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Enhancing Learning Effectiveness through the Synergy of Educational Facilities, Infrastructure Management, and Financial Literacy

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Abstract: *This study examines the synergy between educational facilities, infrastructure management, and financial literacy in enhancing learning effectiveness at SMK PGRI 1 Palembang. Employing a qualitative case study approach, data were obtained through interviews, observations, and document analysis. The findings indicate that effective management practices, including planning, procurement, maintenance, and financial allocation, contribute significantly to improving student engagement, motivation, and practical competencies. Despite challenges related to limited financial resources and coordination, the integration of facilities management and financial literacy plays a critical role in supporting educational quality assurance. The study recommends the implementation of digital asset management systems, strengthened industry partnerships, and increased institutional support to promote sustainable educational development.*

INTRODUCTION

Vocational education plays a pivotal role in preparing skilled human resources ready to enter the workforce. As outlined in the Indonesian National Education System Law No. 20 of 2003, vocational education is designed to equip students with competencies essential for working in specific fields. Vocational schools (Sekolah Menengah Kejuruan or SMK) are thus integral to Indonesia's education system, bridging the gap between theoretical knowledge and industry needs. To achieve this goal, vocational schools must not only emphasize theory but also provide practical, industry-focused training (OECD, 2023).

A critical factor influencing the success of vocational education is the effective management of educational facilities and infrastructure (Palah et al., 2022; Wulogening & Timan, 2020). Facilities include movable instructional tools like computers, laboratory equipment, and learning media, while infrastructure consists of fixed resources such as classrooms, workshops, laboratories, and supporting utilities like electricity and internet access (Kemendikbud, 2023). These elements are vital to the National Education Standards (Standar Nasional Pendidikan) and directly affect the quality of the learning process. Recent studies have reaffirmed that well-managed facilities and infrastructure significantly contribute to school effectiveness and student performance (Assoumpta & Andala, 2020; Andrade et al., 2024).

Garcia-Perez et al. (2020) outline that management encompasses four key functions:

planning, organizing, actuating, and controlling, which together ensure the optimal use of institutional resources. In the context of education, facility management includes planning, procurement, utilization, maintenance, and disposal of assets. Efficient management ensures facilities are utilized effectively to support learning activities. Rahman et al. (2022) stress that asset management in education must be systematic and ongoing to prevent inefficiency, equipment degradation, and resource waste. Recent studies align with this view, showing that digitalized asset tracking and preventive maintenance practices improve school efficiency and reduce resource loss (Puspita & Andriani, 2021; Al-Salim, 2018).

This study focuses on SMK PGRI 1 Palembang, a public vocational school in South Sumatra. According to data from the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek), the school covers an area of approximately 9,375 square meters but faces challenges such as limited internet access. These conditions hinder the implementation of technology-driven learning and industry-aligned practices. Issues like inadequate practical equipment, poor maintenance, and underutilized learning spaces have prevented the school from fully meeting vocational education standards. These infrastructure gaps are consistent with findings from other studies in Indonesian vocational education, which highlight the unequal distribution of resources and limited use of digital facilities in rural and suburban schools (Setia & Nasrudin, 2020; Jajuli et al., 2022; Darimi, 2017).

Ulfa and Shalahuddin (2023) emphasized that quality educational management involves the efficient use of resources to achieve institutional goals. Similarly, Slavin (2019) argued that effective learning occurs when students have access to high-quality learning resources. Without proper facilities, students face difficulties in developing the competencies required by modern industries. Arikunto (2021) highlighted the crucial role of school principals as managerial leaders responsible for coordinating educational components, including the management of physical facilities. Supporting these perspectives, Bush (2008) found that leadership commitment and collaborative management positively impact the maintenance and use of school facilities.

In this context, SMK PGRI 1 Palembang offers a relevant case for examining how the management of educational facilities and infrastructure impacts learning effectiveness. This study uses a qualitative approach to explore how facility planning, utilization, and maintenance contribute to enhancing student learning outcomes. Furthermore, the study introduces financial literacy as a critical element that complements facility management. Financial literacy enables the efficient allocation and management of resources, ensuring that limited budgets are used effectively for the maintenance and procurement of educational infrastructure.

This research aims to contribute both theoretically and practically. Theoretically, it enriches the academic discourse in educational management by providing empirical insights into the synergy between facility management and financial literacy in vocational schools. Practically, it offers actionable recommendations for school leaders and policymakers on how to optimize resource procurement, maintenance, and sustainable use, incorporating financial literacy practices. Ultimately, this study emphasizes that effective management of both facilities and financial resources not only supports technical learning but also enhances the overall quality of education, ensuring students are prepared for the demands of the professional world in an era of rapid technological progress.

LTERATURE REVIEW

a. Management of Educational Facilities and Infrastructure

The management of educational facilities and infrastructure involves a structured approach to planning, acquiring, organizing, utilizing, maintaining, and evaluating the physical resources in educational institutions to support the achievement of learning objectives. Batubara and Arifin (2022) defined management as encompassing four main functions: planning, organizing, actuating, and controlling, all of which are applicable in educational contexts. In schools, the planning function focuses on identifying facility needs based on curriculum requirements and student demographics, while organizing involves creating a systematic structure for asset management. Actuating aims to optimize human and material resources, and controlling ensures effective supervision and performance evaluation of facilities.

Lahesti et al. (2023) emphasized that facilities and infrastructure are not just physical assets but strategic tools that enhance the learning process. To maintain their relevance and functionality, facilities require rational planning, systematic inventory management, and regular evaluations. Similarly, Syarifah (2020) advocated for a Total Quality Management (TQM) approach in educational facility management, stressing that all stakeholders—including teachers, students, technical staff, and school committees—should collaborate to foster a culture of shared responsibility and continuous improvement. Recent studies reinforce these ideas. Ardliana et al. (2021) found that effective management of school facilities boosts productivity, reduces maintenance costs, and creates an environment conducive to learning. UNESCO-UNEVOC (2022) further emphasized that sustainable facility management, including preventive maintenance, eco-friendly designs, and digital monitoring systems, supports the long-term quality of vocational education.

In Indonesia, the Ministry of National Education Regulation No. 24 of 2007 outlines the required standards for educational infrastructure, including quality, safety, functionality, and sustainability. Vocational schools, in particular, require specialized infrastructure like workshops, laboratories, and internet connectivity that meet industry standards. Borotoding et al. (2021) highlighted the disparities in infrastructure, especially in rural areas, where limited digital facilities and poor resource maintenance significantly hinder effective practical learning. Chasovy et al. (2023) noted that facility management in vocational schools must follow a step-by-step process, from planning to procurement, maintenance, inventory management, and disposal, to ensure systematic order and efficiency. More recent research by Santos et al. (2024) revealed that the implementation of Digital Facility Management Systems (DFMS) significantly enhances transparency, accountability, and user satisfaction in school asset management, aligning with global trends of integrating information systems and sustainability into school management practices.

b. Learning Effectiveness and Its Relationship with Facilities

Learning effectiveness refers to the extent to which learning objectives are achieved, evidenced by students' mastery of knowledge, skills, and attitudes. Gagne (2019) proposed that different learning outcomes require distinct conditions, including appropriate facilities and tools. For example, motor skills development requires hands-on practice equipment, while verbal knowledge can be enhanced through visual and multimedia resources. Slavin (2019) argued that effective learning is facilitated by cooperative environments and access to adequate learning resources. Classroom design, seating arrangements, and instructional materials play essential

roles in promoting interaction and engagement. Arikunto (2021) stated that assessing learning outcomes must include considerations of the supporting factors, such as the quality and condition of facilities. Sudjana (2001) asserted that "the more complete and relevant the learning facilities, the greater the likelihood of achieving educational goals".

Recent empirical studies have validated these foundational theories. Andrade et al. (2024) conducted a meta-analysis and found a strong positive correlation between the quality of school infrastructure and student performance across various educational settings. Saeed et al. (2022) reported that vocational students in schools with well-managed facilities demonstrated higher levels of motivation, participation, and academic achievement. Bravo et al. (2017) found that digital learning environments, combined with sufficient technological infrastructure, significantly enhanced both student engagement and learning efficiency in vocational settings. Additionally, Day et al. (2020) highlighted the critical role of leadership, noting that visionary school principals can mobilize resources to ensure the sustainability and optimal use of educational assets. This finding was echoed by Malik et al. (2020), who found that leadership commitment and participatory management positively influenced both the quality of facility maintenance and the overall effectiveness of learning in Indonesian schools.

METHOD

a. Research Design

This study employed a qualitative descriptive approach with a case study design to explore how the management of educational facilities and infrastructure, alongside financial literacy, contributes to enhancing learning effectiveness at SMK PGRI 1 Palembang. The qualitative approach was chosen because it facilitates an in-depth exploration of real-world phenomena, particularly the practices of managing facilities and their impact on learning outcomes in vocational schools. The case study design enabled the researcher to focus intensively on SMK PGRI 1 Palembang, providing a comprehensive understanding of its facility management processes, challenges, and contextual influences (Creswell & Poth, 2018; Neuman, 2019). As Patton (2020) suggests, qualitative research is ideal for capturing participants' experiences and perspectives in their natural settings, and descriptive case studies are effective for explaining complex educational practices. This approach is therefore well-suited to uncover how the planning, use, and maintenance of facilities, along with financial management, contribute to improving the learning environment.

b. Time and Research Setting

The study was conducted at SMK PGRI 1 Palembang, located in South Sumatra, Indonesia, over a period of three months from August to October 2025. This school was specifically selected based on its relevance to the research objectives, such as its vocational practice facilities, ongoing infrastructure management efforts, and initiatives aimed at enhancing learning effectiveness. Purposive site selection is commonly used in qualitative research to identify settings that can offer the most insight into the phenomenon being studied (Sugiyono, 2021; Hutabarat et al., 2022).

c. Participants

Participants in the study were selected based on their involvement in managing the school's facilities and infrastructure. Purposive sampling was used to choose informants who were experts in educational management (Patton, 2020). The main informants were:

1) The school principal,
2) The vice principal in charge of facilities and infrastructure,
3) Two vocational subject teachers from the engineering department, and
4) Six Grade XI students who actively participate in vocational practice sessions.

This selection ensured data triangulation across administrative, instructional, and student perspectives, providing a balanced understanding of facility management practices (Long & Robinson, 1998).

d. Data Collection Techniques

To obtain valid and comprehensive data, three main qualitative data collection methods were used:

1) Semi-structured interviews with key informants to explore their perceptions, strategies, and experiences regarding the management of facilities and financial resources.
2) Participant observation of the school environment to document the condition, utilization, and maintenance of facilities.
3) Document analysis involving school inventory reports, maintenance schedules, procurement records, and relevant administrative documents.

This triangulated approach aligns with recommendations from Flick (2013), who assert that combining multiple data sources enhances the credibility and depth of qualitative findings. All interviews were recorded with permission and transcribed verbatim to ensure accuracy.

e. Data Analysis

Data were analyzed using the interactive model of Miles and Huberman (2019), which involves three concurrent stages:

1) Data Reduction: selecting, simplifying, and organizing raw data into meaningful categories.
2) Data Display: presenting data in narrative, tabular, or matrix forms to facilitate interpretation.
3) Conclusion Drawing and Verification: identifying patterns, relationships, and insights through continuous reflection and comparison.

Throughout the analysis, the researcher engaged in iterative coding and categorization to ensure that interpretations were grounded in empirical evidence. This model remains one of the most widely used in contemporary qualitative research for its systematic and flexible analytical process.

RESULT AND DISCUSSION

The Process of Facilities and Infrastructure Management at SMK PGRI 1 Palembang

The management of educational facilities and infrastructure at SMK PGRI 1 Palembang follows a structured yet semi-formal process involving several interconnected stages: planning, procurement, utilization, maintenance, and evaluation. These stages are largely guided by the School Activity and Budget Plan *(Rencana Kegiatan dan Anggaran Sekolah)*, which serves as the framework for managing all facilities. The planning phase begins with coordination meetings involving the school principal, vice principal for facilities, department heads, and the school committee. In these meetings, each department submits a proposal based on the curriculum's needs, student population, and available resources. As the Vice Principal for Facilities noted:

> *"Every year we hold coordination meetings with teachers to identify what facilities are needed for the next academic year. We consider the curriculum, the number of students, and the available budget before submitting the proposal"* (Interview, September 2025).

This participatory approach ensures that decisions are made collectively and that facility needs are aligned with the school's instructional priorities.

Once planning is finalized, the procurement process takes place according to the priorities established in the RKAS. Given the school's limited financial resources, procurement is focused on essential learning tools that directly support student practice and skill development. The school principal confirmed that the selection of items follows a careful assessment process, emphasizing the importance of prioritization over expansion. As the Principal explained,

> "*We have to be selective. The budget is limited, so we prioritize what directly supports learning activities, such as machines and lab tools, rather than administrative facilities"* (Interview, August 2025).

This statement reflects the school's pragmatic approach to resource allocation, balancing between urgent needs and available funding. Procurement decisions are also influenced by recommendations from vocational teachers, who have first-hand experience with the usability and condition of workshop tools.

In terms of organization and implementation, the division of roles is clear. The vice principal for facilities oversees procurement logistics and maintenance schedules, while teachers serve as users and supervisors responsible for ensuring that facilities are utilized properly. This decentralized model promotes both accountability and shared responsibility. A vocational teacher described this arrangement by saying,

> *"Teachers are responsible for ensuring that the equipment in their workshop is used properly and safely. They also report if something needs repair"* (Interview, September 2025).

Observations confirmed that classrooms and workshops were generally well-organized and used efficiently, though some facilities, particularly in the automotive and electrical workshops, showed signs of aging and lack of regular maintenance.

Documentation review showed that while the school maintains inventory records, including item specifications and purchase details, these records are still kept manually and are not updated consistently. This makes tracking damaged or outdated equipment time-consuming, and preventive maintenance is often overlooked. The lack of a digital monitoring system hinders long-term facility planning. Despite these limitations, teachers' commitment to maintaining the facilities reflects a strong sense of ownership. During one observation, teachers and students were seen collaborating to clean and repair basic workshop tools, reinforcing a culture of responsibility and hands-on care.

These findings indicate that SMK PGRI 1 Palembang's management process reflects the basic principles of educational facility management planning, organizing, actuating, and controlling (Palah et al., 2022). However, budget constraints, manual documentation, and insufficient maintenance systems limit its effectiveness. This aligns with Lewis (2025), who stressed that structured documentation and ongoing evaluation are crucial for successful facility management. Ceballos et al. (2020) also highlighted the importance of participatory leadership and shared responsibility for maintaining educational infrastructure. While the current system provides a strong foundation, improvements in digitalization, preventive maintenance, and industry collaboration are necessary to ensure sustainability and support vocational learning

outcomes effectively.

Challenges in Managing Educational Facilities and Infrastructure

The study revealed several persistent challenges in managing educational facilities at SMK PGRI 1 Palembang, despite having a relatively structured management process. The main challenges identified were limited funding, inadequate maintenance and technical support, and inconsistent coordination among stakeholders.

The most significant challenge was limited funding. The school's operational budget, mainly sourced from government allocations via the *Bantuan Operasional Sekolah (BOS)* program, is insufficient to cover the full scope of procurement, repairs, and maintenance. Funds are primarily directed towards essential teaching materials, leaving little for facility upgrades or replacing outdated tools. As the Vice Principal for Facilities explained:

> *"Our biggest obstacle is budget limitation. Sometimes we have to postpone repairs because the funds are prioritized for urgent teaching materials."* (Interview, September 2025).

This financial constraint directly affects the school's ability to maintain the quality and functionality of its physical environment, leading to a gradual decline in equipment performance and the overall learning atmosphere.

Another significant challenge concerns maintenance and repair. The findings indicate that the school's maintenance practices tend to be reactive rather than preventive, primarily because there are no dedicated technical staff responsible for regular inspection and upkeep. Maintenance is typically carried out only when equipment becomes unusable or severely damaged, resulting in longer downtime and reduced availability of learning tools. The Principal acknowledged this issue, stating,

> *"We only repair the equipment when it's already broken because we don't have enough staff to perform regular maintenance*." (Interview, August 2025).

Similarly, a teacher from the electrical engineering department highlighted the rapid wear and tear of equipment due to intensive use, explaining that

> *"Some tools are used daily by students. Without proper maintenance, they wear out quickly. Unfortunately, we can't replace them immediately."* (Interview, September 2025).

This reactive maintenance pattern leads to inefficiencies and increased repair costs over time, illustrating a gap between planning and implementation in the school's infrastructure management system.

In addition to financial and maintenance constraints, coordination and communication between school management and facility users remain inconsistent. The study found that minor damages or malfunctions are not always reported promptly, allowing problems to escalate before action is taken. Teachers and students sometimes assume that someone else will report the issue, which creates delays in the repair process. A student commented on this situation, stating,

> *"We usually tell the teacher if something breaks, but sometimes it takes weeks before it's fixed."* (Interview, October 2025).

This lack of timely communication reflects an underlying challenge in accountability and workflow management, suggesting the need for clearer procedures and reporting mechanisms.

Another area of concern is the technological infrastructure, particularly internet connectivity. Limited bandwidth and unstable connections have affected both teaching and administrative operations, making it difficult for teachers and students to access digital learning resources or conduct blended learning sessions effectively. As the ICT teacher expressed,

> *"The internet connection is unstable, which affects digital learning. We hope for better network support to integrate online resources."* (Interview, September 2025).

Observations and document reviews further revealed that certain digital facilities, such as multimedia rooms and computer laboratories, remain underutilized because of outdated hardware and the lack of compatible software. These conditions reduce opportunities for integrating modern instructional technologies into vocational education, which is increasingly reliant on digital tools and online learning systems.

These challenges highlight the complexity of managing facilities in resource-limited vocational schools. Financial constraints, lack of maintenance routines, and weak coordination negatively impact the effectiveness of facility management. These findings align with Hariyanto et al. (2023), who identified financial limitations and weak communication as key factors in infrastructure degradation in vocational education.

The Impact of Facilities and Infrastructure Management on Learning Effectiveness

The study explored how the management of educational facilities and infrastructure affects learning effectiveness at SMK PGRI 1 Palembang. Findings revealed a strong correlation between effective facility management and improved teaching and learning outcomes. Well-maintained classrooms and workshops that are organized and fully equipped foster a conducive learning environment, enhancing student engagement, motivation, and performance. This is particularly important in vocational education, where hands-on practice is essential for developing technical skills. One student from the automotive department shared:

> "*When all the tools are available and working, learning becomes more enjoyable. We can practice directly instead of just listening to explanations."* (Interview, Student, October 2025).

Teachers also confirmed that the availability and functionality of facilities significantly improve classroom management and the assessment process. With proper tools and resources, teachers can conduct practical evaluations that better reflect students' real-world competencies. A vocational teacher explained that

> *"It's easier to evaluate students' competencies when they can demonstrate them directly using proper tools."* (Interview, September 2025).

This highlights that adequate facilities not only support student learning but also enhance instructional efficiency and objectivity in performance assessments. In contrast, a shortage or malfunction of essential equipment disrupts learning continuity and reduces student enthusiasm. During observations, several workshops were seen operating below capacity due to limited equipment, forcing teachers to divide students into smaller groups and rotate practice sessions.

This not only extended lesson duration but also limited the hands-on time available to each student, thereby reducing the depth of skill acquisition.

Moreover, the lack of sufficient facilities often compels teachers to make pedagogical compromises. The Vice Principal for Curriculum admitted that lesson plans sometimes need to be modified due to unavailability of tools or damaged equipment, stating that

> *"If the facilities are incomplete, the learning process slows down. Sometimes we have to modify lesson plans to adjust to the available tools."* (Interview, September 2025).

Such adjustments, while necessary, can hinder the achievement of curriculum goals, especially in technical subjects that require direct practice aligned with industrial standards. This situation reflects a broader systemic issue faced by many vocational schools in Indonesia, where resource limitations force educators to prioritize adaptability over instructional rigor.

Despite these challenges, where facilities were adequately managed, students demonstrated higher motivation, stronger discipline, and improved collaborative skills. Teachers observed that functional and up-to-date equipment helped bridge the gap between classroom learning and industry expectations, preparing students for employment. Regular maintenance and efficient use of facilities also fostered responsibility among students, who were involved in maintaining the cleanliness and safety of their learning spaces.

These findings confirm that effective facility management is crucial for learning effectiveness in vocational education. Well-maintained infrastructure enhances both students' technical competencies and their soft skills, such as teamwork, problem-solving, and responsibility. This aligns with Hutabarat et al. (2022), who found that schools with well-managed physical environments achieve higher student performance and institutional satisfaction. For SMK PGRI 1 Palembang, effective facility management is a strategic investment that supports learning outcomes, aligns with industry needs, and strengthens the school's capacity to produce competent, job-ready graduates.

Discussion

The findings of this study highlight the synergy between effective educational facility management, infrastructure development, and financial literacy in enhancing learning outcomes at SMK PGRI 1 Palembang. The study reinforces the theoretical frameworks proposed by Santos et al. (2024), emphasizing the importance of the four core management functions planning, organizing, actuating, and controlling in ensuring efficient use of resources. The evidence from SMK PGRI 1 Palembang demonstrates how these management principles are put into practice through participatory planning, transparent budgeting, and continuous evaluation, all of which contribute to the functional sustainability of school facilities. Effective planning ensures that procurement and maintenance align with curriculum needs, while organizing establishes clear responsibilities among administrators, teachers, and staff (Hariyanto et al., 2023). The actuating function, illustrated by the collaboration between teachers and students in maintaining workshops, reflects the school's ability to mobilize its human resources toward shared goals. Regular evaluation and control processes identify inefficiencies and areas for improvement, creating a cycle of ongoing development.

Despite these positive aspects, the study reveals several sustainability challenges that hinder long-term facility management effectiveness. Limited financial resources constrain the school's ability to procure new tools and maintain existing equipment, while inadequate maintenance systems often take a reactive rather than proactive approach. Additionally, inconsistent data management, with facility records still being maintained manually and updated irregularly,

complicates the overall management process. These challenges are not unique to SMK PGRI 1 Palembang but reflect broader issues in vocational education, particularly in underfunded regions where infrastructure support is lacking. To address these issues, the study suggests the need for collaborative partnerships between schools, local governments, and industry stakeholders. Such collaborations can supplement financial resources, provide access to modern equipment, and ensure facilities meet industrial standards. Industry partnerships can also contribute through equipment donations, technical assistance, and student internships, thus bridging the gap between education and workforce development.

In this context, visionary leadership becomes a key driver of success. As Windasari et al. (2024) assert, leaders who are innovative, transparent, and committed to shared responsibility are better equipped to manage limited resources and foster institutional growth. At SMK PGRI 1 Palembang, the principal's leadership has been instrumental in fostering collaboration among stakeholders and encouraging a sense of ownership among both teachers and students. This leadership style not only sustains operational efficiency but also cultivates a culture of accountability and continuous improvement.

Ultimately, this study demonstrates that facility and infrastructure management in vocational schools should not be seen as a mere administrative function but as a strategic component of educational quality assurance. When facilities are properly managed, they create an environment that supports teaching effectiveness, enhances student motivation, and improves learning outcomes. Moreover, efficient facility management boosts institutional credibility by demonstrating professionalism, responsible resource management, and alignment with national education standards. Thus, integrating sound management practices, financial literacy, sustainable partnerships, and visionary leadership can transform facility management into a catalyst for educational excellence and long-term institutional development in vocational education (Hutabarat et al., 2022).

CONCLUSION

The results of this study conclude that the management of educational facilities and infrastructure at SMK PGRI 1 Palembang is essential for enhancing the effectiveness of vocational learning. The overall process, which involves planning, procurement, utilization, maintenance, and evaluation, is implemented in a structured yet semi-formal manner, demonstrating the principles of participatory management and shared responsibility among school stakeholders. The findings show that effective planning, transparent budgeting, and collaborative decision-making contribute to the optimal use of available resources, while inadequate funding, weak maintenance systems, and limited technological infrastructure remain significant obstacles to sustainable management. Moreover, the study confirms that well-managed facilities directly improve student engagement, motivation, and skill acquisition, leading to better learning outcomes and enhanced institutional credibility. Therefore, facility management is not merely an administrative task but a strategic element of educational quality assurance that aligns the school environment with industry standards and expectations.

In light of these findings, several recommendations are proposed for future improvements and research. First, schools should implement a comprehensive digital asset management system to improve the accuracy of documentation, inventory updates, and maintenance scheduling. Second, the government and local education authorities should increase funding allocations specifically for preventive maintenance and technological upgrades to ensure the long-term sustainability and relevance of vocational education. Third, stronger partnerships with local industries and community stakeholders should be fostered to provide additional support through

expertise, equipment donations, and technical assistance. Fourth, school leaders should continue to develop transformational leadership practices that encourage collaboration, accountability, and innovation in resource management. Lastly, future research should focus on comparative or longitudinal studies across multiple vocational schools to explore how differences in facility management practices affect learning outcomes over time. Expanding research to include digital transformation, environmental sustainability, and stakeholder engagement in facility management would offer a deeper understanding of how schools can adapt to the evolving demands of education and industry. Through these ongoing efforts, educational institutions, especially vocational schools, can create more sustainable, efficient, and learner-centered environments that fully support the development of competent and competitive human resources.

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