

## **Principal's Strategies in Implementing Digital Literacy**

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**Abstract:** This study aims to analyze the principal's strategies in implementing digital literacy at SMK Negeri 1 Sekayu, Indonesia, focusing on planning, implementation, and supervision, as well as associated challenges and solutions. Employing a qualitative descriptive approach, data were collected through observation, in-depth interviews, and documentation involving the principal, vice principals, teachers, and educational staff. Data analysis followed an interactive model of reduction, display, and conclusion drawing. The findings reveal a multi-stage strategy. Planning involved integrating digital literacy into the curriculum and annual programs, developing technology-based instructional tools, and providing supporting facilities. Implementation centered on encouraging digital learning platforms, conducting professional development workshops to enhance teachers' digital competencies, and promoting project-based learning with digital technology. Supervision was executed through regular monitoring and evaluation of classroom practices. Key challenges identified include suboptimal platform use, varying teacher digital competence, and infrastructure limitations. Solutions implemented involve strengthening teacher capacity through continuous training and optimizing available technological resources. The novelty of this study lies in its specific examination of leadership strategies for digital literacy within a vocational high school context in Indonesia, offering insights into the principal's role as a central driver. Practically, the findings provide a strategic framework for school leaders in similar contexts to navigate digital integration. This study contributes to educational leadership literature by demonstrating that effective digital literacy implementation requires coherent, multi-level strategies from planning through to supervision, coupled with targeted solutions to address persistent challenges.

**Keywords:** Digital Literacy, Educational Management, Principal's Strategy, Vocational High School

### **A. Introduction**

The Industrial Revolution 4.0 has required the world of education to adapt rapidly, allowing all information to be accessed in real time and quickly, anywhere and at any time. Advances in science and technology resulting from the Industrial Revolution 4.0 require teachers, students, and educational staff to understand the digital world in

order to create a positive learning environment and maximize students' abilities and creativity (Ilori & Ajagunna, 2020; Joshi et al., 2024). Digital literacy is a basic literacy skill currently essential in learning activities, including reference sources, identification, access, evaluation, and integration of information in teaching and learning activities. Digital literacy should be more than just the ability to use various digital sources effectively. It also encompasses a specific way of thinking rooted in computer literacy and information literacy (Ilomäki et al., 2023; Wuyckens et al., 2022). Currently, the literacy rate in Indonesia is still low, necessitating innovation to improve it (Ika Sari et al., 2024). The development and sophistication of modern technology reinforce the notion that increasing literacy rates in Indonesia is not impossible. The presence of various new digital-based knowledge, skills, and literacy expertise in the era of the industrial revolution 4.0 provides convenience in accessing information and knowledge quickly and without limits (Oke & Fernandes, 2020).

However, the lack of attention to the development of digital literacy is a problem that must be addressed immediately (Tinmaz et al., 2023). One example of this lack of attention is the research by Raharjo and Winarko, which found that the millennial generation's digital literacy skills had a low index score of 34.4%. The highest component was comprehension, with an index score of 46.8%. The lowest was collaboration, with an index score of 32.2% (Raharjo & Winarko, 2021). Therefore, schools play a crucial role in efforts to improve literacy rates in Indonesia. By instilling literacy skills, particularly digital literacy, it is hoped that they will instill a passion for reading and learning in students and facilitate their wise search, discovery, understanding, evaluation, and critique of the information they need. Literacy is currently a hot topic in the world of education. Through literacy, educators and students can improve their intellectual capacity on a global scale. Initially, the public only understood literacy as the ability to read and write texts, as well as the ability to understand and interpret informational texts (Pangrazio & Sefton-Green, 2020).

Over time, the definition of literacy has continued to evolve and change (Kampourakis, 2022). Literacy is a soft skill possessed by an individual in reading, writing, speaking, calculating, and solving problems at various levels, making this skill inseparable from everyday life. On the other hand, 21st-century education demands that educational institutions be responsive to developments and changes by mastering information technology, also known as digital literacy. Creating a generation skilled in digital literacy requires the support of professional educators capable of delivering learning models that keep pace with current developments, namely learning that utilizes digital media. Therefore, learning quality standards are needed that are relevant to current challenges. Learning quality is a combination of the learning process and outcomes achieved by students, supported by educators and other educational personnel. Learning is said to be of quality if all elements, including students, educators, and education staff, are able to demonstrate their best performance in carrying out their duties and responsibilities (Asiyai, 2022).

All of this is done to meet learning objectives, namely, to produce satisfactory learning outcomes that meet the desired targets. Rapid technological developments have drastically changed the educational landscape. Today's education system is required to improve the quality of learning by integrating digital media literacy and various other technologies. However, on the other hand, the increasing dependence on the internet and technology also presents its own challenges. The importance of this research lies in understanding the long-term impact of technological developments on the learning process and individual readiness for an increasingly digital future. Therefore, strategies for strengthening digital literacy skills are a non-negotiable necessity. As the head of an educational institution, the principal must have an effective strategy for implementing digital literacy, particularly in the learning process, to ensure effectiveness and quality. Therefore, the principal, as a leader, through his or her strategy, can mobilize all elements of the school to support the achievement of effective and quality learning (Hariyadi et al., 2022; Pardosi & Utari, 2022).

This research was conducted at SMK Negeri 1 Sekayu. Based on preliminary observations conducted by researchers from May 9, 2025, to May 23, 2025, they found indicators indicating that the principal of SMK Negeri 1 Sekayu had created a school program that integrated digital literacy elements into various subjects by adding specific modules, utilizing digital learning platforms, and emphasizing that some assignments involve digital technology. Furthermore, the principal had designed project-based learning activities, where students actively use digital technology to complete relevant assignments, which can help improve students' digital literacy. However, preliminary observations by researchers indicated that the program was not yet running optimally, as the learning process did not yet implement digital literacy to support effective communication and learning. Several findings indicated that teaching and learning activities still did not utilize platforms such as Google Classroom, Moodle, or other digital platforms to facilitate student and teacher access to materials and submission of assignments, which are expected to improve digital skills and develop students' critical and innovative thinking skills, as well as prepare them to face the challenges of the digital era.

Based on the results of initial observations conducted by the researcher, it can be stated that the principal's strategy for implementing digital literacy at SMK Negeri 1 Sekayu has not been running optimally, so the researcher is motivated to conduct research to identify and obtain information about the strategies and obstacles encountered by the principal in implementing digital literacy. Based on the background above, it is necessary to carry out research with the title "Principal's strategy in efforts to implement digital literacy at SMK Negeri 1 Sekayu, Sekayu District."

## **B. Methods**

This research was conducted at SMK Negeri 1 Sekayu, Sekayu District, from June to September 2025. This study used a qualitative approach with descriptive qualitative methodology. In this study, the researcher will describe the findings related to the principal's strategies in implementing digital literacy at SMK Negeri 1 Sekayu. The research informants consisted of one principal, one vice principal, and two teachers from SMK Negeri 1 Sekayu, Sekayu District, who were able to provide accurate information for this research. Qualitative research procedures produced descriptive data in the form of written or spoken words from individuals and observed behavior. The analysis in this study used a qualitative approach because the problems discussed were not concerned with numbers but rather with clear and detailed descriptions and obtaining in-depth data from the research focus (Moleong, 2021).

The procedure in this research was carried out through several stages adopted from the research stages by Sugiyono (2022), including the following:

- a. Description stage or orientation stage. At this stage, the researcher describes what is seen, heard, and felt. The researcher only briefly records the information obtained.
- b. Reduction stage. At this stage, the researcher reduces all information obtained in the first stage to focus on a specific problem.
- c. Selection stage. At this stage, the researcher elaborates on the established focus in more detail and then conducts an in-depth analysis of the problem. The result is a theme constructed based on the data obtained, forming knowledge, hypotheses, and even new theories.

The data sources in this study were obtained through data collection techniques using observation, interviews, and documentation. This is based on Fauzan's (2017) opinion that the success of naturalistic research depends greatly on the accuracy and completeness of the notes compiled through observation, interviews, documentation, and literature review (Almusaed et al., 2025). The data collection techniques in this study used observation, documentation, and interviews. The data validity was checked using triangulation. The technique used in this study was source and method triangulation, which involves checking data obtained from multiple sources. The data analysis techniques used in this study include data reduction, data presentation, and drawing conclusions.

## **C. Results and Discussion**

### **Principal's Strategy in Efforts to Implement Digital Literacy**

The research findings suggest that the principal, in addition to being a leader for the school they lead, also acts as an agent of change. Therefore, the principal must have a thorough understanding of all aspects of their school. The school must also have a

clear vision for the future so that plans to improve digital literacy can be implemented gradually. The strategies of the principal of SMK Negeri 1 Sekayu, Sekayu District, to improve school quality and competitiveness include 1) a planning strategy for implementing digital literacy, 2) an implementation strategy for implementing digital literacy, and 3) a monitoring strategy for implementing digital literacy.

### *Digital Literacy Implementation Planning Strategy*

The principal's planning strategy appears to be based on the principle that digital literacy programs need to be supported by needs mapping, program direction determination, human resource capacity building, and external partnerships. Interviews indicate that the initial step is supervision/audit of facilities to ensure technological infrastructure readiness. The school has several classrooms equipped with computers and good internet access, but there is still disparity in the availability of devices in some classrooms. This situation indicates that digital literacy planning cannot be separated from efforts to ensure equitable access as a prerequisite for equitable digital learning. The findings regarding the identification of technology needs (facility audits, equitable distribution of devices, and internet access) align with the digital competency framework, which emphasizes the importance of available access, meaningful use, and user capacity as prerequisites for digital learning. Within the citizen digital competency framework, schools need to ensure students have equal opportunities to develop digital skills, including the ability to use technology safely, productively, and responsibly (Vuorikari, 2022). Therefore, the policy of equitable distribution of devices and the gradual procurement plan can be understood as a structural strategy to ensure that digital literacy does not become the property of a particular class but becomes part of the school culture.

Regarding the aspect of strengthening program direction, interview results indicate that schools develop digital literacy programs that are integrated with the school's vision and mission, formulated through the formation of teams and the ratification of work structures through decrees. From an educational management perspective, strengthening the direction of the program through teams and formal documents provides a basis for coordination, division of tasks, and certainty of implementation so that the program does not depend on individuals but becomes an institutional agenda. Planning also focuses on integrating digital literacy into the curriculum across subjects. Interviews with the vice principal in charge of curriculum emphasized that digital literacy is not confined to specific subjects but is intended to become a daily learning habit through the use of technology across various subjects. This approach aligns with the digital competency framework, which emphasizes digital skills as a cross-disciplinary competency, not a stand-alone competency.

The planning strategy positions teachers as key to the program's success. Interviews indicate a teacher training agenda, although some teachers still require more hands-on training. Findings regarding the integration of digital literacy into the curriculum

reinforce the view that digital literacy cannot be simply placed as ICT material but needs to be embedded within the learning process across subjects. From a technology-pedagogy-content integration perspective, effective digital learning occurs when teachers are able to integrate subject matter knowledge, teaching strategies, and appropriate technology, rather than simply “using apps”. Therefore, the school’s move to integrate e-learning platforms and the use of productive software (e.g., AutoCAD/Photoshop) demonstrates the operationalization of this integration, as technology is used to deepen vocational competency attainment, not as an additional activity.

Planning is strengthened through collaboration with industry and parental involvement. Interviews indicate efforts to establish collaborations to support equipment and internship opportunities, as well as meetings with parents to gather input and support for the program. Public involvement in the literacy movement is a crucial principle because literacy (including digital literacy) is more effective when built as a school ecosystem that involves the school community and the community. The involvement of parents/committees and stakeholders in program development aligns with the notion that literacy policies (including digital literacy) are stronger when positioned as ecosystem movements, rather than sectoral programs. The principle of public involvement in the school literacy movement emphasizes that family and community support strengthens program sustainability and fosters literacy practices outside the classroom (Costa & Faria, 2025; Wijaya et al., 2022).

Partnerships with industry reinforce the argument that vocational schools need to maintain alignment between the skills taught in schools and the demands of the workplace. In vocational education, strengthening collaboration with industry is understood as a crucial strategy for schools to adapt to technological changes and the need for work competencies, including through the support of equipment, training, and internship programs. Thus, industry collaboration can be positioned as a bridge between the school curriculum and the reality of competencies in the field. To reinforce the Indonesian context, a study on the digital leadership of school principals shows that school leadership in the digital era requires the ability to build a digital vision, digital communication, and digital resilience in the face of technological change and risks (Sugiarto, 2025). This perspective is relevant to emphasize that the planning steps identified in team formation, decree issuance, and annual program integration are not merely administrative activities but part of the digital leadership capacity to drive the school organization.

#### *Implementation Strategy for Digital Literacy Application*

The digital literacy implementation strategy at SMK Negeri 1 Sekayu is evident in three main forms: the use of technology in learning, the implementation of project-based learning, and strengthening industry partnerships through real-world student experiences. First, technology is used not merely as a tool but as a learning tool that

enables students to develop skills relevant to workplace needs. In practice, technology is utilized through classroom devices, the internet, e-learning platforms, and the use of software appropriate to the expertise program. This implementation reflects the orientation of digital literacy as a functional competency for students, not only using technology but also learning to complete tasks and produce products through it. The above findings demonstrate learning practices that emphasize authentic experiences. The literature on project-based learning confirms that project-based learning encourages higher-order thinking skills, problem-solving, collaboration, and the development of tangible products as learning outcomes (Chen et al., 2022; Loyens et al., 2023). In the 21st-century context, project-based learning is also often seen as relevant because it encourages students to use technology as a work tool, not simply a presentation tool. Therefore, assignments such as web application development, graphic design, or multimedia production are understood as implementation strategies that align vocational competencies, digital literacy, and industry needs.

Project-based learning is the dominant implementation strategy. Interviews with teachers and students indicate that project assignments encourage students to create products such as web applications, graphic designs, or multimedia works, while simultaneously fostering team collaboration and problem-solving. These findings align with PBL studies, which confirm that project-based learning effectively enhances 21st-century skills (collaboration, creativity, communication) and fosters meaningful learning because students produce tangible products. Furthermore, studies on inductive learning methods also position project-based learning as an approach that fosters understanding through real-world problems/projects, thereby increasing motivation and engagement. Inductive learning positions models like project-based learning as approaches that consistently increase engagement and understanding, especially when learning objectives require practical skills (Sánchez-García & Reyes-de-Cózar, 2025). The implementation strategy is strengthened through collaboration with industry, particularly in the form of equipment support, training, and internships.

Interviews indicate that internships are seen as providing students with the opportunity to apply digital skills in real-world work situations. This is important because digital literacy in vocational schools ideally should not be limited to school competencies but rather be tested in a professional context through work experience and industry standards. The challenge of equitable access can be further strengthened by research on digital leadership in vocational schools, which emphasizes that the success of school digitalization depends heavily on the principal's ability to build a digital culture, ensure system support, and manage change consistently across work units. This means that when schools have implemented digital learning but still face gaps in facilities, the implementation strategy needs to be accompanied by managerial strategies to reduce inequities in access and ensure equitable learning services.

The implementation of industry collaboration (equipment, training, and internships) also aligns with the logic of improving the quality of school outputs. In school leadership, improvements in learning outcomes and organizational quality are strongly influenced by consistent implementation of core programs and adequate resource support (White et al., 2025). Thus, the implementation described above can be positioned as an effort to maintain quality consistency through alignment of learning processes, resources, and real work experience.

#### *Strategy for Supervising the Implementation of Digital Literacy*

The oversight strategy in this study was evident through ongoing program monitoring and evaluation, instructional supervision, and organizational restructuring of program implementers. Interviews with school principals revealed evaluations of technology distribution and follow-up efforts, including planning for the procurement of additional devices. Supervision was also conducted to ensure that the technology used truly supports learning and helps students master the necessary digital skills. In school leadership literature, the monitoring/evaluating function is viewed as a crucial responsibility of school leaders to maintain program sustainability and the quality of learning outcomes. This principle is also emphasized in research-based leadership studies, which position monitoring and evaluation as a leadership responsibility that impacts school performance improvement. From a learning supervision perspective, supervisory practices that focus on mentoring and improvement align with the developmental supervision approach, which emphasizes that effective supervision is conducted by adapting the approach to the teacher's needs and professional stage, using either directive, collaborative, or non-directive methods.

This is relevant to the finding that teachers still need more practical training, meaning that supervision should not only assess but also address specific teacher competency improvement needs. Strengthening supervision in the current digital era is increasingly driven by the use of technology (e.g., digital platforms for reporting, reflection, learning documentation, or mentoring). The SLR study on technology-based educational supervision shows that digital supervision can increase the efficiency of supervision implementation and contribute to improving teacher competency, although challenges remain regarding internet access, the readiness of senior teachers, and the need for supporting training. The supervision strategy (supervision, monitoring, and follow-up) aligns with the view that effective academic supervision is oriented towards fostering and improving teacher professionalism, not merely inspection. The instructional supervision perspective emphasizes that good supervision includes constructive feedback, mentoring, and concrete support to enable teachers to improve their teaching practices (Akpalu et al., 2025).

## **Obstacles to Improving Digital Literacy**

The results of this study indicate that SMK Negeri 1 Sekayu, Sekayu District, faces several obstacles in implementing digital literacy in the school. One of the main challenges is limited technological infrastructure. Although some classrooms are equipped with adequate digital devices, others are not fully equipped with the necessary technology. The principal explained that budget constraints are a major factor behind the uneven distribution of devices across classes. To address this, the school has allocated a portion of its School Operational Assistance (BOS) funds to procure the necessary technology devices. Furthermore, the principal is also seeking partnerships with various companies to secure support in the form of device donations or discounts on device purchases. Another strategy is utilizing cloud-based technology, which allows students to access various applications and learning materials without the need for expensive hardware. This approach is expected to ensure equitable access to digital technology across all classrooms, providing greater flexibility for students and teachers in learning.

However, despite efforts to improve infrastructure, another obstacle is the limited training for teachers in the use of digital technology. Many teachers feel that current training focuses too much on theory while lacking practical instruction that can be directly implemented in learning activities. Principals responded by organizing practical application-based training that was more relevant to classroom needs. This training involved practitioners or experts in technology-based learning who could provide up-to-date insights into the software used in schools. SMK Negeri 1 Sekayu also established a digital teacher community, which serves as a forum for teachers to share experiences and challenges in integrating technology into their teaching. With this approach, it is hoped that teachers can more quickly master the necessary technology and be more effective in teaching it to students.

Another major challenge is the rapid development of technology, which can quickly render the devices used in schools obsolete. The principal revealed that although the school strives to update the technology used, it often struggles to keep pace with rapid technological developments. To address this, SMK Negeri 1 Sekayu ensures that the curriculum is continuously updated to align with the latest technological developments in the industrial world. By partnering with companies and industrial institutions, the school can monitor the latest technology trends required by the job market. Furthermore, the use of cloud-based devices allows for automatic and more efficient software updates, eliminating the need for complete hardware replacement. This also reduces reliance on physical devices that are vulnerable to rapid technological changes. Furthermore, limited time within the curriculum is a major obstacle to implementing digital-based learning. Project-based learning involving technology often requires more time than is available during regular class hours. Many students find it difficult to participate in digital learning activities within a limited time. To address this issue, SMK Negeri 1 Sekayu organizes extracurricular

activities focused on developing digital skills. These activities provide students with additional time to learn and practice using technology without being limited to school hours. Furthermore, the school utilizes e-learning platforms to support learning outside of school hours, allowing students to access learning materials and complete technology-based assignments more flexibly.

### **Solutions to Improve Digital Literacy**

The research results indicate that the principal of SMK Negeri 1 Sekayu, Sekayu District, plays a crucial role in addressing various obstacles to implementing the digital literacy program at the school. The main obstacles identified include limited infrastructure, a lack of appropriate teacher training, rapid technological developments, and limited time for digital-based learning. To address these challenges, the principal implemented various solution-oriented and adaptive strategies tailored to the school's circumstances. Limited infrastructure is a major obstacle to equitable access to digital facilities across all classes. To address this, the principal allocated a portion of the School Operational Assistance (BOS) funds to gradually procure digital literacy support facilities. This effort was complemented by collaborating with industry to obtain equipment assistance and purchase discounts. Furthermore, the school has begun utilizing cloud-based technology so that students and teachers can continue to access learning resources without relying entirely on expensive physical devices. This step demonstrates both efficiency and equitable access to learning technology.

Regarding teacher competency improvement, the principal recognizes that teachers' ability to use technology is a determining factor in the success of the digital literacy program. Therefore, schools are conducting more practical training and involving practitioners in the field of digital learning. Teachers are also encouraged to join digital teacher communities as a forum for sharing experiences and best practices in implementing technology in the classroom. This approach contributes to the continuous improvement of teacher skills and the growth of a collaborative culture within the school's teaching community. Rapid technological developments also pose a challenge in maintaining the relevance of learning tools and curricula. The principal responded by updating the curriculum to align with industry needs and by establishing partnerships with companies and related institutions to obtain information on the latest technology trends. The school also strives to provide flexible and easily updated devices to maintain relevance. In addition to teachers, students are also provided with short training sessions to improve their adaptability to new technologies.

Time constraints in implementing project-based learning pose a particular obstacle. To address this, the school developed extracurricular activities focused on digital skills and utilized e-learning platforms to enable students to learn outside of school hours. This approach provides flexibility while increasing the effectiveness of

technology-based learning. In addition to these strategies, the principal also provides ongoing coaching and supervision to teachers. Supervision is conducted in person to specifically identify each teacher's strengths and weaknesses. The principal also provides motivation and encouragement to teachers to continue their professional development through training activities, coordination meetings, and regular evaluations. These personal communication efforts have proven effective in fostering teacher enthusiasm and commitment to the digital literacy program. Overall, the strategy implemented by the principal of SMK Negeri 1 Sekayu demonstrates visionary and transformative leadership. The approach emphasizes not only technical aspects but also human resource development and a collaborative culture within the school. Thus, digital literacy efforts at SMK Negeri 1 Sekayu can be more effective, relevant to technological developments, and support student readiness to face the challenges of the industrial world.

#### **D. Conclusion**

Based on the research findings, it can be concluded that the principal's strategy in strengthening digital literacy at the school is implemented through a systematic and phased approach encompassing planning, implementation, and evaluation. The key finding reveals a comprehensive leadership framework where the principal serves not merely as an administrator but as a visionary, motivator, and facilitator of digital transformation. In the planning phase, the strategy is operationalized through the development of a school vision and mission explicitly focused on enhancing digital literacy, supported by internal policies that promote technology integration in both learning and administrative processes. This planning is needs-oriented, deliberately considering the competencies required by teachers and students to navigate digital era challenges. During implementation, the principal adopts a collaborative approach, actively engaging the entire school community. This is realized through targeted training and workshops to elevate teachers' digital competencies, optimization of technology-based facilities, and encouragement of digital platform usage in teaching and learning activities. The principal provides consistent moral and technical support throughout the transformation process. In the evaluation and supervision phase, the principal conducts regular monitoring through learning supervision and program evaluation, with findings serving as the foundation for continuous program improvement and development. The practical implication of this study is that effective digital literacy strengthening requires principals to adopt a multifaceted leadership role that extends beyond policy formulation to active engagement and support. The collaborative approach demonstrated involving teachers, staff, and students ensures that digital literacy becomes a shared responsibility rather than a top-down mandate. Regular monitoring and feedback loops enable responsive adjustments, ensuring programs remain relevant and effective. This model provides a valuable blueprint for school leaders seeking to navigate digital transformation, highlighting that sustainable change requires simultaneous attention to vision-setting, capacity-building, infrastructure provision, and continuous quality assurance. Future research

should investigate the direct correlation between specific principal leadership behaviors and measurable improvements in student digital literacy outcomes. Comparative studies examining how this leadership model adapts to different school contexts varying in size, resources, and community characteristics would enhance generalizability. Additionally, exploring the relationship between teacher digital competence development and subsequent classroom practice could inform more targeted professional development programs. Finally, longitudinal research tracking the long-term sustainability of digital literacy initiatives following principal leadership changes would provide insights into institutionalizing such transformations.

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