

Digital Transformational Leadership and Innovation Culture: Understanding Children's Learning Experiences in An Indonesian Elementary School

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Abstract

Digital transformation in elementary education requires more than the adoption of technological tools; it also involves leadership practices, organizational culture, teacher innovation, and the quality of children's everyday learning experiences. This qualitative case study explored how digital transformational leadership and an innovation-oriented school culture were enacted in a public elementary school and how these practices were reflected in children's learning experiences. The study was conducted at SD Negeri 067242 Medan and involved one principal, three Grade 6 teachers, and ten Grade 6 students. Data were collected through semi-structured interviews, observations, and document analysis and were analyzed using the interactive model of data condensation, data display, and conclusion drawing and verification. The findings indicate that digital transformational leadership was enacted through four interconnected practices: articulating a digital-oriented vision, empowering teachers to experiment with instructional practices, facilitating professional collaboration, and strengthening digitally supported organizational communication. The innovation-oriented culture was reflected in teacher experimentation, collaboration, responsiveness to students' learning needs, and the development of participatory learning activities. From the children's perspectives, these practices were experienced through varied and interactive learning activities, opportunities to participate and express opinions, supportive teacher-student relationships, and greater comfort and confidence in classroom interaction. Rather than demonstrating a causal or mediating relationship, the findings suggest an interpretive pathway in which digital transformational leadership, innovation-oriented culture, teacher practices, and children's learning experiences are interconnected within the case. The study contributes a child-centered perspective to digital school leadership by emphasizing that the educational significance of digital transformation lies not only in technology adoption but also in how leadership and innovation are translated into everyday classroom experiences.

Keywords: digital transformational leadership; innovation-oriented culture; children's learning experiences; elementary school; digital leadership

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1. Introduction

Digital technology has fundamentally reshaped school management, communication, teacher collaboration, and daily classroom instruction. Yet, digital transformation in primary education is about far more than just rolling out devices and software; it depends heavily on strong leadership and an organizational climate that nurtures meaningful learning ((OECD, 2023)). School principals, in particular, serve as key catalysts in turning digital opportunities into practical classroom realities. While research on digital school leadership has expanded rapidly in recent years, the literature remains somewhat scattered across different fields (Wollscheid & Edelhard, 2025).

Digital transformational leadership extends transformational principles to tech-driven school contexts. School principals, particularly in developing education systems, face complex dynamics when guiding digital adoption (Dasruth et al., 2024). Recent studies highlight that effective digital leadership relies on principals' technological self-efficacy and active support, which directly drive teachers' technology integration in classrooms (Laouni, 2023; Maala & Lagos, 2022). Furthermore, leaders play a critical role in balancing the "push and pull" factors

of digital resources, ensuring that technological adoption enhances instruction rather than creating friction or backfiring in practice (Asante & Novak, 2024).

To better understand this role, digital transformational leadership applies traditional transformational principles to today's tech-driven educational landscape. On the ground, these manifest as articulating a shared digital vision, supporting staff, encouraging instructional trial-and-error, fostering collaboration, and addressing teachers' individual professional needs. Existing studies frequently link digital leadership to teacher innovation and updated teaching methods (Saewa & Wechayaluck, 2024; Timan & Imron, 2022). However, most of this work focuses on teacher-level or organizational outcomes, often overlooking how these changes ripple down into children's day-to-day learning.

Leadership does not operate in a vacuum, it is deeply tied to organizational culture, which can either foster or stifle innovation. An innovation-oriented school culture encourages teachers to collaborate, experiment, learn continuously, and try out new ways of teaching. (Erdoğan et al., 2024) underscored how a supportive culture fuels collective teacher innovation. In the Indonesian context, research in elementary schools has similarly connected transformational leadership and school culture with broader organizational change (Windasari et al., 2023). Still, we know surprisingly little about how this interplay between leadership and culture actually plays out in daily classroom activities and how pupils experience it firsthand.

Listening to children's voices is vital here. True educational innovation isn't just about adopting new gadgets; it's about creating learning environments where students feel engaged, supported, emotionally secure, and heard. Research on child-friendly schools consistently highlights that student-centered learning and supportive relationships are crucial for children's overall well-being (Mangestuti et al., 2022). Unfortunately, young students are still largely treated as passive recipients of educational change, rather than active participants whose lived experiences can reveal the real impact of these innovations.

An innovation-oriented school culture thrives when transformational leadership intersects with teachers' self-efficacy to encourage innovative work behaviors (Bakker et al., 2023; Zainal et al., 2021). Rather than relying solely on top-down directives, a supportive culture empowers transformative teacher leadership, allowing educators to actively co-create innovative learning practices and share resources across peer networks (Jakavonytė-štaškuvienė & Barkauskienė, 2023).

Children's perspectives are vital because educational innovation is meaningful only when learning environments support active participation, voice, and emotional security. Research underscores that cultivating student voice within a supportive school culture fosters positive attitudes toward learning and democratic participation (Kan et al., 2024). Moreover, teacher support that addresses students' psychological needs directly enhances classroom engagement and reduces learning anxiety among elementary school students (Patall et al., 2024; Zhang et al., 2024). When teachers provide consistent instructional and emotional support, students develop stronger academic self-efficacy, leading to deeper participation in everyday learning activities (Yang et al., 2023).

This study directly addresses three key gaps in the current literature. First, existing research on digital leadership tends to overemphasize tech integration, professional development, and high-level school outcomes. Second, studies exploring leadership and innovation rarely look closely at how these ideas translate into actual classroom teaching

practices. Third, children's own perspectives on these tech-enabled learning environments remain largely missing from the conversation. Bridging these gaps requires a holistic approach, one that examines leadership, school culture, teacher practices, and student experiences together within a real-world elementary school context.

To structure this exploration, the study conceptualizes digital transformational leadership through four dimensions, using an innovation-oriented culture as the backdrop for teacher collaboration and classroom experimentation. It maps out an interpretive pathway linking digital transformational leadership, an innovative school culture, adaptive teaching practices, and children's lived experiences. Importantly, this pathway serves as a qualitative lens to guide our interpretation, rather than a rigid statistical model meant to prove direct cause-and-effect or mediation.

Guided by this framework, the study addresses three central research questions: How does the elementary school principal enact digital transformational leadership to drive innovation within the school? In what ways does the school's culture of innovation shape teachers' classroom practices and the overall learning environment? How do children experience and perceive the learning environment created through these digital leadership and innovation efforts? By bringing together the perspectives of the principal, teachers, and students, this study offers a child-centered view of how digital leadership and school innovation actually take shape in everyday school life.

2. Method

This study employed a qualitative case study design to examine how digital transformational leadership and an innovation-oriented school culture were enacted and reflected in children's learning experiences. The research was conducted at SD Negeri 067242 Medan, a public elementary school in Medan, North Sumatra, Indonesia, focusing on Grade 6. Participants were selected purposively and consisted of one principal, three Grade 6 teachers (two women and one man, each with five years of teaching experience), and ten students. To protect confidentiality, participants were coded as P1, T1–T3, and S1–S10.

Table 1. Participants' Coding

Code	Participant	Grade/Role
P1	Principal	School principal
T1	Teacher	Grade 6
T2	Teacher	Grade 6
T3	Teacher	Grade 6
S1-S10	Student	Grade 6

Data were collected through semi-structured interviews, observations, and document analysis. The data were analyzed using Miles, Huberman, and Saldaña's (2014) interactive model, comprising data condensation, data display, and conclusion drawing and verification. Deductive and inductive coding identified themes related to digital leadership, teacher empowerment, professional collaboration, instructional innovation, student participation, and learning experiences. The analysis addressed each research question separately and compared available evidence across participants and data sources. The findings were interpreted through an interpretive pathway connecting digital transformational leadership, innovation-oriented school culture, adaptive teaching practices, and children's learning experiences, without claiming statistically established causal or mediating relationships.

Trustworthiness was supported through source and methodological triangulation, member checking, prolonged engagement, and an audit trail. Ethical procedures included school permission,

informed consent from adult participants and parents or guardians, and age-appropriate assent from student participants. Participation was voluntary, and confidentiality was maintained through participant coding.

3. Results

3.1 RQ1: How is digital transformational leadership enacted by the elementary school principal in promoting innovation within the school?

Digital transformational leadership at SD Negeri 067242 Medan primarily manifests through four interconnected practices: articulating a digital-oriented vision, empowering teachers to experiment, facilitating collaborative learning among staff, and leveraging digital media for organizational communication. These practices align closely with the four dimensions of transformational leadership, inspirational motivation, intellectual stimulation, individualized consideration, and idealized influence (Bass & Avolio, 1994). Notably, the digital aspect went beyond merely introducing technological tools; it was centered on using digital resources to elevate pedagogy and strengthen professional interaction.

3.1.1 Developing a Digital-Oriented Vision

The principal explicitly framed technology as a catalyst for learning rather than an end goal in itself. As P1 emphasized:

“Yang paling penting adalah bagaimana teknologi itu bisa membantu guru memberikan pengalaman belajar yang lebih baik kepada anak.”

This pedagogical focus echoes contemporary arguments that digital education is most effective when guided by meaningful learning objectives rather than technology adoption for its own sake (Berkovich & Hassan, 2025; OECD, 2023).

3.1.2 Empowering Teacher Experimentation

Rather than demanding immediate perfection, the principal cultivated a safe space for instructional trial and error. P1 noted:

“Kalau ada yang belum berhasil, kita evaluasi bersama dan mencari cara lain.”

Teachers confirmed this approach, noting that they felt trusted to choose media and apps that best suited their classrooms. These accounts reflect both intellectual stimulation and individualized consideration, framing innovation as an ongoing, iterative process. This dynamic aligns with broader research linking supportive digital leadership to heightened teacher innovation (Saewa & Wechayaluck, 2024).

3.1.3 Facilitating Collaborative Professional Learning

Digital channels became active spaces for professional growth, where teachers routinely exchanged teaching apps, media, and lesson ideas. T1 described this organic sharing:

“Guru lain bisa mencoba atau memodifikasinya sesuai dengan kelas masing-masing.”

By using digital tools to streamline knowledge sharing, the school built a collective learning habit, a dynamic widely recognized as crucial for sustained educational innovation (OECD, 2023).

3.1.4 Supporting Organizational Communication

Digital platforms significantly sped up day-to-day coordination. As T2 pointed out:

“Kalau ada informasi atau kegiatan yang harus segera dikoordinasikan, bisa langsung disampaikan melalui grup.”

Crucially, the principal maintained that messaging apps were never meant to replace face-to-face check-ins or classroom visits. Instead, digital tools served as a complementary layer to leadership, ensuring efficiency without diluting personal engagement (OECD, 2023).

Overall, digital transformational leadership at the school blended pedagogical clarity with teacher autonomy, peer collaboration, and streamlined communication. Together, these practices established the organizational groundwork for instructional innovation. Rather than proving a direct cause-and-effect pipeline, these qualitative findings illustrate a supportive pattern of alignment between leadership practices and an emerging culture of innovation.

3.2 RQ2: How is the school’s innovation culture reflected in teachers’ practices and the learning environment?

The school's innovation culture revealed itself across four main practices: instructional experimentation, collaborative lesson planning, responsiveness to student needs, and active classroom engagement. Rather than proving a direct causal chain, these patterns illustrate how leadership support for innovation filtered down into daily teaching habits and classroom dynamics.

3.2.1 Experimentation in Teaching Practices

Teachers described a clear shift away from rigid routine toward reflective experimentation. T1 reflected on this change:

“Previously, I tended to use the same teaching methods because I was accustomed to them. Now we are encouraged to try different approaches.”

T2 echoed this sentiment, highlighting how the fear of failure had diminished:

“Not every new method works immediately. However, because we are accustomed to discussing our experiences, we do not feel that an unsuccessful attempt means that we have failed.”

These insights show that experimentation was about adapting pedagogy, not just collecting new digital devices. This aligns with (OECD, 2023) framework on educational improvement and findings by Rasdiana et al., 2024 regarding digital leadership and teacher agility. Importantly, however, these conditions created *opportunities* for experimentation; they do not imply that every attempt was a success or that all teachers adopted new methods at the same pace.

3.2.2 Collaborative Lesson Development

Beyond individual trial and error, teachers routinely shared instructional materials and adapted peer ideas for their own classrooms. T2 explained:

“When someone has a medium or activity that they believe has worked well, it is usually shared with the other teachers. We then adapt it to the characteristics of the children in our respective classes.”

T3 added:

“When I have difficulties, I can ask other teachers. Sometimes an idea from another teacher actually helps me find a simpler way to teach the children.”

This peer support system reflects established literature on collaborative professional practices (Jakavonytė-staškuvienė & Barkauskienė, 2023; OECD, 2023). The data, however, point more toward practical resource-sharing than deep discussions over pedagogical theory.

3.2.3 Responsiveness to Children's Learning Needs

When trying new approaches, teachers prioritized learning impact over technological novelty. As T1 observed:

"Some understand more quickly when they see pictures, some prefer listening to explanations, and others are more active when they directly engage in activities."

T3 similarly noted that the team constantly evaluates whether a tool *"actually helps children understand the material or makes them more active."*

This child-centric evaluation mirrors OECD, (2023) emphasis on meaningful technology integration. It should be noted, however, that these statements capture teachers' self-reported practices rather than measured gains in academic performance.

3.2.4 Creating a Participatory Learning Environment

Both teachers and students noted that varied classroom activities encouraged broader participation. T2 observed that interactive formats often brought quieter students out of their shells. Students confirmed this shift:

"When we learn through videos or games, I enjoy it more because I do not only listen" (S4). *"I prefer it when the teacher gives us opportunities to choose or express our opinions"* (S7).

These accounts capture how student-centered practices build supportive, participatory classrooms, echoing research on child-friendly learning environments (Mangestuti et al., 2022). Rather than claiming that innovation culture directly *caused* higher engagement, these findings simply demonstrate how organizational norms for experimentation materialized in daily classroom interactions.

In short, the school's culture of innovation was manifested through practical experimentation, peer collaboration, pedagogical adaptation, and student participation—reflecting a broader commitment to refining teaching practices beyond basic technology use.

3.3 RQ3: How do children experience and perceive the learning environment associated with digital transformational leadership and innovation practices?

Reflections from ten Grade 6 students revealed four distinct dimensions of their learning experience: engagement through varied activities, opportunities for active expression, supportive teacher–student relationships, and a sense of comfort and confidence. Naturally, students experienced these factors directly at the classroom level rather than attributing them to the principal's leadership actions.

3.3.1 Engagement through Varied Learning Activities

Students consistently linked high engagement with lesson variety—such as blending videos, visuals, games, and group tasks. As S2 noted:

"Kalau guru menggunakan video atau gambar, saya lebih mudah memperhatikan."

S4 shared a similar preference:

"Saya suka kalau pembelajaran tidak selalu sama."

These comments highlight that students valued variety itself rather than tech for tech's sake. Digital resources proved effective primarily when embedded within engaging, dynamic activities (OECD, 2023).

3.3.2 Opportunities to Participate and Express Ideas

Participation meant more than just completing assignments; students valued having a voice and feeling safe to make mistakes. S1 shared:

“Kalau jawaban saya salah, guru biasanya menjelaskan lagi, jadi saya tidak terlalu takut untuk mencoba.”

S3 added:

“Kami juga bisa menyampaikan apa yang kami pikirkan.”

While teacher experimentation provided the foundation for these open interactions, students naturally perceived these benefits through their daily exchanges with teachers rather than connecting them to leadership initiatives.

3.3.3 Supportive Teacher–Student Relationships

When asked what made learning supportive, students pointed to teacher patience, approachable communication, and encouragement. S10 noted:

“Biasanya guru menjelaskan lagi dengan cara yang berbeda.”

S6 added:

“Guru biasanya mengatakan supaya kami mencoba lagi.”

These reflections underline that human relationships remain the bedrock of a positive learning environment, fully consistent with findings on student well-being (Mangestuti et al., 2022). No amount of digital innovation diminished the need for supportive human connection in the classroom.

3.3.4 Comfort and Confidence during Learning

Collaborative tasks and low-stakes environments noticeably boosted student confidence. S8 explained:

“Saya lebih percaya diri kalau belajar dalam kelompok.”

S9 reflected:

“Kalau ada kegiatan, saya lebih semangat mengikuti pelajaran.”

Group work provided peer support, while hands-on activities built enthusiasm. Because this study offers a point-in-time snapshot, these statements capture student impressions during the research period rather than tracking long-term shifts in self-efficacy.

Taken together, children experienced school innovation through concrete, classroom-level moments: varied lesson design, freedom of expression, patient teachers, and peer collaboration. These experiences integrated both digital and non-digital elements. The link between principal leadership and student experience is best understood as an interpretive pathway: administrative leadership fostered innovative school norms, which encouraged adaptive teaching, ultimately shaping the daily classroom environment that children experienced.

4. Discussion

4.1 Digital Transformational Leadership and Innovation Culture

The findings show that digital transformational leadership manifested through a shared, tech-oriented vision, teacher empowerment, active professional collaboration, and streamlined digital communication. These practices correspond neatly to the four core dimensions of transformational leadership outlined by Bass and Avolio (1994): inspirational motivation, intellectual stimulation, individualized consideration, and idealized influence. Crucially, the "digital" aspect here was not simply about adopting hardware or software; rather, it was about purposefully weaving technology into leadership channels, staff support systems, collaborative networks, and pedagogical growth. This finding reinforces Berkovich & Hassan (2025) perspective on meaningful digital adoption and supports existing research linking digital leadership with enhanced teacher innovativeness (Saewa & Wechayaluck, 2024).

This culture of innovation was equally visible in how teachers actively experimented with new methods, shared instructional materials, and adapted teaching practices. These dynamics mirror the work of Erdoğan et al., (2024) who emphasized the role of a supportive school climate in driving collective innovation. It is important to note, however, that these qualitative patterns reflect an organic alignment among leadership behaviors, peer collaboration, and classroom trial-and-error rather than proving a direct, deterministic cause-and-effect pipeline between leadership and school culture.

The findings confirm that the principal's digital leadership served as a key driver for school innovation. This aligns with Banoğlu et al. (2023) and Maala & Lagos (2022), who demonstrated that school heads' technology leadership directly fosters a learning-organization culture and enhances teachers' integration of digital tools. Furthermore, by framing failure as an opportunity for joint evaluation, the principal helped mitigate the potential backfire of digital resource adoption, underscoring the crucial buffering role of digital leaders identified by Asante and Novak (2024). This environment also nurtured teachers' self-efficacy and innovative behaviors (Zainal et al., 2021), allowing transformative teacher leadership to emerge organically (Jakavonytė-staškuvienė & Barkauskienė, 2023).

4.2 Children's Learning Experiences and the Interpretive Pathway

Students experienced educational innovation through participatory, interactive, and supportive classroom interactions rather than directly perceiving administrative leadership. This finding reinforces the broader literature on student engagement, which shows that teacher support for students' psychological needs and opportunities to exercise "student voice" cultivate comfort, confidence, and active participation in elementary classrooms (Kan et al., 2024; Patall et al., 2024). Furthermore, the positive correlation between supportive teacher behaviors and heightened student engagement aligns with longitudinal and empirical evidence in primary education (Yang et al., 2023; Zhang et al., 2023).

From the students' perspective, positive learning experiences were defined by interactive tasks, open participation, approachable teacher–student relationships, and a safe classroom atmosphere. These accounts underscore a key insight: the true educational value of digital innovation lies not in the sophistication of the technology itself, but in how thoughtfully teachers leverage tools to deepen student engagement and participation. This aligns closely

with research on child-friendly schools, which positions student-centered learning and supportive relationships at the heart of student well-being (Mangestuti et al., 2022).

Unsurprisingly, primary school children did not perceive or evaluate the principal's administrative leadership directly. Instead, their reflections offer a window into the everyday classroom interactions through which broader organizational priorities actually take root. Synthesizing these insights across principal interviews, teacher accounts, classroom observations, documents, and student reflections reveals an overarching interpretive pathway: Digital Transformational Leadership → Innovation-Oriented School Culture → Teacher Experimentation and Collaboration → Adaptive Classroom Practices → Children's Learning Experiences.

This conceptual pathway serves as a qualitative lens to trace how leadership intent filters through school culture and teaching habits down into student experiences. It is intended to map contextual relationships within this specific case, rather than present a statistically validated structural equation or mediation model.

4.3 Implications and Limitations

Theoretically, this study bridges a critical gap by connecting digital leadership, school culture, teacher practice, and student voice within a single elementary school context. From a practical standpoint: For School Principals: Leadership should focus primarily on the pedagogical purpose of technology rather than mere tool adoption. Principals can nurture growth by providing safe spaces for teacher experimentation, fostering peer collaboration, and using digital communication to facilitate ongoing professional learning. For Teachers: Digital and traditional media should be adapted flexibly around student needs, prioritizing participatory learning and emotionally supportive teacher–student relationships. For Educational Decision-Makers: School improvement efforts should systematically include children's perspectives, as the real success of any educational innovation is ultimately reflected in their daily learning experiences.

4.3.1 Limitations and Future Directions

Several limitations should be considered when interpreting these findings: Scope and Transferability: The study was conducted in a single public elementary school with a relatively small participant sample, which naturally limits the broad transferability of the findings to other contexts. Potential Response Bias: Self-reported interview data may carry subtle social desirability bias, and participant selection could have introduced sample bias if school administration played a role in teacher recruitment. Cross-Sectional Snapshots: The study used a cross-sectional design without baseline data, preventing definitive conclusions about long-term institutional change or growth over time. Data Triangulation Constraints: Observational and documentary evidence provided more secondary corroboration compared to the rich detail gathered through direct interviews.

To build on these insights, future research could explore multi-school comparative designs, incorporate longitudinal observations, and collect baseline-to-follow-up data to test whether similar interpretive pathways emerge across diverse educational settings.

5. Conclusion

This study explored how digital transformational leadership and an innovation-oriented school culture filter into daily teaching practices and children's lived learning experiences at SD Negeri 067242 Medan. The findings reveal that digital leadership in this context was anchored in a clear pedagogical vision, active teacher empowerment, peer collaboration, and strategically used digital communication. In turn, an innovative school culture manifested through teachers' willingness to experiment, share instructional resources, and adapt lessons around student needs. From the students' perspective, the true value of these tech-supported environments rested on interactive learning formats, meaningful opportunities to participate, emotionally supportive teacher–student relationships, and a safe, comfortable classroom atmosphere.

To synthesize these dynamics, the study offers an interpretive pathway linking digital transformational leadership, an innovation-oriented school climate, adaptive teaching practices, and children's classroom experiences. Rather than serving as a statistically proven causal or mediating model, this pathway provides a qualitative lens for understanding how leadership priorities organically permeate everyday classroom life.

Practically, these insights suggest that school leaders should look beyond hardware acquisition and focus on the pedagogical purpose of technology, fostering environments where teachers feel safe to experiment and collaborate. Furthermore, school improvement initiatives should actively incorporate children's voices, as the ultimate test of any educational innovation lies in how students experience their daily learning. Given that this study was conducted within a single elementary school context, these findings should be interpreted qualitatively and contextually. Future research across multiple school sites and extended timeframes would offer valuable insights into whether similar interpretive pathways operate across broader, more diverse educational settings.

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