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Digital Technology-Based Learning Strategies in Junior High Schools: A Case Study at Muhammadiyah 3 Junior High School, Depok, Sleman

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Abstract
Digital education transformation often focuses solely on infrastructure without addressing managerial aspects and character values. This study aims to analyze digital technology-based learning strategies at SMP Muhammadiyah 3 Depok Sleman, a school that integrates the digital school concept with strengthening Islamic character. Using a qualitative case study design approach, data were collected through in-depth interviews, observations, and documentation of the principal, curriculum, and teachers. Data analysis was conducted with the help of ATLAS.ti 9 software to ensure objectivity and depth of theme categorization. The results show that the school's strategy rests on the integration of the TPACK (Technological Pedagogical Content Knowledge) framework packaged within the POAC (Planning, Organizing, Actuating, Controlling) management unique to Muhammadiyah. Key findings reveal that the success of digitalization lies not only in the availability of devices but also in the formation of a digital ecosystem that aligns with the school's religious identity. This study contributes to the digital school management model in faith-based educational institutions.

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1. INTRODUCTION

Digital technology innovation has become a key driver of educational transformation in the modern era. Education in the 21st century demands a transformation in the learning paradigm, oriented toward the use of digital technology. Ideally, the learning process should not only focus on knowledge transfer but also on developing critical, collaborative, creative, and communicative thinking skills through technological support (Azizah Siti Lathifah, 2024). The use of digital technology in learning not only facilitates access to information but also enriches teaching and learning methods (Nurhidayati, 2024). Synergy between teacher instructional readiness and the availability of adaptive technological tools is a key prerequisite for realizing effective digital learning strategies (Timotheou, S., 2023). Digital literacy management in the 21st century requires schools to be prepared to manage the flow of information and technology to ensure it is relevant to students' needs (Sunarti, Hidayati, & Hasanah, 2024).

Technology-based learning is an educational approach that utilizes technology as the main tool in the learning process (Nazwa Dzakirah Hakim)[1], Shavira Nur Annisa2, 2024). In Indonesia, the implementation of digital learning at the secondary school level still faces the challenge of dualism between the potential of digital technology and the reality of human resource competencies (Darmansah, 2023). The availability of digital resources is often not accompanied by adequate instructional strategies, resulting in low student

engagement and less than optimal information absorption during the learning process (Noormawanti, Setyawati, Sukma, & Badrudin, 2024). Although technology-based learning offers greater flexibility and accessibility, technical challenges and infrastructure needs need to be considered so that technology use runs smoothly and supports student learning success (Sarah, 2024).

However, the implementation of digital learning strategies is not evenly distributed across educational institutions. Previous research has primarily documented the use of digital technology and has been limited to the technical aspects of application use (Mailisa Firma Putri & Wirawati, 2022). The main obstacle arises from the unequal accessibility of devices and internet connectivity among students. Furthermore, educator competency is also a crucial issue, particularly related to limited digital literacy and the ability to manage and utilize learning platforms innovatively (Wahyudi & Jatun, 2022). This situation reflects the gap between the expectations of digital education policies and the reality of implementation on the ground. This reality presents a challenge for schools to adapt to the demands of 21st-century education, which demands creativity, collaboration, communication, and critical thinking (Nurhidayati, 2024).

Effective digital technology-based learning strategies require synergy between teacher pedagogical preparedness and the availability of technological infrastructure that adapts to student needs (Sangeeta & Tandon, 2021). Lagging in technology utilization can impact the low competitiveness of graduates in the future and hinder the educational transformation envisioned by the government. Yet, Junior High Schools (SMP), as a secondary level of basic education, play a crucial role in preparing students to adapt to the digital age (Resky Faradibah Suhab, 2025). Without a structured strategy, the use of digital technology in the classroom risks becoming a source of distraction that hinders the achievement of learning objectives (Kurniawan, 2022).

Based on the realities on the ground, it is necessary to identify digital technology-based learning strategies that can be effectively implemented in schools, particularly at the junior high school level. Training teachers in the use of digital technology is crucial (Aktif, 2025). Emerging issues relate not only to infrastructure readiness but also to teachers' ability to design and implement meaningful digital learning (Scherer, R., Howard, S. K., Tondeur, J., & Siddiq, 2021a). Furthermore, it is crucial to examine how school management support, organizational culture, and collaboration among stakeholders can strengthen the implementation of these strategies for sustainability.

In the context of education in the Sleman region, SMP Muhammadiyah 3 Depok has emerged as a secondary institution that is adaptive to digital transformation by utilizing various technology platforms in its pedagogical practices. However, this school's uniqueness lies in its efforts to integrate digital technology with Muhammadiyah values and the strengthening of Islamic character, as well as the school's strategy in balancing the speed of technology adoption with maintaining students' digital citizenship ethics (Hidayat, 2023a). This is highly relevant to research because the success of school digitalization is measured not only by the sophistication of the devices but also by the managerial and pedagogical strategies implemented to support the school's vision.

Theoretically, digital technology-based learning strategies are based on the TPACK (Technological Pedagogical and Content Knowledge) theory proposed by Mishra & Koehler (Oktaviana & Yudha, 2022), which emphasizes the importance of balancing material understanding, pedagogy, and technology in teaching practice. Furthermore, the Digital Constructivism theory emphasizes that students learn more effectively through hands-on experiences facilitated by interactive digital media (Azizah Siti Lathifah, 2024). Integrating these theories enables teachers to design learning that utilizes technology

pedagogically, not merely technically, enabling students to construct meaning in their learning independently and collaboratively. However, the use of digital technology in learning is not solely viewed from a pedagogical perspective; it also requires systematic management. From the perspective of the POAC (Planning, Organizing, Actuating, Controlling) management theory, digital learning strategies must be designed through careful planning, resource organization, targeted implementation, and ongoing control and evaluation to optimally achieve learning objectives (Terry, 2019).

The urgency of this research lies in the need to find digital learning strategies that best suit the characteristics of junior high school students and the real conditions in schools. Post-COVID-19 pandemic, digital transformation in education is no longer temporary but has become a permanent requirement for flexible and innovative learning (Zein, 2024). This research is crucial for providing empirical evidence on digital learning strategies, identifying implementation barriers, and formulating policy recommendations that can strengthen the capacity of schools and teachers to manage educational technology sustainably. This research highlights the need for a reference model for private schools based on religious organizations in navigating digital transformation without losing their institutional identity (Tondeur, J., Howard, S. K., & Yang, 2021b). Through this case study, it is hoped that a strategic pattern can be formulated that can be adopted by similar educational institutions to continuously improve the quality of digital learning.

This research offers novelty by positioning digital technology-based learning strategies not merely as innovative uses of learning media, but as a strategic process systematically managed through planning, implementation, monitoring, and evaluation of learning at the educational unit level. The development of learning strategies in secondary schools must consider pedagogical readiness and student developmental characteristics to ensure effective innovation (Martaningsih et al., 2022). This differs from previous research, which tends to emphasize the effectiveness of digital tools or platforms (Sarah, 2024).

Based on the background and urgency of the research, this study aims to map the comprehensive strategy implemented by SMP Muhammadiyah 3 Depok Sleman in managing digital technology-based learning. The main problem examined in this study is how digital learning strategies are designed and implemented through the integration of the TPACK framework into pedagogical practices and POAC management functions. Through this case study, it is hoped that a strategic pattern can be formulated that can be adopted by similar educational institutions to continuously improve the quality of digital learning.

2. RESEARCH METHODS

This research is a qualitative study using a case study approach to explore digital technology-based learning strategies. The research location is SMP Muhammadiyah 3, Depok, Sleman. The research location was purposive, considering the institution's reputation as a digitally-driven school capable of synergizing technology with Muhammadiyah values. The research participants consisted of the principal, the vice principal in charge of curriculum, and teachers. Data collection was conducted through semi-structured interviews, observation, and documentation (Mashuri, Sarib, Rasak, & Alhabsyi, 2022). The data analysis technique used is descriptive qualitative analysis. The data analysis technique in this study is based on the interactive analysis model developed by Miles and Huberman (Purnasari & Sadewo, 2021). The analysis steps carried out (Miles, M. B., & Huberman, 1994), namely data collection, data presentation, data reduction, and conclusion drawing. The data analysis process in this study utilized the Atlas. ti 9 software to design a concept map for formulating digital technology-based learning strategies at SMP Muhammadiyah 3, Depok. The data obtained was then reduced. Data reduction was

carried out by selecting, grouping, selecting, and summarizing data. After the data was reduced, it was ready to be presented. The final step was data verification, which was carried out by drawing conclusions based on the data obtained. To test the validity or credibility of the data, the researchers used data triangulation and member checking techniques to ensure the objectivity of the research results in accordance with the reality on the ground (Sugiyono, 2022).

3. RESULTS AND DISCUSSION

Research Results

This section presents the research results and discussion regarding digital technology-based learning strategies at SMP Muhammadiyah 3, Depok, Sleman. The research results were obtained through the analysis of interview data, observations, and documentation, analyzed using a descriptive qualitative approach with the help of the Atlas. ti 9 software. The presentation of the results focuses on mapping themes and subthemes that represent the digital learning strategies implemented systematically by the school.

The following is a cycle of digital technology-based learning strategies implemented at the research location.

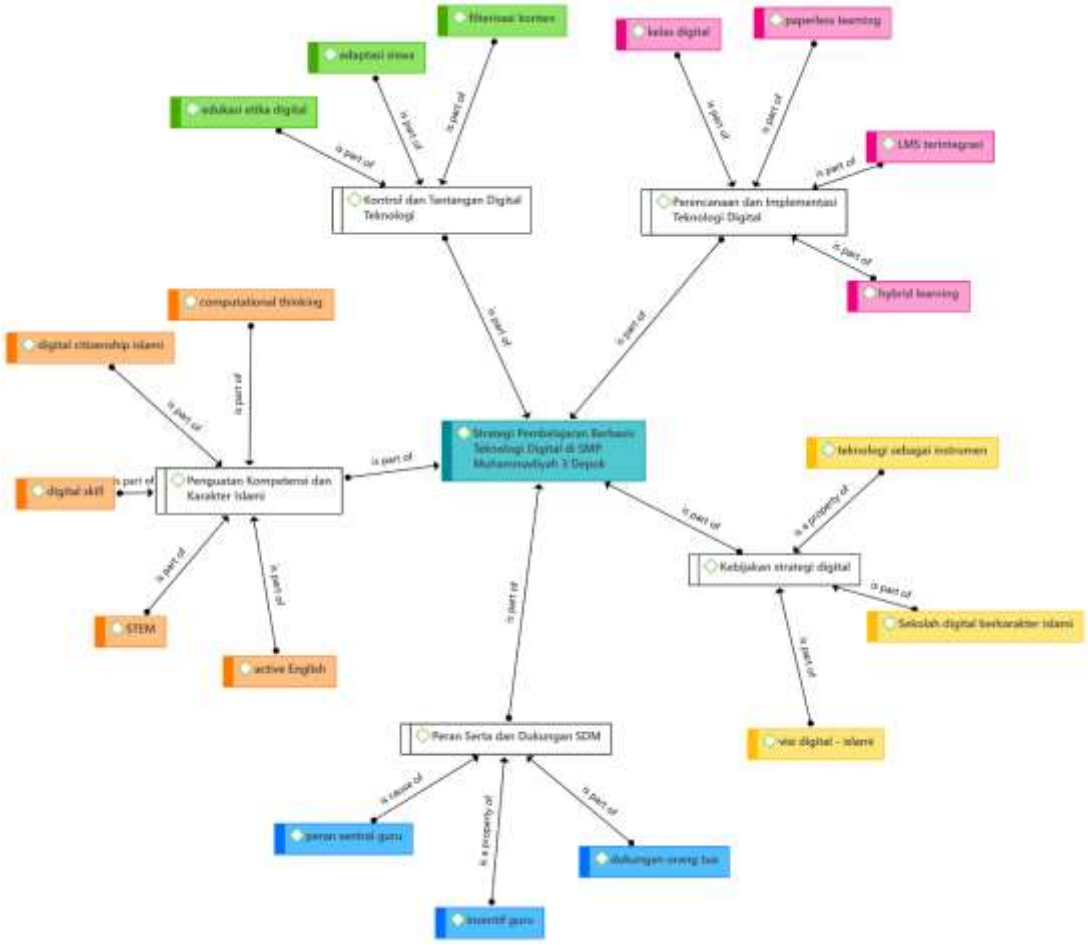

Figure 1. Digital Technology-Based Learning Strategy Cycle

Based on the results of coding and network mapping using Atlas. ti 9, Figure 1 shows that the central theme of this study is Digital Technology-Based Learning Strategy at SMP Muhammadiyah 3 Depok. This core theme is formed from five large, interrelated clusters, namely 1) digital strategy policy, 2) digital technology planning and implementation, 3)

strengthening Islamic competencies and character, 4) human resource participation and support, and 5) digital control and challenges.

The inter-cluster relationship shows that the digital learning strategy in this school is systemic, planned, and sustainable, in line with the POAC management approach and the learning technology integration theory (TPACK).

1. Digital Strategy Policy as the Main Foundation

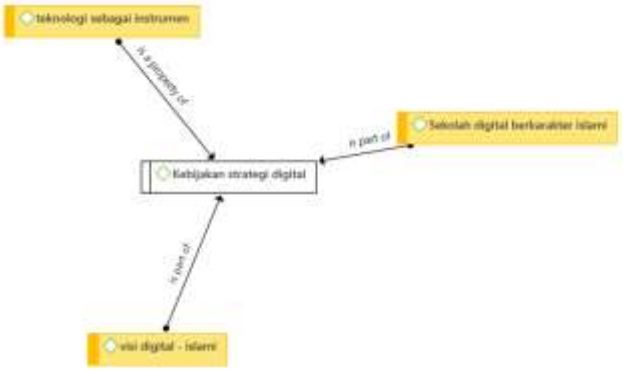

Figure 2. Digital Strategy Policy

The coding results indicate that the digital technology-based learning strategy at Muhammadiyah 3 Junior High School, Depok, Sleman, stems from an institutionally formulated digital strategy policy. This policy positions technology as a learning support tool guided by the school's Islamic vision and values. The principal emphasized that the direction of the digital policy is inseparable from the school's identity, as stated:

> *"We simplify Techland at Mugadeta Middle School; it is a digital school with character.*
> *"Islamic. So digital isn't just about IT, but also Islamic values."*(R1)

This statement emphasizes that digital policy is designed as a value-based policy, not just a technical policy.

Furthermore, the policy is formulated through a digital-Islamic vision that serves as the basis for the school's strategic decision-making. This vision positions technology as an educational instrument, not an end in itself. The principal explained that technology use must remain within the boundaries of education and character:

> *"Technology is a tool, not an end in itself. The goal remains education and character development for children."*(R1)

Thus, the digital strategy policy serves as a guiding framework that ensures all digital learning practices remain aligned with Islamic values. This aligns with the function *planning* in POAC theory and emphasizes that digital transformation must be based on institutional vision (Terry, 2019).

2. Digital Technology Planning and Implementation

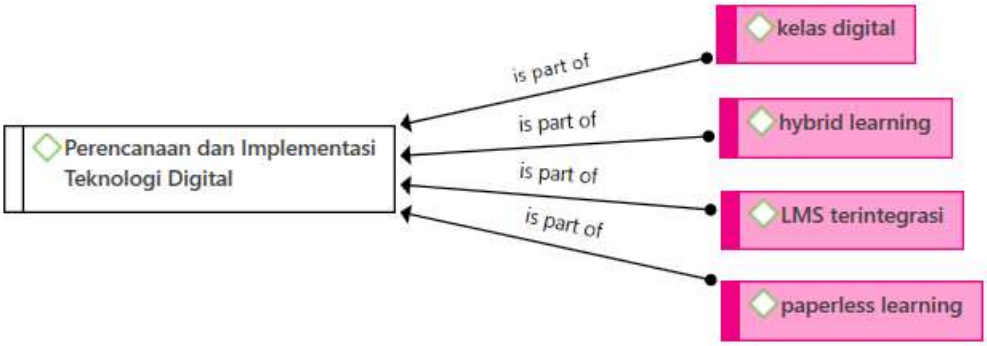

Figure 3. Digital Planning and Implementation

The Digital Technology Planning and Implementation Cluster in this diagram shows the relationship with the *Integrated LMS, digital classroom, paperless learning,* and *hybrid learning*. This relationship shows that the four subcodes are concrete forms of strategy implementation.

The Deputy Head of Curriculum emphasized that digital learning planning is carried out systematically from the beginning of the school year:

> *"The learning strategy planning process begins at the beginning of the school year. From teacher assignments to module preparation and teaching resources, everything is digitized in the system. As with most schools, the learning program is socialized to parents and students from the beginning of the year.* (R2)

Conceptually, these findings demonstrate the application of the TPACK framework, where teachers integrate aspects of content, pedagogy, and technology into a single digital classroom design that not only functions as a supporting tool, but also forms a learning ecosystem that facilitates digital constructivism through active, collaborative, and experience-based learning activities (Azizah, 2024).

3. Strengthening Islamic Competence and Character through Digital Learning

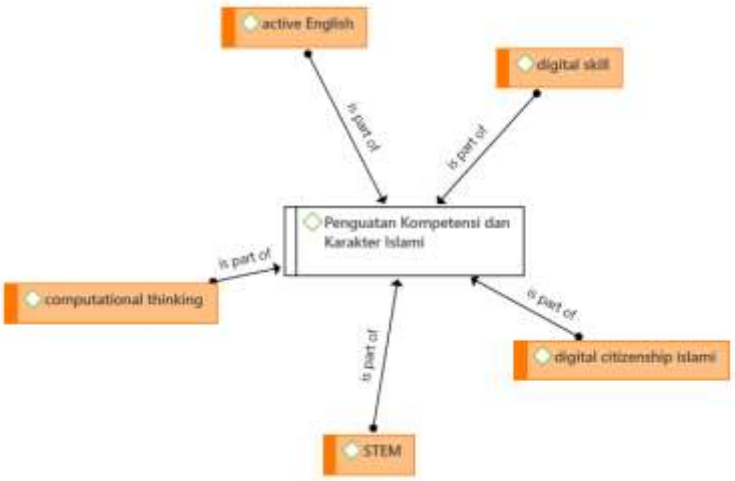

Figure 4. Strengthening Islamic Competence and Character

Atlas. ti mapping results show that strengthening student competencies is not only directed at cognitive aspects, but also character and Islamic digital literacy. Schools develop four core competencies: *digital skill*, *computational thinking*, STEM, and*active English*, designed to support 21st century skills.

The Deputy Head of Curriculum stated:

"The school's flagship program related to digital learning is video-based learning. Learning Management System (LMS) where the material can be accessed 27/4, monitored by students,

Teachers and parents. Daily learning uses laptops/80% paperless, with 4 specific competency areas: Digital skills, Computational Thinking, STEM, and Active Learning.

English."(R2)

This quote shows that competency strengthening is designed systematically in the curriculum, not incidental. The principal also emphasized that the use of technology needs to be accompanied by the instillation of values of responsibility and honesty as an integral part of strengthening *digital citizenship*.:

"The first value is responsibility. Then, if we look at the next value, it's about sincerity, because facing the real world and the virtual world requires sincerity and honesty. Those are the values that are implemented in our school."(R1)

The principal also emphasized the need to strengthen competencies:

"In our opinion, digitalization in schools is not an end in itself. It's an instrument for achieving learning goals and the school's vision." (R1)

This finding aligns with research by Hidayat (2023), which emphasized that the implementation of digital technology in Muhammadiyah schools must be accompanied by the internalization of Islamic values so that the learning process is not solely oriented towards technical aspects. Therefore, the digital learning strategy at SMP Muhammadiyah 3, Depok, Sleman can be understood as a strategic step in building and strengthening students' Islamic character in the digital space.

4. The Central Role of Teachers and Human Resources Support in the Success of Digital Strategies.

Figure 5. Role and Support of HR

The Atlas. ti concept map above shows that the role and support of human resources at SMP Muhammadiyah 3, Depok, Sleman is formed by three main components: the central role of teachers, parental support, and teacher incentives. The central role of teachers is positioned as a causal factor that drives the formation of overall human resources support, because teachers are the main actors in the planning and implementation of digital learning in the classroom. The principal emphasized the position of teachers as the main actors in digital transformation:

"Teachers are everything. So, in mentoring children, teachers are a key factor.

determinant. One, so the teacher must be finished with the content problem. For example, not

"Mistakes in concept, not mistakes in knowledge and insight. That is absolute." (R1)

Meanwhile, parental support and teacher incentives are understood as part and characteristics that strengthen the sustainability of technology-based learning strategies

Digital. Muhammadiyah 3 Junior High School, Depok, Sleman, provides various human resource support, from training and incentives to providing technology facilities. The principal stated that parental support is crucial to maintaining the sustainability of digital learning at home:

"We involve parents, because children also learn using digital devices at home, so there must be joint supervision and guidance."(R1)

This support reflects the function of *organizing* and *actuating* in the POAC theory, SMP Muhammadiyah 3, Depok, Sleman, not only designs policies but also ensures effective strategy implementation by strengthening teacher capacity. This aligns with Scherer, R., Howard, S. K., Tondeur, J., & Siddiq (2021), who emphasized that teacher readiness is a key determinant of successful digital learning.

5. Control and Challenges in Digital Learning

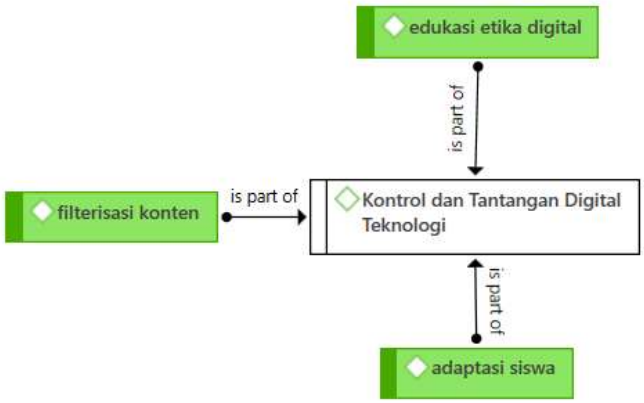

Figure 6. Digital Control and Challenges

Despite effective implementation of digital strategies, SMP Muhammadiyah 3 Depok Sleman still faces challenges, particularly in student adaptation and controlling technology use. The greatest challenge arises for seventh-grade students, who are still adapting to laptop-based learning.

This is as conveyed by the class VII teacher:

"For grade 7, it really requires special attention because of the adaptation period and

requires a lot of adjustments from the previous level. Basic skills (office and education)

"Digital ethics) needs to be strengthened. Understandably, in elementary school, some students have never used a laptop/computer, even though their devices are active. Digital at Muhammadiyah 3 Middle School in Depok is laptop-based, not mobile-based."(R3)

"The main challenge is student readiness, especially in the early stages of seventh grade. For upper grades, strengthening screen time and classroom management is crucial. While technology tends to be exciting, children must still be provided with hands-on activities."(R3)

This statement is in accordance with what was conveyed by the Deputy Head of Curriculum:

"The digital classroom we manage at Muhammadiyah 3 Middle School in Depok is laptop-based, based on the school's ability to filter content using a centralized Wi-Fi system. We can ensure website access restrictions, filtering for content related to ethnicity, religion, race, and intergroup relations (SARA), and pornography, for example. This means that cell phones are not used as primary devices; instead, their use is minimized except in special learning situations that require it."(R2)

As a form-controlling, Muhammadiyah 3 Middle School Depok Sleman implements content filtering, settings *screen time*, and strengthening digital ethics education. This approach demonstrates that digital learning strategies are inseparable from the ongoing control and evaluation functions emphasized in educational management theory. Schools balance open access to technology with controlling students' digital behavior through content filtering and strengthening digital ethics literacy, so that technology does not become a source of distraction (Kurniawan, 2022).

Discussion

The data coding results show that the digital technology-based learning strategy at SMP Muhammadiyah 3, Depok, Sleman is formed from several main themes that are interconnected and form a unified learning strategy. The relationships between themes are visualized in an Atlas. ti 9 network map depicting the link between school policies, digital learning planning and implementation, strengthening Islamic competencies and character, the role of human resources, and control and adaptation mechanisms to digital challenges.

1. Digital Strategy Policy as the Foundation of Transformation

The research results show that the digital technology-based learning strategy at SMP Muhammadiyah 3, Depok, Sleman begins with a value-based institutional policy. Digitalization is not positioned as an end in itself, but rather as an instrument to achieve the vision of a "Digital School with Islamic Character."

These findings reinforce the view that school digital transformation must be initiated by visionary leadership and strategic policies integrated with the institution's identity (Timotheou, S., 2023). The study confirms that a school's digital capacity is heavily influenced by policy direction and managerial commitment, not simply the availability of devices.

From an educational management perspective, this policy reflects the planning function within POAC, where strategic planning is the primary foundation for successful implementation (R. F. Suhab, 2025). Furthermore, this values-based approach aligns with the findings of Tondeur, J., Howard, S. K., & Yang (2021), who stated that sustainable technology integration must align with the school's culture and vision to avoid technocratic tendencies.

Thus, the digital strategy at SMP Muhammadiyah 3 Depok shows that effective digital transformation starts from the integration of institutional vision, strategic leadership, and the school's ideological values.

2. Planning and Implementation: Integration of TPACK in the Digital Ecosystem

The research results show that the implementation of digital learning is carried out through an integrated LMS, paperless learning, and hybrid learning, designed from the beginning of the school year.

These findings demonstrate concrete practices of integrating the TPACK framework, where teachers simultaneously combine content knowledge, pedagogy, and technology (Scherer, R., Howard, S. K., Tondeur, J., & Siddiq, 2021b). The study confirms that teachers' readiness to integrate these three aspects significantly influences the quality of digital learning.

Furthermore, LMS-based learning practices, which can be monitored by teachers and parents, demonstrate a transparent and collaborative form of digital learning management. This aligns with a study (Noormawanti, Setyawati, E., Sukma, H. S., 2024), which stated that technology-based management strategies must build a systemic, not a fragmented, learning ecosystem.

This approach also supports the theory of digital constructivism, where students become active participants in constructing knowledge through digital interactions (Azizah Siti Lathifah, 2024). Thus, technology functions not only as a medium but also as a learning space that enables collaboration, reflection, and exploration.

3. Strengthening Islamic Competence and Character: Value-Based Digitalization

The research results show that digital learning is integrated with strengthening four main competencies: digital skills, computational thinking, STEM, and active English.

This approach is relevant to the demands of 21st-century competencies, as emphasized in a study of post-pandemic digital education transformation (Zein, 2024). However, what sets it apart is the integration of the values of responsibility, honesty, and sincerity as part of digital citizenship.

This finding is in line with research (Hidayat, 2023), which states that technology integration in Muhammadiyah schools must be accompanied by the internalization of Islamic values to prevent moral disorientation in the digital space.

Furthermore, systematically managed digital literacy is a crucial factor in character building (Sunarti, T., Hidayati, D., & Hasanah, 2024). This means that the digital strategy at SMP Muhammadiyah 3 Depok is not solely focused on technical skills but also on developing Islamic digital ethics.

Thus, this model shows a synthesis between digital competence and moral formation, which is rarely found in previous research that emphasizes technical aspects.

4. The Central Role of Teachers and Human Resources Support

The research confirms that teachers are key players in the success of digital strategies. Teachers' pedagogical readiness and digital literacy are crucial factors.

This finding corroborates research (Scherer, R., Howard, S. K., Tondeur, J., & Siddiq, 2021b), which found that teacher readiness is a key predictor of success in both online and blended learning. Without teacher readiness, digital infrastructure has no significant impact on learning quality.

School support through training, incentives, and parent collaboration reflects the organizing and actuating functions of POAC. Timotheou et al. (2023) also emphasized

that school digital transformation is only successful when there is collective support from all stakeholders.

Parental involvement in controlling digital learning at home demonstrates the expansion of the educational ecosystem into the domestic sphere, a characteristic of post-pandemic digital schools.

5. Control and Challenges: The Controlling Function in Digital Transformation

This study found that the main challenges lie in the adaptation of seventh-grade students and controlling screen time and digital distractions.

This finding is in line with Kurniawan's (2022) study, which states that without strong digital classroom management, technology has the potential to become a learning distraction.

Muhammadiyah 3 Junior High School, Depok, implemented content filtering, restricted website access, and strengthened digital ethics. These practices reflect the POAC's controlling function and demonstrate that an effective digital strategy must be balanced with regulatory mechanisms.

This is also supported by Tondeur, J., Howard, S. K., & Yang (2021), who emphasize the importance of continuous monitoring in the technology integration process so that the transformation is not temporary.

Thus, the digital strategy in this school demonstrates a balance between innovation and regulation, between open access and value control.

4. CONCLUSION

Based on the results of data analysis and concept maps using ATLAS.ti software, it can be concluded that the digital technology-based learning strategy at SMP Muhammadiyah 3, Depok, Sleman is systematically developed through the integration of institutional policies based on Islamic values. This strategy does not merely focus on infrastructure procurement, but is rooted in the vision of a "Digital School with Islamic Character" that positions technology as an educational instrument to achieve pedagogical goals and strengthen morals simultaneously. The implementation of this strategy is carried out through structured management, including independent curriculum planning (Computational Thinking, STEM, and Active English), organizing a paperless ecosystem based on the Sinergi LMS, and implementing innovative hybrid learning. The key to the success of this school's digital transformation lies in the synergy between strong managerial governance, the digital pedagogical readiness of teachers as the main actors, and the existence of strict control mechanisms through content filtering and digital ethics education to ensure responsible technology use that is in line with the institution's identity.

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