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Optimizing Learning Performance through Digital Media Integration, Teacher Literacy, and School Leadership

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ABSTRACT: This article examines the optimization of learning performance through the integration of digital media, teacher digital literacy, and school leadership at the secondary education level. This study uses a qualitative approach involving two schools (High School and Madrasah Aliyah) through interview, observation, and documentation techniques. The results of the study show that the integration of digital media has been carried out systematically and adaptively through the use of PowerPoint, YouTube, interactive applications, and online learning platforms such as Google Classroom and Google Forms. Teachers' digital literacy is in the good category and plays a role as a foundation in optimizing the use of technology for interactive, contextual, and student-centered learning. The leadership of the principal functions as a leverage factor through strategic policies, the provision of infrastructure, and continuous academic supervision. The synergy of these three aspects has been proven to be able to optimize learning performance which is characterized by increasing teacher creativity, the effectiveness of the learning process, and the active participation of students. However, technical constraints and network limitations are still a challenge in the optimization process. This study confirms that optimizing digital-based learning performance requires a systemic approach that integrates teacher competence, leadership support, and sustainable use of technology.
KEYWORDS: *digital media integration, teacher digital literacy, school leadership, learning performance optimization, secondary education*

I. INTRODUCTION

Digital transformation has brought significant changes in various sectors of life, including education. The integration of digital technology in learning is no longer optional, but rather a strategic need to improve the quality of education in the 21st century era. The use of digital media allows the learning process to be more interactive, flexible, and contextual, so that it is able to respond to the demands of global competencies. In this context, teachers are required not only to be able to use technology, but also to integrate it effectively in pedagogical practices to improve learning performance. A number of studies show that teachers' digital literacy is a key factor in the success of technology integration in learning. Digital literacy includes not only technical skills in operating devices, but also pedagogical skills in selecting, managing, and utilizing digital media appropriately. Research shows that teachers' digital literacy has a significant impact on strengthening educational human resources, especially when supported by adaptive leadership and innovative organizational culture (Bakhri et al., 2025). This is strengthened by the findings that digital literacy contributes to the professionalism of teachers in carrying out learning tasks (Dewi & Murniati, 2026).

On the other hand, the leadership of school principals plays an important role in encouraging digital transformation in the educational environment. The principal not only functions as an administrator, but also as a learning leader who is able to create visions, policies, and environments that support the integration of technology. The transformation of technology-based leadership is an important strategy in increasing the effectiveness of administration and learning (Rosmini et al., 2024). In addition, the digital leadership of school principals has a direct influence on the level of technology integration by teachers in schools (Kasim & Surya, 2025).

The integration of digital media in learning has been proven to be able to improve the quality of the teaching and learning process. The use of various digital platforms such as Learning Management Systems, interactive applications, and video-based media can increase student involvement, enrich learning resources, and facilitate learning evaluation. Systematic integration of technology is able to improve digital competence and learning effectiveness (Hermansah et al., 2025). However, the implementation of educational technology is inseparable from various challenges, such as limited infrastructure, digital competency gaps, and resistance to change (Nurhidayati & Thaufani, 2025; Hulwana, 2024).

Although various studies have examined digital literacy, leadership, and technology integration in education, most studies are still partial by focusing on one specific variable or using a quantitative approach that emphasizes the relationships between variables statistically. Previous research tends to not reveal in depth how the interaction between teachers' digital literacy, principals' leadership, and digital media integration practices takes place in the real context of learning, especially at the secondary education level in the regions. In addition, studies that place the integration of digital media not only as an aid, but as an integral part of pedagogical practices that have a direct impact on teachers' learning performance are still relatively limited.

Based on these gaps, this research not only focuses on improving learning performance, but further on how that performance can be optimized through the synergy between digital media integration, teacher digital literacy, and school leadership. Optimization in this context is interpreted as a systematic process in maximizing the potential of technological resources, teacher competence, and organizational support to produce more effective, adaptive, and sustainable learning. Thus, this study presents an integrative approach that not only explains the relationships between variables, but also uncovers the mechanisms of how the three work synergistically in the real context of secondary education.

II. THEORETICAL FRAMEWORK

2.1 Integration of Digital Media in Learning

The integration of digital media in learning is a process of systematically utilizing technology to support the achievement of more effective, interactive, and contextual learning goals. This integration is not only limited to the use of technological devices, but also includes how digital media is used in the planning, implementation, and evaluation of learning. In the context of modern education, digital media such as interactive presentations, learning videos, simulations, and e-learning platforms allow teachers to create a more varied and student-centered learning experience. Theoretically, digital media integration is in line with the concept of digital pedagogy and technology integration which emphasizes the importance of alignment between technology, learning strategies, and educational goals. The use of digital technology in learning has been proven to increase student engagement, expand access to learning resources, and encourage more flexible learning (Koehler & Mishra, 2009; Trust, 2018). In a practical context, Sitorus (2025) emphasized that the use of digital technology in education management contributes to improving the quality of learning, while Hermansah et al. (2025) show that the integration of technology systematically can improve digital competence and learning effectiveness.

Digital media integration is also related to the ability of teachers to create innovation-based learning that is adaptive to technological developments. This includes the ability to choose the right media, manage digital interactions, and evaluate technology-based learning. Thus, the integration of digital media not only serves as an aid, but as a strategic element in learning transformation. Digital media integration is a complex and strategic pedagogical process that connects technology with learning practices, thus playing an important role in improving the quality, interactivity, and effectiveness of learning in the digital era.

2.2 Digital Literacy for Teachers

Teachers' digital literacy is the ability to access, understand, evaluate, and utilize digital technology effectively in learning. This literacy not only includes technical skills in using digital devices, but also includes cognitive and pedagogical skills in integrating technology into the learning process in a meaningful way. In the context of 21st century education, digital literacy is an essential competency that teachers must have to answer the demands of technology-based learning. Conceptually, teachers' digital literacy can be understood through the framework of Technological Pedagogical Content Knowledge (TPACK) which emphasizes the integration between technological knowledge, pedagogy, and content (Koehler & Mishra, 2009). Research shows that teachers' digital literacy has a significant impact on improving the quality of learning and teacher professionalism (Bakhri et al., 2025; Dewi & Murniati, 2026). In addition, digital literacy also plays a role in supporting the implementation of the 21st century curriculum that emphasizes critical thinking, collaboration, communication, and creativity skills (Haikal et al., 2026).

Teachers' digital literacy is also related to the ability to adapt to changing technological developments. Teachers who have high digital literacy tend to be more innovative in designing learning, more effective in utilizing digital media, and able to create a dynamic learning environment. Therefore, strengthening digital literacy is an important part of teacher professional development. Teachers' digital literacy is the main foundation in the integration of learning technology that not only reflects technical capabilities, but also pedagogical and adaptive capabilities in creating innovative and relevant learning.

2.3 School Leadership in the Digital Age

School leadership has a strategic role in supporting the implementation of technology in learning. Principals not only function as administrators, but also as instructional leaders who are able to create visions, policies, and environments that support digital transformation in schools. In the digital era, the concept of

digital leadership has emerged which emphasizes the ability of leaders to direct the use of technology to improve the quality of education. Research shows that the digital leadership of school principals has a significant effect on the success of technology integration by teachers (Kasim & Surya, 2025). Technology-based leadership transformation is also an important strategy in increasing the effectiveness of learning and education management (Rosmini et al., 2024). In addition, adaptive and visionary leadership is able to encourage the improvement of teachers' digital literacy through policies, training, and the provision of technological infrastructure (Hulwana, 2024; Dexter, 2011).

School leadership also plays a role in building an organizational culture that supports innovation and the use of technology. Effective principals are able to create a collaborative environment, encourage teachers' professional development, and ensure the sustainability of digital programs in schools. Thus, school leadership is a key factor in the success of digital transformation of education. School leadership in the digital era is a determining factor that serves as the main driver in creating an educational ecosystem that supports technology integration and improving the quality of learning.

2.4 Instructional Performance

Teacher learning performance is the ability of teachers to plan, implement, and evaluate learning effectively to achieve educational goals. In the context of digital learning, teacher performance is not only measured from the delivery of material, but also from the ability to utilize technology to improve the quality of interaction, student involvement, and learning effectiveness. Research shows that teachers' digital competence has a significant influence on improving learning performance (Sari, 2025). In addition, digital literacy-based human resource management also contributes to increasing the effectiveness of teacher performance (Hidayad et al., 2025). Internationally, the use of technology in learning has been proven to improve the quality of teaching, enrich learning methods, and improve student learning outcomes (OECD, 2019).

Teachers' learning performance in the digital era also reflects their ability to adapt to changes and innovations in learning practices. Teachers who are able to integrate technology effectively will be more creative, responsive, and able to create meaningful learning for students. Teacher learning performance is the main indicator of the quality of education which is influenced by digital competence, pedagogical ability, and support for the school environment in integrating technology.

2.5 Theoretical Synthesis (Intervariable Relationships)

Based on the theoretical study above, the integration of digital media, teacher digital literacy, and school leadership have interrelated relationships and form a system that affects teacher learning performance. Teachers' digital literacy is the basis for the use of technology, while school leadership plays a supporting role in providing policies, facilities, and a conducive environment. Digital media integration is the main process that connects individual teacher competencies with organizational support. When teachers have good digital literacy and are supported by adaptive school leadership, then the integration of technology in learning can run optimally. This will ultimately have an impact on improving the quality of learning, both in terms of process and learning outcomes.

Thus, the relationship between the three variables is synergistic and mutually reinforcing in improving teacher learning performance. This integrative approach provides a more comprehensive understanding of how technology, teacher competence, and school leadership interact in the context of digital education. The synergy between teachers' digital literacy, school leadership, and digital media integration is a key factor in improving teacher learning performance in a sustainable and adaptive manner to educational technology developments.

III. METHODS

This study uses a qualitative approach with a case study design to explore in depth the phenomenon of digital media integration, teacher digital literacy, and school leadership in improving learning performance at the secondary education level. The qualitative approach was chosen because it is able to capture meaning, experience, and social dynamics that occur in the real context of learning (Creswell & Poth, 2018). Case studies are used to provide an in-depth contextual understanding of digital-based learning practices in a specific school setting (Yin, 2018).

This approach allows researchers to understand the interactions between various research variables holistically, including how teachers integrate digital media, how digital literacy develops, and how school leadership influences these practices. In addition, the qualitative approach also provides flexibility in digging into data in depth through various complementary data collection techniques (Merriam & Tisdell, 2016). Thus, the qualitative approach of the case study in this study focuses not only on the description of phenomena, but also on the interpretation of the meaning and relationships between variables in the context of digital education.

The research corpus consists of two secondary education institutions, namely one Senior High School (SMA) and one Madrasah Aliyah (MA). The selection of research locations was carried out purposively by considering the characteristics of schools that have applied digital media in learning. The research subjects include school principals and teachers who actively use technology in the learning process. The research data was collected through three main sources, namely in-depth interviews, classroom observations, and documentation. Interviews were conducted to explore the perceptions and experiences of informants, observations were used to see real learning practices, while documentation was used to complete data in the form of learning tools and school policies. The use of these various data sources aims to increase the depth and validity of the data (Creswell & Poth, 2018).

The informant selection technique uses purposive sampling, which is to select informants who are considered to have knowledge and experience that is relevant to the focus of the research (Patton, 2015). Thus, this research corpus is designed to provide a comprehensive overview of the practice of digital media integration in the real context of secondary education.

The interviews in this study used semi-structured techniques that allowed researchers to obtain in-depth data while being flexible in exploring informant answers. The interview guidelines are compiled based on the focus of the research, namely the integration of digital media, teacher digital literacy, and school leadership. This technique allows researchers to explore the experiences, perceptions, and practices carried out by teachers and principals in the context of digital learning (Kvale & Brinkmann, 2015).

The interview process is carried out directly with varying durations, recorded using digital devices, and then transcribed verbatim for analysis purposes. During the interview process, the researcher also conducted probing to deepen the information provided by the informant. This approach aims to obtain rich and in-depth data and be able to describe the reality that occurs in the field. In addition, to increase the credibility of the data, a member checking process is carried out, which is confirming the results of interviews with informants to ensure the suitability between the data obtained and the intended conveyance (Lincoln & Guba, 1985). The data analysis in this study uses an interactive analysis model developed by Miles, Huberman, and Saldaña (2014), which includes three main stages, namely data reduction, data presentation, and conclusion drawn. Data reduction is carried out by filtering and grouping data based on themes relevant to the focus of the research. Data presentation was carried out in the form of descriptive narratives and thematic categorization, while conclusions were drawn through the process of interpretation of patterns and relationships between variables. Data analysis was also carried out with a thematic analysis approach to identify key patterns in the data related to digital media integration, teacher digital literacy, and school leadership (Braun & Clarke, 2006).

This approach allows researchers to systematically organize data and generate meaningful findings. To ensure the validity of the data, this study uses the triangulation technique of sources and methods, which is comparing data from interviews, observations, and documentation. In addition, trail audits and peer debriefing are also carried out to increase the credibility and dependability of the research (Lincoln & Guba, 1985). This research has several limitations that need to be considered. First, the number of research locations limited to two schools causes the results of this study to be contextual and cannot be generalized widely. However, this limitation is a characteristic of qualitative research that emphasizes more on depth of analysis than generalization (Creswell & Poth, 2018). Second, this research relies heavily on the perception and experience of informants, so the potential for subjectivity is unavoidable. To minimize this, researchers have used triangulation and data validation techniques. Third, limited time and access to data cause that not all aspects of technology integration can be studied comprehensively. Despite its limitations, this study still makes an important contribution to understanding the practice of integrating digital media in learning as well as the relationship between digital literacy, school leadership, and teacher learning performance in the context of secondary education.

IV. RESULTS AND DISCUSSION

4.1 Integration of Digital Media in Learning Practices

The results of the study show that teachers in high school and MA have integrated digital media in the learning process in an adaptive and contextual manner. This integration can be seen in the use of various platforms such as PowerPoint, YouTube-based learning videos, Google Classroom, Google Forms, as well as interactive applications such as Kahoot and Canva. The use of digital media not only serves as a visual aid, but has become part of a learning strategy designed to increase student engagement.

Empirically, the results of the observation show that teachers utilize digital media in three main stages of learning, namely planning (preparation of digital-based materials), implementation (use of interactive media), and evaluation (use of digital platforms for assessment). This shows that the integration of digital media has reached an integrative level, not just a technological substitution. These findings are in line with the concept *of technology integration* which states that the effective use of technology must be integrated in the entire learning process (Koehler & Mishra, 2009).

Table 1. Forms of Digital Media Integration in Learning

Learning Aspects	Forms of Digital Media Integration
Planning	PowerPoint, e-book, learning videos
Implementation	YouTube, Kahoot, Canva, digital discussions
Evaluation	Google Forms, Google Classroom

The results of the interviews also reinforce these findings. One of the teachers stated:

"We use PowerPoint and YouTube videos to explain the material for students to understand more easily, and for evaluations we usually use Google Forms."

However, digital media integration still faces obstacles, especially related to the limitations of the internet network and the variation in teachers' ability to use more complex applications. This shows that even though integration has been underway, capacity and infrastructure are still needed. These findings are in line with OECD research (2019) which emphasizes that the effectiveness of technology integration is highly dependent on infrastructure readiness and user competence.

4.2 Teachers' Digital Literacy in Learning

The results of the study show that teachers' digital literacy is in the good category, which is characterized by the ability to access, understand, and utilize digital technology in learning. Teachers are able to use various digital platforms functionally, such as operating presentation software, utilizing digital learning resources, and using technology-based evaluation platforms.

In more depth, teachers' digital literacy is not only seen in the technical aspect, but also in the pedagogical ability to choose media that suits the needs of students. This shows the connection with the TPACK concept, where teachers are able to integrate technological knowledge, pedagogy, and content in learning (Koehler & Mishra, 2009). This finding is also supported by research by Bakhri et al. (2025) which states that teachers' digital literacy plays an important role in improving the quality of learning**.**

Table 2. Teacher Digital Literacy Indicators

Learning Aspects	Forms of Digital Media Integration
Access Technology	Teachers are able to use digital devices
Utilization	Using digital media in learning
Evaluation	Using digital platforms for assessment
Adaptation	Tailoring media to students' needs

The following interview excerpts reinforce the findings:

"We're used to using technology, such as searching for materials on the internet and using learning apps to help students understand lessons."

However, there are variations in the level of digital literacy between teachers, especially in the use of more complex applications. This shows that digital literacy still needs to be improved through continuous training and professional development. These findings are in line with Trust (2018) which emphasizes the importance of developing teachers' digital competencies in facing 21st century learning.

4.3 School Leadership in supporting Digital Integration

The leadership of school principals has proven to have a significant role in supporting the integration of digital media in learning. School principals play a role in formulating policies, providing facilities such as WiFi and LCD, and supervising teachers' learning practices. This shows that school leadership is not only administrative, but also oriented towards improving the quality of learning.

The results of the interviews showed that the principal actively encouraged teachers to use technology in learning:

"We always encourage teachers to use digital media in learning and provide the facilities needed."

This finding is in line with the concept *of digital leadership* which emphasizes the role of leaders in encouraging technology-based innovation in schools (Dexter, 2011). In addition, research by Kasim and Surya (2025) also shows that digital leadership has a direct influence on the level of technology integration by teachers.

However, the effectiveness of leadership is still influenced by limited resources and teacher readiness. Therefore, more adaptive and sustainable leadership is needed to ensure the success of digital transformation in schools.

4.4 Optimizing Learning Performance through Digital Media Integration

The results of the study show that the integration of digital media has a positive impact on teacher learning performance. Teachers become more creative in delivering material, more effective in managing learning, and able to increase student involvement in the learning process.

Specifically, the performance improvements are seen in:

a. Creativity in the use of learning media
b. Effectiveness of material delivery
c. Increased student participation
d. Efficiency in learning evaluation

These findings are supported by the teacher's statement:

"By using digital media, students are more active and easier to understand the material than conventional methods."

These results are in line with OECD research (2019) which shows that the use of technology in learning can improve the quality of teaching and student learning outcomes. In addition, Sari (2025) also found that digital literacy contributes to improving teacher performance. However, this positive impact is still faced with challenges such as limited internet networks and teachers' technical competence. Therefore, continuous efforts are needed to improve the quality of technology integration in learning.

Based on the results of the study, it can be concluded that there is an interrelated relationship between teachers' digital literacy, school leadership, and digital media integration in improving learning performance. Teachers' digital literacy is the basis for the use of technology, while school leadership plays a supporting role in creating a conducive environment.

The integration of digital media is the main process that connects the two factors in learning practice. When teachers' digital literacy is high and supported by effective school leadership, technology integration can run optimally and have an impact on improving learning performance. These findings reinforce the concept of *an integrative model of digital learning* that emphasizes the importance of synergy between individual competencies, organizational support, and the use of technology in improving the quality of learning (Trust, 2018).

The results of the study show that the integration of digital media not only has an impact on improving learning performance, but has led to more systematic teacher performance optimization. This optimization can be seen from the ability of teachers to maximize the function of digital media to improve the quality of planning, implementation, and evaluation of learning.

Empirically, the optimization of learning performance is shown through: (1) increasing teachers' creativity in designing digital-based learning media, (2) the effectiveness of delivering more structured and interactive materials, (3) increasing students' active participation in the learning process, and (4) efficiency in the implementation of technology-based evaluations.

The optimization does not occur partially, but is the result of the interaction between adequate teachers' digital literacy and adaptive school leadership support. Teachers who have good digital literacy are able to make the most of technology, while school leadership provides an ecosystem that allows the practice to take place in a sustainable manner.

Thus, the integration of digital media serves as a key mechanism in the process of optimizing learning performance, which links the individual competencies of teachers with the structural support of the school organization. These findings show that learning performance optimization is the result of systemic synergy, not just the use of technology.

Based on the results and discussion, it can be summarized that the integration of digital media in learning has been running adaptively and has a positive impact on the learning process. Teachers have been able to utilize various digital platforms to increase the effectiveness and interactivity of learning, although there are still technical constraints and competency limitations. Teachers' digital literacy is a key factor in the success of technology integration. Teachers who have good digital literacy tend to be more innovative and able to create more interesting and relevant learning. However, there is still a variation in abilities between teachers which shows the need for sustainable capacity building.

School leadership plays a key supporting role in creating an environment conducive to technology integration. Policy support, facilities, and academic supervision are important elements in encouraging teachers to make optimal use of digital media. Thus, the three variables form an interrelated relationship and contribute to improving teacher learning performance. An integrative and systemic approach is the key to optimizing the use of technology in education. These findings show that learning performance not only improves, but undergoes an optimization process through systemic integration between technology, teacher competence, and school leadership.

V. CONCLUSION

Based on the formulation of the problem and the results of the research, it can be concluded as follows:

1. The integration of digital media in the learning process has been carried out adaptively through the use of various platforms such as PowerPoint, YouTube, Google Classroom, and Google Forms. This integration not only serves as an aid, but has become part of a pedagogical strategy that plays a role in optimizing interactivity, effectiveness, and student engagement in learning.
2. Teachers' literacy in learning is in the good category, which is shown by the ability to access, understand, and utilize technology pedagogically. However, literacy is still functional and uneven, so it is necessary to strengthen competencies on an ongoing basis to support the process of optimizing technology-based learning.
3. The leadership of school principals plays a significant role as a driving force in the process of optimizing learning performance through policies, provision of facilities, and academic supervision. Adaptive and visionary leadership is able to create an environment conducive to the integration of technology in learning.

Overall, the integration of digital media, teacher literacy, and school leadership are interrelated factors and contribute synergistically to optimizing learning performance. The optimization occurs through the interaction between teacher competence, technology utilization, and school structural support. Therefore, a systemic, comprehensive, and sustainable approach is needed in integrating technology, strengthening teacher capacity, and educational leadership to achieve optimal learning performance.

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