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Technological Pedagogical and Content Knowledge (TPACK) Based Learning to Improve Student Learning Achievement at SDN Pekojan 03 and SDN Pekojan 05 Tambora, West Jakarta

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ABSTRACT
Technological Pedagogical and Content Knowledge (TPACK)-based learning is a strategic agenda for improving the quality of education in primary schools. Teachers, as the main implementers of instruction, require systematic management support to effectively integrate technology, pedagogy, and content. This study aims to describe the management of TPACK-based learning through the POAC (Planning, Organizing, Actuating, Controlling) framework in enhancing student achievement at SDN Pekojan 03 and SDN Pekojan 05 Jakarta Barat. The research employed a qualitative approach with a case study design through observations, interviews, and document analysis involving principals, teachers, and students. The findings reveal that planning for TPACK-based learning has been incorporated into instructional documents, yet its implementation remains inconsistent; organizing is still simple with limited ICT management teams; actuating involves the use of digital applications and interactive media, though not evenly across all classrooms; and controlling tends to focus more on administrative compliance rather than in-depth reflection on TPACK effectiveness. Limited facilities, teachers' digital literacy, and unstable internet connectivity emerge as the main challenges, although both principals and teachers demonstrate strong commitment to sustaining digital learning innovation. The study concludes that applying POAC in TPACK-based learning has the potential to enhance teacher creativity, student engagement, and learning achievement, provided that it is supported by needs-based planning, structured team organization, collaborative implementation, and reflective as well as continuous supervision. It is expected that this study contributes to the development of adaptive, innovative, and sustainable TPACK-based learning policies and practices in primary schools.

INTRODUCTION

Learning management plays a strategic role in improving the quality of basic education, which serves as the main foundation for success at subsequent education levels. Teachers are expected not only to convey subject matter but also to act as facilitators, motivators, and drivers of student creativity (Glickman et al., 2001b; Mishra & Koehler, 2006b; Terry, 1997b). The success of the learning process is strongly influenced by the performance of professional, adaptive teachers who can integrate various approaches according to current demands (Miles et al., 2014; Robbins & Judge, 2018b; Terry, 1997a). However, field realities indicate that technology use in elementary school learning remains suboptimal, resulting in limited innovation and student learning outcomes that do not meet national competency standards (Robbins & Judge, 2018a). Therefore, planned, organized, and sustainable learning management based on Technological Pedagogical and Content Knowledge (TPACK) is an

urgent necessity to support the improvement of student learning achievement (Glickman et al., 2001a; Mishra & Koehler, 2006a; Wulandari, 2021).

Although education policies have encouraged the use of technology, their implementation often faces obstacles. Research by (Aini et al., 2021) and Nurdin, Faisal, & Daeng (2024) shows that Technological Pedagogical and Content Knowledge (TPACK) has the potential to increase student interest and engagement, but its practice in elementary schools is often hampered by low digital literacy among teachers and limited ICT facilities. Similar conditions were found by (Putri, 2023), who emphasized that many teachers understand the Technological Pedagogical and Content Knowledge (TPACK) concept theoretically but are not yet skilled at integrating it into learning. This confirms the gap between normative policies and classroom learning management practices.

Field observations show different dynamics at two elementary schools in West Jakarta. At SDN Pekojan 03, Technological Pedagogical and Content Knowledge (TPACK)-based learning has been supported by the principal's policy through the provision of ICT facilities and collaboration among teachers in developing teaching tools, but obstacles arise in the form of network instability and limited technical skills among some teachers. Conversely, at SDN Pekojan 05, the digital literacy program and the use of interactive learning media are more structured, but supervision of implementation tends to be administrative and has not resulted in systematic follow-up. These two conditions confirm the vulnerability of Technological Pedagogical and Content Knowledge (TPACK)-based learning management, as shown by previous studies.

To strengthen the effectiveness of Technological Pedagogical and Content Knowledge (TPACK), a management approach can be used as a strategic framework. Terry (1997) explains the function of management through four main stages (POAC): planning, organizing, executing, and controlling. In the context of Technological Pedagogical and Content Knowledge (TPACK), POAC means that teachers and principals not only develop teaching tools that integrate technology, pedagogy, and content, but also build resource coordination, implement participatory digital-based learning, and conduct data-based evaluation and follow-up. Thus, Technological Pedagogical and Content Knowledge (TPACK)-based learning management has the potential to become an instrument for optimizing teacher performance and student learning achievement in a measurable way.

Several studies support the importance of management integration in Technological Pedagogical and Content Knowledge (TPACK). (Widaningsih, 2023) proves that the application of Technological Pedagogical and Content Knowledge (TPACK)-based learning increases student motivation and learning outcomes. (Hakim, 2022) emphasizes that principal support through digital learning management is directly correlated with improved teacher skills. Similarly, Musgrove et al. (2021) found that the success of Technological Pedagogical and Content Knowledge (TPACK) implementation is greatly influenced by simultaneous pedagogical management and technology utilization. These findings show that POAC-based management is relevant to strengthening the effectiveness of Technological Pedagogical and Content Knowledge (TPACK) learning in elementary schools.

However, studies that specifically examine Technological Pedagogical and Content Knowledge (TPACK)-based learning from an educational management perspective are still limited. Previous studies have focused more on learning outcomes or teacher competencies but

have not comprehensively explored the managerial process through POAC functions. In fact, a comprehensive understanding of the planning, organizing, implementing, and supervising of Technological Pedagogical and Content Knowledge (TPACK)-based learning is essential for the systematic improvement of student achievement.

Based on this, this study focuses on the question: How does Technological Pedagogical and Content Knowledge (TPACK)-based learning management improve student learning achievement at SDN Pekojan 03 and SDN Pekojan 05 in West Jakarta? The objective is to analyze Technological Pedagogical and Content Knowledge (TPACK)-based learning strategies, practices, and outcomes based on the POAC function, taking into account the social, cultural, and institutional contexts of each school.

The novelty of this study lies in the integration of the POAC management concept with Technological Pedagogical and Content Knowledge (TPACK)-based learning practices in the context of urban elementary schools. Theoretically, this study is expected to enrich the literature on educational management with an integrative approach among technology, pedagogy, and content. Practically, the results of this study can serve as strategic recommendations for school principals, teachers, and policymakers in designing more adaptive, collaborative, and sustainable Technological Pedagogical and Content Knowledge (TPACK)-based learning, thereby strengthening student learning achievement in elementary schools.

RESEARCH METHOD

This study used a qualitative approach with a case study design. This design was chosen based on the research objective, which was to gain an in-depth understanding of the process of Technological Pedagogical and Content Knowledge (TPACK)-based learning management in improving student achievement at SDN Pekojan 03 and SDN Pekojan 05 in West Jakarta. The qualitative approach was selected because it was able to explore the meanings, experiences, and real contexts carried out by teachers and principals in managing learning in a naturalistic manner. Meanwhile, case studies were used to provide a factual description of the practices of planning, organizing, implementing, and supervising Technological Pedagogical and Content Knowledge (TPACK)-based learning without manipulating the research variables.

The research targets were the main actors in the learning management process at both schools. Informants were selected using purposive sampling based on their direct involvement in the implementation of Technological Pedagogical and Content Knowledge (TPACK)-based learning, namely: (1) the principal as the person responsible for policy and the main facilitator of technology integration in learning; (2) sixth-grade teachers as the direct implementers of Technological Pedagogical and Content Knowledge (TPACK)-based learning and developers of teaching modules; (3) educational staff who supported the organization of technological facilities and infrastructure; and (4) students as the direct beneficiaries of the application of Technological Pedagogical and Content Knowledge (TPACK) in learning activities.

Data collection techniques were carried out using three main methods. First, non-participatory observation, which involved directly observing Technological Pedagogical and Content Knowledge (TPACK)-based learning practices, including lesson planning, the use of digital media, and teacher–student interactions in the classroom. Second, in-depth interviews

were conducted with school principals, teachers, and students to gain an understanding of the strategies, obstacles, and impact of Technological Pedagogical and Content Knowledge (TPACK) on student motivation and learning achievement. Third, a documentation study was conducted, which involved analyzing documents such as teaching modules, ATP, prota–prosem, learning evaluation reports, and minutes of teacher coordination meetings. The combination of these three techniques aimed to ensure the depth and validity of the data through the triangulation of sources and methods.

The research procedure consisted of several stages. First, the planning stage, which involved preparing interview guidelines, observation guidelines, and document analysis formats relevant to the POAC management function. Second, the field implementation stage, in which the researcher collected data through interviews, observations, and documentation at SDN Pekojan 03 and SDN Pekojan 05. Third, the recording and verification stage, which involved reducing, coding, and categorizing data according to the research focus. Fourth, the evaluation stage, which involved examining the consistency of the data with the research objectives to produce valid and relevant findings.

Data analysis used the interactive model of Miles et al. (2014), which consisted of three main steps: (1) data reduction, which was the process of selecting, simplifying, and focusing on data relevant to Technological Pedagogical and Content Knowledge (TPACK)-based learning management; (2) data presentation, in the form of descriptive narratives, tables, or thematic matrices to facilitate interpretation; and (3) conclusion/verification, which involved reviewing the analyzed data to ensure consistency and validity. This analysis was carried out continuously from data collection to the final stage of the research, so that the results obtained were able to fully describe the dynamics of Technological Pedagogical and Content Knowledge (TPACK)-based learning management in both elementary schools.

RESULT AND DISCUSSION

Planning (Planning) of Technological Pedagogical and Content Knowledge (TPACK)-Based Learning to Improve Elementary School Students' Learning Achievement

The findings indicate that TPACK-based learning planning at SDN Pekojan 03 and SDN Pekojan 05 has been directed at developing teaching tools that integrate technological, pedagogical, and content aspects, but it has not fully met the principles of educational management as stated by Terry (1997b), which emphasizes that planning must be systematic, focused, and oriented toward achieving learning objectives. In ideal practice, TPACK-based learning planning should be developed based on an analysis of student needs, teacher readiness, and the availability of ICT facilities that support learning innovation.

Empirically, teachers at both schools have attempted to develop planning documents in the form of teaching modules, ATP, and TPACK-based prota-prosem. This planning is supported by the principal's policy of allocating a special budget for the provision of technological tools, such as computers, projectors, and internet access. However, weaknesses are still apparent in terms of consistency of implementation, as the limited digital literacy of some teachers means that the tools developed are not always optimally integrated into the learning process. This condition is in line with Putri's (2023) findings that teachers' understanding of TPACK is still limited, so that planning often stops at the document stage without meaningful implementation.

On the other hand, there are also simple planning practices that are carried out by adjusting the technology available in the classroom. For example, teachers choose digital media such as Quizizz or Canva incidentally, without comprehensively mapping student needs. This shows that planning still tends to be pragmatic and oriented towards the availability of facilities, rather than structured pedagogical strategies. In fact, according to Mishra & Koehler (2006b), the success of TPACK integration depends on the alignment between learning objectives, technology selection, and the pedagogical strategies used by teachers.

In comparison, SDN Pekojan 03 is relatively superior in terms of TPACK-based teaching tool documentation because teachers are accustomed to developing teaching modules with the support of the principal's policy. However, SDN Pekojan 05 is more consistent in integrating technology into routine school programs such as digital literacy and English Day, although this is not fully documented in written lesson plans. Both schools face similar obstacles, namely top-down planning and minimal student involvement in the planning stage. According to (Burden, 2010), collaborative planning that involves students is more effective because it makes learning relevant to their real needs.

In addition, lesson planning at both schools has not fully integrated a cycle of continuous evaluation. Planning should not stop at the preparation of initial documents, but should include periodic reflection to adjust strategies based on evaluation results. The absence of this reflection cycle makes learning less responsive to the changing needs of students and the ever-changing digital challenges. Robbins & Judge (2018a) emphasize that the quality of planning is greatly influenced by the availability of human resources, infrastructure, and visionary leadership.

When linked to previous research, these findings reinforce the results of Widaningsih (2023), which show that systematic TPACK-based learning planning can significantly improve student learning outcomes. Conversely, weaknesses in planning make TPACK-based learning not much different from conventional patterns. Thus, the results of this study confirm that planning is the main foundation for the successful implementation of TPACK.

Based on the description above, it can be concluded that TPACK-based learning planning at SDN Pekojan 03 and SDN Pekojan 05 has not been optimal. On the one hand, there are schools that already have formal planning documents, but their implementation has not been consistent. On the other hand, there are schools that focus more on direct practice with technological innovation, but their planning is not systematically documented. Neither has placed planning as a collaborative process that fully involves teachers and students as subjects of learning.

To improve this condition, TPACK-based learning planning needs to be directed at: (1) developing teaching tools based on student needs analysis, (2) setting clear learning objectives in line with 21st-century competencies, (3) selecting relevant and sustainable technology, (4) involving teachers and students in the planning process to create collaborative learning, and (5) integrating the reflection cycle (plan–do–check–act) to ensure continuous improvement. Thus, TPACK-based learning planning is no longer seen as merely an administrative obligation, but rather a managerial strategy that can improve student learning achievement in a sustainable manner.

Organization of Technological Pedagogical and Content Knowledge (TPACK)-Based Learning to Improve Elementary School Students' Learning Achievement

The findings indicate that the organization of TPACK-based learning at SDN Pekojan 03 and SDN Pekojan 05 does not fully comply with the principles of educational management as emphasized by Terry (Terry, 1997b), who explains that organization must be able to group resources, divide roles, and build coordination so that learning objectives can be achieved effectively. In the context of TPACK, organization should include the distribution of ICT facilities, the division of teacher responsibilities, and collaboration among educational personnel in utilizing technology.

Empirically, both schools have attempted to establish patterns of teacher cooperation through coordination meetings and the division of schedules for the use of ICT facilities. At SDN Pekojan 03, the principal encouraged the formation of a small team to manage technological resources, although it is still informal. ICT inventory documents and coordination meeting notes show that attention has been paid to the distribution of devices. However, the weakness lies in the limited number of devices and the lack of technical personnel specifically tasked with managing digital resources. This results in teachers still having to work independently in preparing technology, so that the efficiency of TPACK-based learning is not yet optimal. This condition is in line with (Filina, 2024) findings that limited devices and human resources are the main obstacles in the implementation of TPACK in elementary schools.

On the other hand, SDN Pekojan 05 is relatively more structured in organizing TPACK-based programs due to routine activities such as digital literacy, training in the use of interactive applications, and English Day. However, in terms of management, there is no special team to oversee the systematic implementation of TPACK. Organization is mostly carried out by individual teachers, while the role of educational staff is still limited to administrative support. In fact, according to Robbins & Judge (Robbins & Judge, 2018a), the success of an organization is largely determined by a clear division of roles and coordination among members.

In comparison, SDN Pekojan 03 excels in documenting its ICT inventory, while SDN Pekojan 05 is stronger in integrating TPACK into routine learning activities. However, both face similar problems, namely weak formal organization in the form of team structures and systematic collaboration mechanisms. According to (Sitorus, 2023), structured and collaboration-based organization can increase teachers' adaptability to digital learning innovations.

Another limitation in organization is the lack of cross-party coordination. Teachers do conduct joint reflections at the beginning of the semester, but the results of these reflections have not been used as a basis for developing joint institutional strategies. Students are also not consistently involved in TPACK-based learning organization, even though, according to Burden (2010), student involvement in learning planning and management increases their sense of ownership of the learning process.

When linked to previous research, these findings reinforce (Kumala, 2022) results, which state that teachers' TPACK profiles vary greatly depending on their experience and the support they receive from their school organization. Conversely, without adequate

organization, teachers rely solely on personal initiative, resulting in uneven effectiveness of TPACK-based learning across classes.

Based on this description, it can be concluded that the organization of TPACK-based learning at SDN Pekojan 03 and SDN Pekojan 05 has not been optimal. On the one hand, the schools have made efforts to organize the distribution of facilities and hold regular ICT-based activities, but weaknesses are still apparent in the absence of a special team, limited coordination between teachers, and minimal technical support from educational staff.

To improve this situation, the organization of TPACK-based learning needs to be directed towards: (1) forming a special ICT management team at the school, (2) clearly dividing the roles of teachers and educational staff, (3) arranging a fair and equitable schedule for the use of ICT facilities, (4) strengthening collaboration among teachers in the design and evaluation of learning, and (5) involving students as active subjects in the management of digital learning. Thus, the organization is not only administrative in nature but also becomes a managerial instrument that ensures the implementation of TPACK is more effective, collaborative, and sustainable.

Implementation of Technological Pedagogical and Content Knowledge (TPACK) Based Learning to Improve Elementary School Students' Learning Achievement

The findings show that TPACK-based learning at SDN Pekojan 03 and SDN Pekojan 05 has been implemented by integrating technology, pedagogy, and content, although its application has not been consistent across all classes. This is in line with Terry (Terry, 1997b) principles of educational management, which state that implementation must reflect integrated planning and organization and be carried out effectively to achieve the objectives set. In the context of TPACK, implementation requires teachers to be able to integrate digital technology into pedagogical strategies that are relevant to the learning content, so that learning is more interactive and meaningful.

Empirically, teachers at SDN Pekojan 03 have utilized simple technologies such as projectors, laptops, and interactive digital applications in the learning process. Some teachers also use online learning platforms to enrich the material. However, implementation is still limited to teachers who have better digital literacy, while others still rely on conventional methods. This condition makes the implementation of TPACK in the school uneven. These findings are in line with (Musgrove et al., 2021), who stated that the success of TPACK is greatly influenced by the readiness of individual teachers to integrate technology.

In contrast, at SDN Pekojan 05, learning is more integrated with school programs, such as digital literacy activities, English Day, and the use of game-based learning applications. Teachers are more active in utilizing applications such as Canva, Wordwall, and Quizizz in their daily teaching. However, this implementation still faces technical obstacles, such as limited internet access and an insufficient number of devices for all students. This sometimes causes learning not to go according to plan, thereby reducing its effectiveness.

In comparison, SDN Pekojan 03 excels in terms of media variety, as teachers are more creative in choosing applications according to content needs. Meanwhile, SDN Pekojan 05 is stronger in integrating technology-based routine activities, although it is still limited by the available facilities. Both schools face similar problems, namely the implementation of TPACK is not yet fully systematic, as it is not accompanied by a follow-up mechanism and post-

learning reflection. In fact, according to Glickman et al. (2001b), effective learning implementation must include a follow-up cycle to create continuous improvement.

Another weakness lies in the implementation, which still tends to be individual, where each teacher carries out learning according to their own initiative without strong coordination with other teachers. As a result, the quality of TPACK implementation varies between classes, so that student achievement is uneven. This condition shows that there is no collaborative implementation pattern between teachers, even though Burden (2010) emphasizes that collaboration in learning implementation encourages consistency in quality and improves teachers' professional skills.

When linked to previous research, these findings reinforce the results of Widaningsih (2023), who states that systematic implementation of TPACK can increase student motivation and learning outcomes. Conversely, if implementation is only sporadic without a clear pattern, then learning will not differ much from traditional methods.

Based on this description, it can be concluded that TPACK-based learning implementation at SDN Pekojan 03 and SDN Pekojan 05 has begun but is not yet optimal. On the one hand, teachers have made efforts to use digital technology in teaching and learning activities, but its implementation has not been uniform and still faces technical obstacles. On the other hand, the implementation of TPACK-based school programs has been integrated into routines, but there is still a lack of reflection and follow-up.

To improve this situation, TPACK-based learning needs to be directed towards: (1) strengthening teachers' digital competencies through continuous training, (2) providing adequate and equitable ICT facilities, (3) implementing a collaborative learning model among teachers to create consistency, (4) utilizing learning reflection as a follow-up, and (5) adapting learning strategies based on students' needs and characteristics. Thus, the implementation of TPACK can become a real instrument in continuously improving student motivation and learning achievement.

Supervision of Technological Pedagogical and Content Knowledge (TPACK)-Based Learning to Improve Elementary School Students' Learning Achievement

The findings show that TPACK-based learning supervision at SDN Pekojan 03 and SDN Pekojan 05 is still not fully optimal. According to Terry (Terry, 1997b), supervision is a management function that plays a role in ensuring that implementation runs according to plan, detecting deviations, and providing feedback for improvement. In the context of TPACK, supervision should not only be administrative in nature, but also be able to oversee the process of integrating technology, pedagogy, and content so that it truly has an impact on improving student learning achievement.

Empirically, at SDN Pekojan 03, the principal has conducted supervision through classroom observation and review of learning tools, such as teaching modules and ATP. However, supervision still tends to be a formality, limited to checking the completeness of documents without in-depth evaluation of the effectiveness of technology use in learning. This has prevented systematic follow-up improvements. This condition is in line with (Susanto, 2021) findings that supervision in elementary schools often stops at the administrative aspect, thus not having a significant impact on teacher competence.

Meanwhile, at SDN Pekojan 05, supervision is more often carried out informally through regular discussions with teachers after learning activities. The principal provides direct

input regarding teaching strategies and the use of digital learning applications. The advantage of this pattern lies in the close relationship between the principal and teachers, which facilitates smoother communication. However, the disadvantage is the lack of written documentation that can be used as a basis for long-term follow-up. According to Glickman et al. (Glickman et al., 2001b), effective supervision must be data-based and supported by reflective notes in order to produce continuous improvement.

When compared, SDN Pekojan 03 excels in terms of supervision documentation but is weak in the technical evaluation of TPACK implementation. Conversely, SDN Pekojan 05 is stronger in its direct coaching approach but weak in documentation and structured follow-up. Both schools face similar problems, namely supervision that is not fully integrated with the planning and implementation cycle of learning. In fact, Robbins & Judge (Robbins & Judge, 2018a) emphasize that supervision is an important part of the management cycle because it functions as a feedback mechanism to refine subsequent planning.

Another limitation in supervision lies in the lack of involvement of external parties, such as school supervisors or committees, who should be able to provide an objective perspective. In addition, the evaluation has not used specific instruments that comprehensively measure the effectiveness of TPACK. As a result, supervision focuses more on administrative compliance than on improving the quality of learning.

When linked to previous research, these findings reinforce the results of (Stoner et al., 2008; Syaiful, 2019), which state that structured supervision can significantly improve teachers' pedagogical competence, while undocumented supervision only produces temporary changes.

Based on this description, it can be concluded that TPACK-based learning supervision at SDN Pekojan 03 and SDN Pekojan 05 has not been carried out in accordance with ideal management principles. On the one hand, there is supervision that focuses more on administration, while on the other hand, there is supervision based on informal communication without documentation. Neither of these has been able to establish an integrated cycle of reflection between planning, implementation, and evaluation.

To improve this situation, TPACK-based learning supervision needs to be directed towards: (1) the application of specific instruments that assess the effectiveness of TPACK, (2) the strengthening of a systematic supervision documentation system, (3) the implementation of follow-up through teacher training programs, (4) the involvement of school supervisors and external parties to provide an objective perspective, and (5) the integration of the plan–do–check–act reflection cycle so that supervision functions as continuous feedback. Thus, supervision is no longer understood as an administrative obligation, but as a managerial strategy to ensure that TPACK-based learning truly improves teacher quality and student learning achievement.

The results of research on TPACK-based learning management at SDN Pekojan 03 and SDN Pekojan 05 can be examined in greater depth using the six value systems perspective proposed by (Sanusi, 2015). This value system provides a moral, ethical, and practical foundation for principals and teachers in managing learning so that it is not only oriented towards academic achievement but also towards character development, welfare, and the sustainability of education quality.

First, theological values are reflected in the commitment of teachers and principals to implement learning as a form of service. Although the implementation of TPACK still faces limitations in terms of facilities and digital literacy, teachers show sincerity and patience in integrating technology. This is in line with the research findings that learning takes place in a spirit of togetherness even though the facilities are not yet fully adequate. The integration of these theological values fosters a school climate full of sincerity, so that technical challenges do not weaken motivation but rather strengthen a sense of spiritual responsibility towards students.

Second, logical values are key to the implementation of TPACK-based learning. Teachers who develop plans with the support of instruments such as teaching modules, ATP, and assessment rubrics show a tendency to think rationally and based on data. Although there are still teachers who implement learning incidentally, the use of applications such as Quizizz or Canva shows the first steps towards more logical pedagogical decision-making. With a logical approach, teachers are encouraged to engage in evidence-based reflection, rather than simply relying on intuition or old habits.

Third, physiological values are related to the well-being of teachers in carrying out their duties. The results of the study show that limitations in technological devices and internet networks often hinder the implementation of TPACK. This directly affects the comfort of teachers and students in learning. Principals who are concerned with providing basic infrastructure have made efforts to reduce this burden, although it is still limited. The integration of physiological values confirms that the success of TPACK is not only determined by pedagogical readiness, but also by adequate physical and psychological support.

Fourth, ethical values greatly determine the quality of learning supervision. The research findings show that principals in both schools conduct supervision in different patterns, some formally administratively and some informally based on discussion. However, both prioritized transparency and did not pressure teachers. This shows an effort to maintain fair and humanistic supervision ethics. When supervision is carried out with honesty and fairness, teachers are more motivated to improve themselves without feeling that they are being repressively monitored.

Fifth, aesthetic values are reflected in efforts to create a comfortable and enjoyable learning environment. At SDN Pekojan 05, for example, digital literacy and English Day activities are packaged in a creative atmosphere, utilizing visually appealing learning applications. This shows an awareness that beauty in the learning process is not only in the physical aspects, but also in the way the material is communicated and presented. This aesthetic value fosters teachers' pride in their profession and increases student engagement.

Sixth, teleological values are evident in the TPACK-based learning objectives, namely improving student achievement. Although supervision is still weak in terms of documentation, the principal and teachers remain focused on the ultimate goal of increasing motivation and learning outcomes. This is in line with Sanusi's (2015) principle that every educational activity must be directed towards long-term, sustainable goals. Goal-based evaluation allows for continuous improvement through training, reflection, and collaboration.

Based on this description, it can be concluded that the research results are in line with Sanusi's (2015) six value systems. Theological and ethical values strengthen integrity, logical and teleological values encourage data- and goal-based learning, while physiological and

aesthetic values emphasize the importance of comfort and harmony in learning. By integrating these six values, TPACK-based learning management can develop not only as a technical strategy, but also as a moral, ethical, and humanistic instrument in improving the quality of basic education.

CONCLUSION

This study confirms that Technological Pedagogical and Content Knowledge (TPACK)-based learning management, implemented through the POAC (planning, organizing, implementing, and monitoring) functions, plays a strategic role in improving learning quality and student achievement in elementary schools by fostering adaptive, collaborative, and reflective practices that enhance teachers' pedagogical skills and student engagement. Effective planning based on student needs, clear organizational structures supported by ICT, creative and dialogical implementation, and continuous supervision together form a sustainable management cycle aligned with the demands of the digital age. The study highlights the need for schools to strengthen the capacity of principals and teachers through digital literacy training, integrated teaching tools, structured ICT management teams, and consistent follow-up mechanisms such as reflection forums, mentoring, and teacher collaboration. Theoretically, it contributes to educational management literature by positioning TPACK within the POAC framework as a comprehensive approach to 21st-century learning, while practically offering guidance for stakeholders to design and implement more systematic and outcome-oriented learning strategies. Future research is recommended to explore the long-term impact of Technological Pedagogical and Content Knowledge (TPACK)-based management across diverse educational contexts, including rural schools and different grade levels, as well as its integration with emerging educational technologies.

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