

The Role of School Principals' Transformational Leadership in Promoting Technology-Based Learning Innovation Among Teachers at SD Negeri 2 Pagar Kaya

Peran Kepemimpinan Transformasional Kepala Sekolah dalam Mendorong Inovasi Pembelajaran Berbasis Teknologi di Kalangan Guru SD Negeri 2 Pagar Kaya

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Abstract

This study aims to describe and analyze the role of the principal's transformational leadership in encouraging technology-based learning innovation among teachers at SD Negeri 2 Pagar Kaya. This study employed a qualitative approach with a descriptive method. Data collection techniques were conducted through interviews, observations, and documentation involving the principal, teachers, and educational staff as informants. Data analysis used the Miles and Huberman model through data reduction, data display, and conclusion drawing, while data validity was ensured through source and technique triangulation. The results of the study indicate that the principal's transformational leadership plays an important role in encouraging technology-based learning innovation through motivation, exemplary behavior, support, and opportunities for teachers' professional development. The learning innovations implemented by teachers include the use of laptops, projectors, learning videos, digital media, the internet, and interactive boards in the learning process. Supporting factors for innovation include principal support, teacher motivation, and the availability of technological facilities, while inhibiting factors include limited infrastructure, differences in teachers' digital competencies, and limited internet access. This study concludes that the principal's transformational leadership contributes positively to creating an innovative and adaptive school culture toward technological developments, thereby encouraging teachers to develop technology-based learning creatively and sustainably.

Keywords

Transformational Leadership; Principal; Technology-Based Learning Innovation; Elementary School Teachers.

Abstrak

Penelitian ini bertujuan untuk mendeskripsikan dan menganalisis peran kepemimpinan transformasional kepala sekolah dalam mendorong inovasi pembelajaran berbasis teknologi pada guru di SD Negeri 2 Pagar Kaya. Penelitian ini menggunakan pendekatan kualitatif dengan metode deskriptif. Teknik pengumpulan data dilakukan melalui wawancara, observasi, dan dokumentasi dengan informan yang terdiri dari kepala sekolah, guru, dan tenaga kependidikan. Analisis data menggunakan model Miles dan Huberman melalui reduksi data, penyajian data, serta penarikan kesimpulan, sedangkan keabsahan data dilakukan dengan triangulasi sumber dan teknik. Hasil penelitian menunjukkan bahwa kepemimpinan transformasional kepala sekolah memiliki peran penting dalam mendorong inovasi pembelajaran berbasis teknologi melalui pemberian motivasi, keteladanan, dukungan, dan kesempatan pengembangan profesional bagi guru. Inovasi pembelajaran yang dilakukan guru meliputi pemanfaatan laptop, proyektor, video pembelajaran, media digital, internet, dan papan interaktif dalam proses pembelajaran. Faktor pendukung inovasi meliputi dukungan kepala sekolah, motivasi guru, dan ketersediaan fasilitas teknologi, sedangkan faktor penghambat meliputi keterbatasan sarana prasarana, perbedaan kompetensi digital guru, dan keterbatasan akses internet. Penelitian ini menyimpulkan bahwa kepemimpinan transformasional kepala sekolah berkontribusi positif dalam menciptakan budaya sekolah yang inovatif dan adaptif terhadap perkembangan teknologi sehingga mampu mendorong guru mengembangkan pembelajaran berbasis teknologi secara kreatif dan berkelanjutan.

Kata Kunci

Kepemimpinan Transformasional; Kepala Sekolah; Inovasi Pembelajaran Berbasis Teknologi; Guru Sekolah Dasar.

Introduction

The rapid advancement of information and communication technology (ICT) has fundamentally transformed educational practices across all levels. In the era of Industry 4.0 and Society 5.0, educational institutions are expected to integrate technology into teaching and learning to enhance instructional quality and student outcomes (Hikmat, 2022; Trianung et al., 2024). Technology enables more flexible, interactive, and student-centered learning while expanding access to diverse learning resources (Eltaiba et al., 2025). Consequently, teachers are required to develop creativity, innovation, and adaptability in utilizing digital technologies, making technology-based learning innovation an important indicator of teacher professionalism (Skrbinjek & Vi, 2024; Jannah, 2025). The effective use of digital media, online platforms, and educational applications also promotes collaboration, communication, and critical thinking among elementary school students (Nur & Rohima, 2025). However, many teachers continue to face challenges in integrating technology due to limited digital competence, insufficient confidence, inadequate infrastructure, limited professional development opportunities, and school cultures that do not fully support innovation (Rahmawati et al., 2024). These conditions indicate that successful technology integration depends not only on teachers' capabilities but also on the leadership and support provided by school principals (Abdullah & Fuad, 2025).

Transformational leadership has therefore become increasingly important in promoting educational innovation. Principals are expected to function not only as administrators but also as instructional leaders who create a school environment that encourages innovation and adapts to technological change (Satrio & Tumeko, 2025; Kuswaeri, 2025). Through a shared vision, effective communication, and supportive leadership practices, principals can strengthen teachers' commitment to technology-based learning while fostering a psychologically safe environment that encourages experimentation and professional growth (Chang & Chin, 2018; Satrio & Tumeko, 2025; Wisnu et al., 2025).

These issues are evident at SD Negeri 2 Pagar Kaya, where efforts to integrate technology into classroom instruction continue to encounter various obstacles. Although technology is expected to support contextual and student-centered learning (Adhwa et al., 2025), many teachers still rely on conventional teaching approaches and use technology primarily for administrative purposes or simple classroom presentations. Differences in digital literacy, limited participation in technology-related training, inadequate infrastructure, restricted internet access, and the absence of systematic school policies have limited the implementation of sustainable technology-based learning innovation. These challenges suggest that successful innovation requires not only teacher readiness but also institutional support and effective school leadership.

In this context, the principal plays a strategic role as an instructional leader and change agent responsible for motivating teachers, facilitating professional development, and creating conditions that support innovation. Therefore, the primary issue at SD Negeri 2 Pagar Kaya extends beyond technological availability to the extent to which the principal's transformational leadership encourages teachers to adopt innovative technology-based instructional practices. Moreover, previous studies have largely focused on secondary and higher education, leaving elementary school settings relatively underexplored despite their distinct teacher characteristics, student developmental needs, and contextual challenges. Schools located in areas with limited technological resources also face unique barriers that differ from those in urban settings. These gaps highlight the need for contextual research examining how transformational leadership promotes technology-based learning innovation in elementary schools while providing practical recommendations for improving educational quality.

This study adopts Bass's Transformational Leadership Theory as its primary theoretical framework. According to Mulyasa (2022), transformational principals foster positive school change by empowering teachers, cultivating a supportive school culture, and enhancing teacher professionalism. Previous studies similarly demonstrate that transformational leadership plays a critical role in developing innovative school cultures and improving teachers' readiness to respond to educational change (Erlisa, 2025). Bass's theory emphasizes leaders' ability to transform followers' values, motivation, and commitment through inspiration and empowerment rather than relying solely on transactional relationships (Harsoyo, 2022; Hadi, 2025). Within schools, transformational principals encourage teachers to continuously learn, innovate, and improve instructional quality while building trust through consistent leadership practices (Satrio & Tumeko, 2025; Shandilia et al., 2024). They also

inspire teachers to integrate technology into learning, provide ongoing professional support, and create opportunities for experimentation and innovation without fear of failure (Sunari, 2025; Johnson, 2024; Noviyanti et al., 2025).

Previous empirical studies further support the importance of transformational leadership in advancing technology-based learning innovation. Principals play a central role in communicating a shared vision of digital learning, strengthening teachers' positive attitudes toward change, and facilitating continuous professional development (A'yun, 2025; Mulyadi, 2025; Dwiyono et al., 2024; Palius et al., 2024). Academic guidance and mentoring enable teachers to overcome challenges in technology integration (Safiah et al., 2025), while effective instructional leadership contributes to the creation of an innovative school climate (Tomasila, 2025). Furthermore, transformational leadership has been shown to indirectly influence technology integration in teaching (Schmitz et al., 2023), whereas teachers' pedagogical beliefs, motivation, and self-confidence also determine the success of technology-based learning innovation (Liu & Zaman, 2025). A systematic literature review likewise concludes that transformational leadership significantly enhances teachers' digital competence and readiness to implement technology-based learning (Abdullah & Fuad, 2025).

Method

This research was conducted at SD Negeri 2 Pagar Kaya, which was chosen as the research location because the school had begun implementing technology-based learning innovations and had a principal who encouraged the development of teacher competencies in utilizing learning technology. The research was conducted in 2026, covering the research preparation stage, field data collection, data analysis, and the preparation of the research report. Data collection activities were carried out through observation, interviews, and documentation related to the principal's transformational leadership and technology-based learning innovations. This research used a qualitative approach with descriptive methods. This approach was chosen because the research aims to understand in-depth the phenomenon of the principal's transformational leadership in encouraging technology-based learning innovations in teachers. This research used a qualitative approach with descriptive methods. The qualitative approach was chosen because this research aims to understand in-depth social and educational phenomena, particularly the role of the principal's transformational leadership in encouraging technology-based learning innovations in teachers (Tomasila, 2025). The data in this study consisted of primary and secondary data. To ensure the validity of the data in this qualitative research, triangulation techniques were used. To obtain comprehensive and in-depth data, this study uses several data collection techniques as follows: 1. In-depth interviews, 2. Observation, 3. Documentation studies.

Results

During the teaching process, teachers at this school have begun utilizing various technological devices as learning media. Laptops and projectors are frequently used to present material visually, enabling students to more easily understand the content. Furthermore, some teachers utilize instructional videos, interactive images, and internet resources as supplementary teaching materials. In certain classrooms, the school has also used interactive boards, enabling teachers to present material in a more engaging manner and providing opportunities for students to participate directly in learning activities. This demonstrates that the school has made efforts to integrate technology into learning as part of educational innovation in the digital age. This situation demonstrates that SD Negeri 2 Pagar Kaya is committed to continuously adapting to developments in educational technology. However, the implementation of technology-based learning at this school is still in the development stage. The use of technology is not yet fully distributed across all classes and teachers. Overall, general school data indicates that SD Negeri 2 Pagar Kaya has sufficient institutional conditions, human resources, and infrastructure to support its use as a research location. The presence of an active principal in managing change, an adequate number of teachers, supportive learning facilities, and the implementation of the Independent Curriculum make this school an appropriate context for examining how the principal's transformational leadership can encourage teachers to implement technology-based learning innovations. Given these conditions, this school is a relevant location for understanding the relationship between educational leadership and the development of innovative learning at the elementary school level.

1. Observation Results

Based on observations at SD Negeri 2 Pagar Kaya, the principal demonstrated transformational leadership practices in carrying out daily tasks. The principal was seen actively providing direction and motivation to teachers to improve the quality of learning through the use of technology. Classroom observations showed that most teachers had utilized technology as a learning support medium. The technologies used included laptops, LCD projectors, learning videos, the internet, digital presentation media, and interactive boards. During the learning process, teachers used learning videos to explain the material so that students more easily understood the concepts being studied. Teachers also utilized images and learning resources from the internet to enrich the learning materials. Based on observations, the principal provided support to teachers by providing technology-based learning facilities available at the school. The principal also encouraged teachers to participate in training and competency development activities related to the use of technology in learning. Based on observations, it can be concluded that the principal of SD Negeri 2 Pagar Kaya has implemented transformational leadership through role modeling, motivation, support, and professional development opportunities for teachers.

2. Interview Results

A. Dimensions of Idealized Influence (Ideal Influence)

Question 1

How does the principal provide an example or role model for teachers in utilizing technology to support learning?

NO	Informant	Answer
1.	Headmaster	I strive to be an example by using technology in school administration, meetings, and learning supervision.
2.	First Grade Teacher	The principal always uses digital media during meetings so we are motivated to follow suit.
3.	Second Grade Teacher	The principal demonstrated directly the use of technology in school activities.
4.	Grade III Teacher	He gave an example of using a laptop and projector during a presentation.
5.	Fourth Grade Teacher	The principal always supports the use of technology and provides real examples.
6.	Fifth Grade Teacher	The school principal shows an open attitude towards technological developments.
7.	Grade VI Teacher	The principal is a role model in using technology to support work.
8.	Islamic Education Teacher	The principal always encourages teachers to use technology positively.
9.	Physical Education Teacher	Even though the Physical Education subject involves a lot of practice, the principal still encourages the use of learning videos.
10.	Educational Personnel	The principal uses a digital system in managing school administration.

B. Dimension of Inspirational Motivation

Question 2

What do principals do to motivate teachers to implement technology-based learning?

NO	Informant	Answer
1.	Headmaster	I provide motivation through meetings, coaching, and appreciation to innovative teachers.

2.	First Grade Teacher	The principal always encourages students to try new learning media.
3.	Second Grade Teacher	He reminded the importance of technology in 21st century learning.
4.	Grade III Teacher	The principal often encourages us not to be afraid of learning technology.
5.	Fourth Grade Teacher	He gave awards to teachers who actively innovate.
6.	Fifth Grade Teacher	The principal invited teachers to participate in technology training.
7.	Grade VI Teacher	We are often given motivation to improve the quality of learning.
8.	Islamic Education Teacher	The principal provides moral support to teachers who are learning technology.
9.	Physical Education Teacher	The principal motivated me to use sports movement videos as a learning medium for students.
10.	Educational Personnel	The school principal always instills the spirit to continue to develop with the times.

C. Intellectual Stimulation Dimension

Question 3

How do principals encourage teachers to think creatively and innovatively in using learning technology?

NO	Informant	Answer
1.	Headmaster	I give teachers the freedom to try various technology-based learning innovations.
2.	First Grade Teacher	We were given the opportunity to use digital learning media according to our respective creativity.
3.	Second Grade Teacher	The principal always supports new ideas put forward by teachers.
4.	Grade III Teacher	He does not limit teachers in innovating as long as it has a positive impact on students.
5.	Fourth Grade Teacher	The principal encouraged us to look for learning resources on the internet.
6.	Fifth Grade Teacher	We often discuss how to develop technology-based learning.
7.	Grade VI Teacher	The principal gave the opportunity to try new learning methods.
8.	Islamic Education Teacher	He encouraged teachers to utilize learning applications and videos.
9.	Physical Education Teacher	I am encouraged to use sports demonstration videos and visual media for students.
10.	Educational Personnel	The principal always supports the development of technology-based school programs.

D. Dimension of Individualized Consideration

Question 4

How do principals provide support to teachers who are still experiencing difficulties in using technology?

NO	Informant	Answer
1.	Headmaster	I provide mentoring and direct teachers to learn together with colleagues who understand technology better.
2.	First Grade Teacher	The principal helps if we have problems using technology.
3.	Second Grade Teacher	We were given the opportunity to ask questions and discuss the use of technology.
4.	Grade III Teacher	The principal provides direct direction when necessary.
5.	Fourth Grade Teacher	He encouraged teachers to take relevant training.
6.	Fifth Grade Teacher	The principal pays attention to the needs of each teacher in using technology.
7.	Grade VI Teacher	We always get support to improve our digital capabilities.
8.	Islamic Education Teacher	The principal provides motivation and guidance according to teacher needs.
9.	Physical Education Teacher	I received instructions on using video media for sports practice learning.
10.	Educational Personnel	The principal tries to help teachers who experience difficulties in using technology.

E. Technology-Based Learning Innovation

Question 5

What technologies are used in the learning process at SD Negeri 2 Pagar Kaya?

NO	Informant	Answer
1.	Headmaster	Teachers use laptops, LCD projectors, the internet, learning videos, and interactive boards.
2.	First Grade Teacher	I use learning videos and digital images.
3.	Second Grade Teacher	I use a laptop and LCD projector.
4.	Grade III Teacher	I use educational videos from the internet.
5.	Fourth Grade Teacher	I use PowerPoint and digital media.
6.	Fifth Grade Teacher	I use the internet as a learning resource.
7.	Grade VI Teacher	I use interactive boards in certain lessons.
8.	Islamic Education Teacher	I use learning videos and digital presentations.
9.	Physical Education Teacher	I use sports movement videos and visual media for student practice.
10.	Educational Personnel	The most frequently used technologies are laptops, LCDs, and school internet.

F. Supporting and Inhibiting Factors

Question 6

What are the factors that support and hinder technology-based learning innovation in schools?

NO	Informant	Answer
1.	Headmaster	Teacher support and facilities are supporting factors, while limited internet access is an obstacle.
2.	First Grade Teacher	The principal's support is very helpful for learning innovation.
3.	Second Grade Teacher	Availability of facilities is the main supporting factor.
4.	Grade III Teacher	The obstacle that often arises is an unstable internet network.
5.	Fourth Grade Teacher	Teacher training is a supporting factor for innovation.
6.	Fifth Grade Teacher	Limited number of devices is still an obstacle.
7.	Grade VI Teacher	Teacher motivation supports the use of technology in learning.
8.	Islamic Education Teacher	Differences in digital skills between teachers are a challenge in themselves.
9.	Physical Education Teacher	Practical subjects sometimes require more specific technological media.
10.	Educational Personnel	Procurement and maintenance of technological facilities requires considerable costs.

Based on the results of research conducted at SD Negeri 2 Pagar Kaya through interviews, observations, and documentation techniques, various findings were obtained related to the role of the principal's transformational leadership in encouraging technology-based learning innovations in teachers. These research findings were obtained from key informants, namely the principal and teachers, and were strengthened by school documentation data related to the implementation of technology-based learning. In general, the results of the study indicate that the principal plays a significant role in encouraging teachers to begin utilizing technology in the learning process. This role is seen through providing motivation, support, supervision, and the provision of supporting facilities for technology-based learning. In addition, teachers have also begun to demonstrate efforts to innovate in learning through the use of digital media, learning videos, projectors, and interactive boards as learning tools in the classroom. However, the implementation of technology-based learning innovations in schools still faces several obstacles, such as differences in digital skills among teachers, uneven use of technology in each class, and limited teacher experience in developing technology-based learning media independently. Nevertheless, the support of the principal and a culture of cooperation among teachers are supporting factors in the development of learning innovations in schools.

The results of the study indicate that SD Negeri 2 Pagar Kaya implemented various strategies to support technology-based learning innovation. These strategies were implemented by the principal as a form of transformational leadership implementation, namely through efforts to plan programs, provide facilities, supervise, and build a collaborative work culture among teachers. This strategy aims to ensure that learning innovation is not only an individual teacher initiative, but also develops into a sustainable school culture. From a transformational leadership perspective, strengthening a collaborative culture reflects the principal's ability to build a work environment that supports change. The principal does not only focus on individual direction but also creates a social system that encourages collaborative learning. This strategy strengthens the intellectual stimulation dimension because teachers are encouraged to think creatively through discussions, and individualized consideration because each teacher receives support according to their needs. Overall, the results of the study indicate that strengthening a collaborative culture of teachers is an important strategy in supporting technology-based learning innovation at SD Negeri 2 Pagar Kaya. The principal successfully created a work environment that encourages teachers to share, discuss, and help each other. This collaborative culture makes the technology adaptation process more effective and sustainable. Thus, the principal's transformational leadership strategy is not only visible from program planning, provision of facilities, and supervision, but also from his/her ability to build a support system through collaboration between teachers so that technology-based learning innovations can be implemented optimally.

Likewise, the research results show that the principal's transformational leadership has encouraged the emergence of various forms of technology-based learning innovations implemented by teachers at SD Negeri 2 Pagar Kaya. This innovation is evident in the use of digital media in the learning process, both as a tool to assist in delivering material and as a means of increasing student engagement. Overall, the technology-based learning innovations implemented by teachers at SD Negeri 2 Pagar Kaya indicate positive changes in the teaching and learning process at the school. The use of learning videos, laptops and projectors, the internet as a learning resource, digital presentations, and simple interactive media are evidence that teachers have begun to adapt to developments in educational technology. These innovations emerged not only due to individual teacher initiatives, but also due to the support of the principal's transformational leadership, which created a school environment that was open to change, collaborative, and supportive of the development of teacher creativity in learning.

Discussion

The findings indicate that the principal of SD Negeri 2 Pagar Kaya effectively demonstrates transformational leadership in promoting technology-based learning innovation. The principal functions not only as an administrative manager but also as a change agent who cultivates a school culture that is adaptive to technological advancement in education (Liyustari, 2025). In elementary education, principals play a strategic role in determining school policies, creating a supportive organizational climate, and facilitating teachers to implement learning that meets contemporary educational demands (Bagas & Hasanah, 2026). Consequently, effective leadership directly contributes to the development of innovative teaching practices (Yuliawati et al., 2024).

These findings support Bass's Transformational Leadership Theory, which emphasizes four key dimensions of transformational leadership: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. In the school setting, principals act as change agents who inspire teachers to improve instructional quality and embrace innovation (Wardani & Utami, 2026). The results are also consistent with Rogers' Diffusion of Innovation Theory, which argues that innovation is more readily adopted when organizational leaders actively promote and model change. In this study, the principal encouraged teachers to integrate technology into classroom instruction by demonstrating commitment to digital transformation, thereby strengthening teachers' willingness to adopt new practices (Kadluba et al., 2025). Such leadership exemplifies the importance of role modelling in facilitating organizational change (Wibowo, 2023). Principals who consistently demonstrate commitment to innovation are more successful in building teacher engagement and support for school improvement initiatives (Chasbullah & Rindaningsih, 2025; Yaw et al., 2025).

The principal also succeeded in establishing a shared vision regarding the importance of technology-based learning innovation (Yuliawati et al., 2024). According to Bass, transformational leaders motivate organizational members by communicating a compelling vision that encourages collective commitment to common goals (Rahmatullah & Hidayat, 2024). In this study, the principal's motivation increased teachers' openness toward integrating digital media into classroom instruction (Mizal et al., 2023). Furthermore, the school environment promoted creativity and innovation by encouraging teachers to experiment with technology and explore new instructional approaches without fear of failure, reflecting the principle of intellectual stimulation within transformational leadership (Munandar et al., 2025; Sholeh, 2021).

These findings are consistent with previous studies demonstrating that transformational leadership positively influences teachers' instructional innovation (Haesthetics et al., 2023). Similarly, Leithwood et al. (2020) reported that transformational principals strengthen teacher commitment, foster collaboration, and create school cultures that support innovation. Overall, the findings confirm that the principal's transformational leadership plays a pivotal role in promoting technology-based learning innovation at SD Negeri 2 Pagar Kaya. Through exemplary leadership, inspirational motivation, intellectual stimulation, and individualized support, the principal enables teachers to adapt to technological change while enhancing instructional quality. These results reinforce Bass's view that transformational leaders function not only as managers but also as agents of change who inspire organizational members to innovate and achieve continuous improvement (Rizky et al., 2025).

The success of technology-based learning innovation at SD Negeri 2 Pagar Kaya is further supported by a collaborative school culture that emphasizes continuous professional development. The principal actively facilitates teacher participation in training programs, professional collaboration,

and the exchange of instructional experiences, enabling teachers to develop innovative learning media and technology-enhanced teaching strategies. Such initiatives foster a positive professional environment that strengthens teachers' competencies and confidence in integrating technology into classroom practice. Consequently, transformational leadership contributes not only to improving instructional quality but also to enhancing the school's overall readiness to respond to the challenges of education in the digital era.

Conclusions

Based on research conducted at SD Negeri 2 Pagar Kaya, it is clear that the principal's leadership plays a crucial role in encouraging technology-based learning innovation. This role is evident in the principal's efforts to guide teachers in adapting the learning process to evolving technological developments.

1. The principal's transformational leadership plays a role in encouraging teachers to implement technology-based learning innovations. Through motivation, guidance, and support, the principal is able to build teacher awareness of the importance of utilizing technology in teaching and learning activities.
2. The transformational leadership strategies implemented by the principal are implemented through technology-based learning program planning, provision of supporting facilities and infrastructure, academic supervision, and strengthening a culture of collaboration among teachers. This strategy demonstrates that learning innovation does not occur spontaneously but is supported by planned school policies.
3. Technology-based learning innovations implemented by teachers are evident in the use of instructional videos, laptops and projectors, the internet as a supplementary learning resource, digital presentations, and simple interactive media. These innovations demonstrate that teachers have begun adapting to technological developments to create more engaging and effective learning.
4. The success of technology-based learning innovations does not only depend on the abilities of individual teachers, but is also influenced by the support of the principal in creating policies, providing facilities, and building a school culture that supports change.

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