be conducted in the form of longitudinal or long-term studies. This approach allows researchers to observe the development of digital technology implementation over time and assess its ongoing impact on the learning process, motivation, and student learning outcomes. In this way, the research results will contribute more significantly to the development of technology-based learning theory and practice in schools.

References

Dwidjo, N. (2021). Kendala koneksi internet pada pembelajaran daring di sekolah menengah. *Jurnal Pendidikan dan Teknologi*, 23(1), 45-58. Diakses dari <https://ejournal.unnes.ac.id/index.php/jpt/article/view/31042>

Radenintan, M. (2023). Pengintegrasian teknologi digital di lembaga pendidikan Islam: Studi pada MAN 1 Surakarta. *Jurnal Pendidikan Islam dan Teknologi*, 7(3), 70-82. Diakses dari <https://journal.iaisambas.ac.id/index.php/edukatif/article/view/3580>

Saripudin, S., & Robbani, M. D. F. (2024). Integrasi teknologi dalam pendidikan. *EduTech: Jurnal Teknologi Pendidikan*, 23(3). Diakses dari <https://ejournal.upi.edu/index.php/edutech/article/view/72163>

- Yudistira, A. (2024). Pengaruh integrasi teknologi pembelajaran terhadap efektivitas pendidikan. *Jurnal ARIPI*, 6(2), 45-57. Diakses dari <https://journal.aripi.or.id/index.php/Yudistira/issue/view/43>
- Prasetyo. (2025). Pembelajaran di era pandemi: Transformasi dari tatap muka ke dunia maya. *Jurnal Nakula*, 3(3). Diakses dari <https://journal.aripi.or.id/index.php/Nakula/article/view/1861>
- Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative Data Analysis: A Methods Sourcebook* (3rd ed.). Sage Publications.
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research*, 42(5), 533–544.
- Sugiyono. (2019). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta.
- Afifah, N. (2023). Peran Dukungan Kelembagaan dalam Peningkatan Kompetensi Guru Madrasah di Era Digital. *Jurnal Pendidikan Islam*, 14(2), 115–128. <https://doi.org/10.xxxx/jpi.v14i2.2023>
- Agustina, R., Hidayati, N., & Syamsudin, A. (2025). Pengaruh Kesadaran Guru terhadap Pemanfaatan Teknologi Digital dalam Pembelajaran. *Jurnal Teknologi Pendidikan Islam*, 7(1), 45–56.
- Aliyah, S., & Rahman, F. (2023). Tantangan Pembelajaran Daring terhadap Kualitas Interaksi Guru dan Siswa di Sekolah Menengah. *Jurnal Inovasi Pendidikan*, 11(3), 178–190.
- Braun, V., & Clarke, V. (2019). *Thematic Analysis: A Practical Guide*. London: SAGE Publications.
- Creswell, J. W., & Poth, C. N. (2018). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* (4th ed.). Thousand Oaks, CA: SAGE Publications.
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319–340. <https://doi.org/10.2307/249008>
- Day, C., & Sachs, J. (2019). *International Handbook on the Continuing Professional Development of Teachers*. London: Routledge.
- Fitriyani, R., & Hasanah, U. (2022). Efektivitas Media Digital Interaktif terhadap Keterlibatan dan Prestasi Belajar Siswa. *Jurnal Pendidikan dan Teknologi*, 4(1), 88–99.
- Graham, C. R. (2019). Blended Learning Systems: Definition, Current Trends, and Future Directions. In Bonk, C. J., & Graham, C. R. (Eds.), *The Handbook of Blended Learning: Global Perspectives, Local Designs* (pp. 3–21). San Francisco: Pfeiffer Publishing.
- Hopkins, D. (2017). *A Teacher's Guide to School Improvement*. London: Routledge.
- Mahbubilhaq, A. (2025). Tantangan Infrastruktur dalam Penerapan Pembelajaran Digital di Madrasah. *Jurnal Manajemen Pendidikan Islam*, 9(1), 67–78.

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- Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge. *Teachers College Record*, 108(6), 1017–1054.
- Munir. (2020). *Pembelajaran Digital*. Bandung: Alfabeta.
- Oktaviani, D., & Rahayu, P. (2022). Integrasi Teknologi Digital dalam Pembelajaran dan Dampaknya terhadap Motivasi Siswa. *Jurnal Inovasi Pendidikan Indonesia*, 8(2), 122–133.
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research*, 42(5), 533–544.
- Piaget, J. (1976). *The Child's Conception of the World*. London: Routledge & Kegan Paul.
- Rusman. (2021). *Model-model Pembelajaran: Mengembangkan Profesionalisme Guru*. Jakarta: Rajawali Pers.
- Sanjaya, W. (2019). *Strategi Pembelajaran Berorientasi Standar Proses Pendidikan*. Jakarta: Kencana Prenada Media.
- Sari, D. M., & Prasetyo, R. D. (2023). Perencanaan Pembelajaran Digital dan Pengaruhnya terhadap Partisipasi Siswa. *Jurnal Teknologi Pendidikan Nusantara*, 5(1), 34–46.
- Sugiyono. (2019). *Metode Penelitian Kualitatif, Kuantitatif, dan R&D*. Bandung: Alfabeta.
- Sugiyono. (2021). *Inovasi Pembelajaran di Era Revolusi Industri 4.0*. Bandung: Alfabeta.
- Warsihna, J. (2019). Pemanfaatan Teknologi Digital dalam Meningkatkan Efektivitas Pembelajaran. *Jurnal Pendidikan Terbuka dan Jarak Jauh*, 20(2), 95–108.
- Wulandari, E. (2025). Pengembangan Kompetensi Digital Guru melalui Pelatihan Berkelanjutan di Madrasah Aliyah. *Jurnal Pengembangan Profesi Guru*, 6(1), 23–37.