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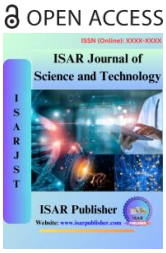

ISAR Journal of Science and Technology

Volume 3, Issue 5, 2025, Page: 30-33

Abbriviate Title- ISAR J Sci Tech

ISSN *(Online)*- 2584-2056

https://isarpublisher.com/journal/isarjst

Digital Leadership Strengthening Strategy for Vocational High School (SMK) Principals

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Article History

Received: 17.04.2025
Accepted: 07.05.2025
Published: 22.05.2025

Abstract: This study aims to explore strategies for strengthening digital leadership in private vocational school (SMK) principals in facing the challenges of digital transformation in the era of education 4.0. The approach used is qualitative with a multi-site case study method. Data were collected through in-depth interviews, participatory observation, and documentation at private vocational schools in Bogor Regency, West Java. The results of the study show that effective digital leadership is characterized by technological competence, digital vision, and managerial ability in integrating technology into learning and school governance. Strengthening strategies are carried out through ongoing training, collaboration with the digital industry, and the development of an organizational culture that is adaptive to technology. The implications of these findings provide strategic recommendations for policy makers and vocational education managers in supporting digital leadership capabilities systematically and sustainably.

Keywords: digital leadership, principal, private vocational schools, digital transformation, strengthening strategy.

Cite this article:

Hermawan, A., Rusnadi, S., Rocha, T., Lima, R., (2025). Digital Leadership Strengthening Strategy for Vocational High School (SMK) Principals. *ISAR Journal of Science and Technology*, *3*(5), 30-33.

1. Introduction

The digital era has brought major disruptions to the world of education, requiring principals not only to be administrative managers, but also as transformational leaders who are able to integrate technology into school management (Anderson & Dexter, 2020). Digital transformation in the world of education, especially at the vocational education level, requires leaders who are not only technologically literate, but also able to build strategic visions and implement adaptive digital systems.

Private vocational schools in Indonesia are in a strategic and vulnerable position. On the one hand, they have the institutional flexibility to innovate without the rigid bureaucratic constraints of state schools. However, on the other hand, they face challenges of resources, competitiveness, and the need to build a reputation through superior school governance that is responsive to the needs of the digital industry. In this context, the principal has a key role as a driving force for transformation.

Several previous studies have highlighted the importance of digital leadership in education. For example, Schrum & Levin (2016) emphasize the role of leaders in creating a technology-based school culture. Meanwhile, ISTE (2018) developed global standards for educational leaders in strategically integrating technology. At the macro level, the OECD (2021) states that digital leadership is a key driver of successful implementation of digitalization in schools.

However, there is a clear gap between the ideality of the concept of digital leadership in the literature and the reality of practice in the field, especially in private vocational schools. Although the government has encouraged the digitalization of education program, in reality there are still many school principals who do not have adequate managerial and digital capacity. A national survey by the Ministry of Education, Culture, Research and Technology (2023) showed that only around 27% of private school principals were active in digital training, and less than 15% implemented a full digital-based management system in their schools. Limited access to training, minimal infrastructure support, and weak digital culture in the school environment are inhibiting factors.

On the other hand, international studies mostly focus on the context of developed countries or public schools that have better system support. This creates a knowledge gap on how concrete strategies for strengthening digital leadership are implemented contextually in private vocational schools in Indonesia that have unique characteristics, such as limited funding and dependence on community participation.

This gap is important to fill because private vocational schools are an important part of the vocational education ecosystem that supplies ready-to-use workers, especially in the technology and creative industry sectors. In other words, strengthening digital leadership in private vocational schools not only has an impact on school management, but also on the quality of graduates and the relevance of education to the job market.

Therefore, this study aims to: (1) identify the digital leadership competencies of private vocational school principals; (2) explore the strategies used in strengthening them; and (3) analyze the challenges and their impacts on institutional performance. This study is expected to provide theoretical and practical contributions to the development of digital leadership in private vocational education environments in Indonesia.

2. Methodology

This research uses a qualitative approach with a multi-site case study design. This approach was chosen to understand the phenomenon of digital leadership in depth in a real context in a private vocational school environment. The case study allows for exploration of the social dynamics, organizational structures, and strategic processes carried out by principals in strengthening their digital leadership.

2.1. Research Design

The research design used is an exploratory case study which is descriptive and interpretive in nature. The research was conducted at a private vocational school in Bogor Regency, West Java, which was selected purposively. The site selection criteria include: (1) the school has implemented a digitalization program for management and learning; (2) the principal is active in the education innovation forum; and (3) has achievements or accomplishments in the field of information technology utilization.

2.2. Data Collection Techniques

To ensure the depth and validity of the data, researchers used three main techniques:

- In-depth Interview: Conducted with the principal, vice principal for curriculum, and ICT teacher. Semi-structured interviews were used to obtain rich narratives about experiences, strategies, and challenges in strengthening digital leadership.
- Participatory Observation: Researchers are directly involved in the school environment to observe digital interactions, technology-based managerial practices, use of digital platforms (LMS, digital attendance systems), and leadership dynamics in internal meetings or forums.
- Documentation Study: Researchers analyzed related documents such as school vision and mission, annual work plans, school digital policies, training reports, and technology implementation evaluation documents.

2.3. Data Analysis Techniques

Data were analyzed using the Miles and Huberman model (1994) which includes three main stages:

- Data Reduction: Filtering data from interviews, observations, and documentation to select relevant information according to the research focus.
- Data Display: Preparation of matrices and thematic categories to map principals' strategies, practices, and responses to digital transformation.
- Drawing Conclusions and Verification: Identify patterns and relationships between data, and reconfirm with informants (member checking) to ensure the validity of the findings.

2.4. Data Validation Techniques

To ensure the validity of the data, a triangulation strategy was used:

- Source Triangulation: Comparing data from various informants.
- Triangulation Technique: Combining interviews, observations, and documentation.
- Member Checking: The results of data interpretation are reconfirmed with the informant to avoid interpretive bias.

2.5. Research Ethics

This research pays attention to the ethical principles of qualitative research:

- Informed consent was obtained from all participants.
- The identities of schools and individuals are disguised to maintain confidentiality.
- Researchers are neutral and do not intervene in the school's internal processes.

With this in-depth and comprehensive methodological design, the research is expected to be able to provide meaningful contributions to the literature and practice of digital leadership in private vocational schools.

3. Theoretical Basis

3.1. Digital Leadership

Digital leadership is a concept that combines information technology capabilities with leadership capacity to strategically transform educational organizations. According to ISTE (2018), digital education leaders are expected to be innovators, digital learning facilitators, and systemic change directors. Anderson and Dexter (2020) emphasize that principals who have digital competence will be better able to direct the use of technology to support the efficiency and effectiveness of school governance.

3.2. Transformational and Visionary Models in Educational Leadership

The transformational leadership model (Bass, 1999) states that ideal leaders are those who are able to inspire, motivate, and encourage collective innovation. In the context of schools, transformational principals not only carry out administrative functions but also create

a vision and culture of learning that encourages the use of technology. Fullan (2020) added that visionary leadership is very important in creating systemic change and encouraging the involvement of all elements of the school.

3.3. Innovation Adoption Theory

Rogers' (2003) innovation adoption theory provides a framework for understanding how technological innovations are adopted in educational environments. In this context, the principal acts as a "change agent" who accelerates the adoption of technology by teachers and students. Factors such as perceived usefulness, ease of use, and contextual appropriateness are key to the successful implementation of technological innovation in learning.

4. Results and Discussion

The results of this study indicate that strengthening digital leadership in private vocational school principals is greatly influenced by three main dimensions: individual competence, institutional support, and collaborative strategies. Principals who have high digital competence, including technological literacy, digital communication skills, and understanding of digital-based school management systems, are able to lead the transformation process with a strategic and data-based approach. This is in line with the principles in the digital leadership model by ISTE (2018), which states that leaders must be able to be role models in adopting technology and become agents of change in the school ecosystem.

The identified implementation indicators include: (1) the involvement of school principals in the use of Learning Management System (LMS) to monitor learning activities and teacher performance; (2) the existence of a strategic planning document containing a digital transformation roadmap; and (3) the formation of a digital transformation work unit or team that is given a special mandate to accelerate technological innovation in schools.

In practice, continuous training has proven to be a core strategy that is implemented systemically. Principals and teachers take part in certified training, both from national organizers such as Pusdatin Kemendikbudristek and from international partners such as Google for Education. This training not only improves technical skills, but also changes the leadership mindset from administrative to digital-transformative. This confirms Schrum & Levin's (2016) research regarding the importance of learning leaders following the rhythm of educational technology developments.

External collaboration, especially with technology industry partners, is a strategic tool that can accelerate the modernization of infrastructure and internal competencies. The real implementation of this collaboration can be seen in the procurement of digital devices through CSR programs, integration of cloud-based management applications, and technical assistance in creating digital teaching content. At SMK PGRI 2 Cibinong, for example, collaboration with edutech service providers resulted in a learning evaluation dashboard that is directly integrated with student attendance and grade data.

Digital innovation culture also grows through participatory and transformational approaches. Principals who successfully build an innovative culture apply the principle of shared leadership, providing space for teachers and students to create contextual digital solutions. Practices such as internal hackathons, weekly digital clinics, and appreciation for teacher technological innovation are concrete manifestations of the implementation of a progressive digital culture. Fullan (2020) emphasizes that sustainable change occurs if leaders are able to create systems that encourage collaboration, experimentation, and the courage to take risks.

Implementation challenges remain, including resistance from some senior teachers to digital systems, limited internet access in certain areas, and disparities in technology adoption between skill programs. However, with an individual coaching approach, the creation of microlearning modules based on teacher needs, and an incentive system for digital innovators, these challenges can begin to be overcome.

Overall, the results of this study indicate that the success of strengthening digital leadership is largely determined by three things: first, the quality of the principal's digital competence; second, the extent to which the school system opens up space for participation in innovation; and third, the principal's ability to establish cross-sector collaboration. With a structured and evidence-based approach, a strategy for strengthening digital leadership can be a major catalyst for improving the quality of vocational education in the digital era.

5. Conclusion and Recommendations

Based on the research results, it can be concluded that the strategy for strengthening digital leadership in private vocational school principals requires holistic development, which is not only focused on increasing technical capacity, but also includes strategic, collaborative, and adaptive leadership skills. An effective principal in digital leadership is able to build a transformational vision, create an innovative ecosystem in the school environment, and establish broad partnerships with the industrial world and technology community.

The findings show that the success of digital leadership is greatly influenced by three main aspects. First, the individual competency of the principal in digital literacy and management. Second, the support system in the school, including a responsive organizational structure, a solid digital transformation team, and a work culture that is open to innovation. Third, strategic partnerships with external parties, such as technology companies and training institutions, which play an important role in supporting the acceleration of the school's digital transformation.

Implementation strategies such as ongoing training, industry collaboration, and strengthening an innovative culture have been shown to produce significant change. This practice must be based on a strong leadership vision and supportive institutional policies. In this context, the leadership of the principal as an agent of digital change is not only symbolic, but truly determines the direction and success of the transformation of vocational education in the digital era.

The strategic recommendations derived from this research are as follows:

1. **For the Government**: Designing national policies that are more focused on strengthening the digital leadership of school principals, through the integration of real-world practice-based training curriculum, digital infrastructure support, and monitoring and evaluation based on digital competency achievements.

2. **For Educational Institutions**: Building a school organizational structure that supports the acceleration of digital transformation, including the appointment of a competent digital transformation team, and providing incentives for teacher innovation and the use of technology in learning.
3. **For Principals**: Enhance the role as transformational leaders by strengthening professional networks, expanding cross-sector collaboration, and fostering an innovative spirit within the school community through a participatory and reflective approach.
4. **For Further Research**: Develop longitudinal studies that examine the impact of digital leadership on student learning outcomes, school organizational effectiveness, and the digital divide across regions or levels of education.

By placing digital leadership as a main pillar in vocational education reform, private vocational schools have a great opportunity to become institutions that are not only responsive to changes in the times, but also become the driving force behind the quality of national education.

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