

Implementation of Deep Learning Using Google Forms and Google Classroom for Learning and Assessment at Pekuwolan Public Basic School, Buay Rawan, OKU Selatan

Riduan¹

¹Universitas PGRI Palembang, Indonesia

*Corresponding author: riduansaidi7a@gmail.com

Abstrak

Transformasi digital dalam dunia pendidikan telah menjadi kebutuhan global di era abad ke-21. Penelitian ini membahas penerapan pembelajaran mendalam melalui pemanfaatan platform digital Google Forms dan Google Classroom di Sekolah Dasar Negeri Pekuwolan. Sebelum transformasi, proses pembelajaran masih bersifat konvensional dan berpusat pada guru, mengandalkan metode ceramah, buku teks, dan latihan tertulis. Proses penilaian dilakukan secara manual, sehingga kurang efisien, rawan kesalahan, dan memakan waktu lama dalam pengolahan serta pelaporan hasil belajar. Dengan dukungan infrastruktur digital, pelatihan TPACK untuk guru, dan integrasi platform Google, sekolah berhasil menciptakan sistem pembelajaran yang lebih interaktif, efisien, dan berpusat pada siswa. Hasil penelitian menunjukkan peningkatan adaptasi guru terhadap teknologi, kemandirian dan keterlibatan siswa yang lebih tinggi, serta efisiensi signifikan dalam proses penilaian berbasis data. Penelitian ini menegaskan bahwa kunci keberhasilan transformasi digital tidak hanya terletak pada alat teknologi, tetapi juga kesiapan sumber daya manusia dan perubahan budaya belajar menuju pembelajaran yang bermakna, sadar, menyenangkan, dan mendalam.

Kata kunci: Transformasi Digital, Pembelajaran Mendalam, Google Forms, Google Classroom, Penilaian Digital

Abstract

Digital transformation in education has become a global necessity in the 21st century. This research discusses the implementation of deep learning using the digital platforms Google Forms and Google Classroom at Pekuwolan Public Basic School. Before the transformation, the learning process was still conventional and teacher-centered, relying on lectures, textbooks, and written exercises. The assessment process was conducted manually, which was less efficient, prone to errors, and time-consuming in processing and reporting learning outcomes. With the support of digital infrastructure, TPACK training for teachers, and the integration of Google platforms, the school successfully created a learning system that is more interactive, efficient, and student-centered. The research results show increased teacher adaptation to technology, higher student independence and engagement, and significant efficiency in data-driven assessment processes. This study confirms that the key to successful digital transformation lies not only in technological tools but also in human resource readiness and a shift in learning culture toward meaningful, mindful, enjoyable, and deep learning.

Keywords: Digital Transformation, Deep Learning, Google Forms, Google Classroom, Digital Assessment

1. INTRODUCTION

Digital transformation in education has evolved from being an optional innovation to an unavoidable imperative in the era of globalized 21st-century learning. This phenomenon is driven by rapid advancements in information and communication technology (ICT) as well as shifting demands for competencies that extend far beyond rote memorization and recall (Jaelani, Zulfitri, & Prapantja, 2025). Modern educational paradigms emphasize not only

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academic proficiency but also the mastery of critical competencies such as collaboration, communication, creativity, critical thinking, and digital literacy collectively known as *21st-century skills* (Rivera et al., 2025; Wibowo, Widiarti, & Widiyatmoko, 2026). These skills enable students to navigate complexity and uncertainty in a world where learning increasingly takes place in digital environments.

In the context of primary education, institutions like Pekuwolan Public Basic School serve as critical spaces for foundational learning and character development. However, traditional teacher-centered methodologies characterized by lecture-based instruction, reliance on physical textbooks, and paper worksheets are ill-suited for realizing the full potential of *deep learning* within digital environments. Pedagogical literature has repeatedly demonstrated that overly teacher-centered models can suppress student agency, limit exploratory learning, and hinder student engagement (Cappial, 2025). Consequently, educators and institutions are calling for transformations that prioritize student interaction, self-directed learning, and authentic assessment.

One key theoretical foundation for understanding such transformation is the Technological Pedagogical Content Knowledge (TPACK) framework, which emphasizes the need for teachers to deepen their competencies across technological, pedagogical, and content dimensions simultaneously (Silalahi, Koto, & Putri, 2025; Rosa, 2025). The TPACK model aligns with constructivist learning principles that learners actively construct understanding through interaction with tools, peers, and contexts. This framework has been shown to effectively support technology integration into instructional design and improve the quality of 21st-century teaching (Aziez, Sadeli, & Furqon, 2025). Deep learning, in this context, refers to instructional strategies that actively engage students with higher-order cognitive processes, rather than passive reception of information.

Despite increasing awareness of digital transformation's benefits, implementation barriers remain pervasive in many primary schools. Limited digital infrastructure, inadequate internet connectivity, and teachers' low digital literacy continue to obstruct meaningful integration of technology into classrooms (Jaelani et al., 2025). This aligns with broader findings of disparities in digital adoption between urban and rural educational settings, where unequal distribution of ICT resources limits the extent to which digital learning platforms such as Google Classroom can be effectively utilized (Astari & Yulianto, 2025). In addition, teacher readiness is constrained not only by infrastructural shortcomings but also by insufficient professional development designed to support digital pedagogies (Ning & Danso, 2025). These challenges underscore the need for context-informed strategies that extend beyond mere access to devices.

Another theoretical lens relevant to this study is *Assessment for Learning*, which argues that assessment should contribute to learning by offering timely, constructive feedback that empowers learners to self-regulate their progress (Wibowo et al., 2025). Conventional assessment practices manual correction of printed work and delayed reporting fail to support formative learning processes. Integrating digital assessment through platforms like Google Forms can improve accuracy, efficiency, and immediate feedback delivery. Digital assessment tools also provide rich data analytics, allowing teachers to identify student learning needs in real time and adjust instruction accordingly.

Despite these theoretical insights, gaps remain in research related to the actual impacts of digital transformation initiatives at the primary school level, especially in rural or under-

resourced contexts. Most existing studies focus on secondary or higher education settings, or explore transformation at policy and macro levels (Jaelani et al., 2025). Fewer empirical studies document how specific tools like Google Classroom and Google Forms contribute to observable gains in student engagement, digital competence, and assessment quality in elementary environments. Additionally, while the TPACK framework underscores the importance of teacher competence in facilitating digital integration, less is known about how this framework interacts with *deep learning outcomes* specifically in primary school contexts.

The above limitations suggest a clear need for empirical research that examines how digital transformation strategies can be operationalized through specific platforms and pedagogical models. This need becomes even more pronounced when considering that teacher adaptation to technology and student autonomy are key predictors of successful transformation (Silalahi et al., 2025). Understanding these dynamics is especially important in Indonesian primary schools, where infrastructural and pedagogical disparities may inhibit widespread implementation of digital learning strategies.

Addressing these gaps is fundamental for formulating actionable recommendations that can benefit schools similar to Pekuwolan Public Basic School. Through systematic evaluation of how deep learning and digital platforms influence instructional practices, assessment processes, and student outcomes, educators and stakeholders can better align transformation efforts with institutional capacities and learning goals. Such insights also inform policy frameworks that support equitable access to digital resources and targeted professional development for teachers.

Given the above context, the present study investigates the implementation of deep learning through the utilization of digital platforms specifically Google Forms and Google Classroom in the teaching and assessment processes at Pekuwolan Public Basic School. This research explores the extent to which these platforms enhance interactivity, teacher adaptation to technology, student independence, engagement, and assessment efficiency. The study also examines how the integration of digital tools, guided by the TPACK framework, contributes to a shift from conventional models to more student-centered learning paradigms aimed at fostering deep, meaningful learning.

This investigation aims to enrich the literature on primary school digital transformation by providing empirical insights into how technology-based platforms can be effectively integrated into teaching, learning, and assessment. Specifically, this study evaluates the effectiveness of implementing deep learning through the utilization of digital platforms, namely Google Forms and Google Classroom, guided by the Technological Pedagogical Content Knowledge (TPACK) framework, in enhancing instructional delivery and assessment practices at Pekuwolan Public Basic School. The study seeks to examine how the integration of these technology-based tools supports more interactive, efficient, and meaningful learning experiences, while also improving teachers' ability to design, implement, and evaluate instruction. The findings are expected to contribute to both educational practice and policy development, particularly in primary school contexts facing similar technological and pedagogical challenges, by offering practical insights into effective strategies for digital transformation and deep learning implementation.

2. METHOD

This study employs a qualitative research approach using a case study design. The primary aim is to obtain an in-depth and holistic understanding of the conditions, challenges, and potentials within the school environment (Tracy, 2024). A qualitative approach is particularly suitable for this study because it allows researchers to explore rich descriptive data from multiple perspectives, capturing the lived experiences, interpretations, and views of participants regarding the phenomena under investigation. This approach ensures a comprehensive understanding of how digital transformation is implemented and experienced in a primary school setting (Creswell & Creswell, 2021).

Participants and Research Setting

The population for this study encompasses the entire school community at Pekuwolan Public Elementary School (SD Negeri Pekuwolan), including teachers, students, and students' parents or guardians. Data collection will be conducted in October 2025.

Key research subjects, or informants, will be selected using purposive sampling, a technique in which participants are chosen based on specific criteria ensuring they possess relevant knowledge, experience, or roles pertinent to the study objectives (Etikan & Bala, 2021). Selected informants are expected to provide critical insights into the implementation of digital learning and assessment using Google Forms and Google Classroom. The main informants include:

1. Teachers, including the school principal or management representatives who oversee educational operations.
2. Students, representing relevant grade levels to provide perspectives on learning experiences and engagement.
3. Parents or guardians, who are actively involved in or have substantial insights regarding the school's educational practices.

By including diverse perspectives, the study ensures data triangulation, which enhances the validity and reliability of the findings (Patton, 2022).

Data Collection Techniques

To obtain comprehensive data, the study employs three primary data collection techniques: participatory observation, in-depth interviews, and document analysis.

1. Participatory Observation

The researcher will conduct direct observation within the school environment to systematically record behaviors, interactions, and physical conditions. Field notes will document classroom activities, social interactions, and the use of digital platforms in teaching and assessment. Participatory observation allows the researcher to gain first-hand insight into the dynamics of the learning process and the practical application of digital tools (Tracy, 2024).

2. In-depth Interviews

Semi-structured interviews will be conducted with key informants, including teachers, students, and parents. These interviews aim to explore participants' experiences, perspectives, and challenges related to digital learning. An interview guide will provide structure, yet the process remains flexible to accommodate emergent topics or insights that arise during discussions. In-depth interviews help to uncover nuanced information that might not be visible through observation alone (Creswell & Creswell, 2021).

3. Documentation Study

Secondary data will be collected from official school documents, such as student and teacher statistical data, school strategic plans, lesson plans, and activity reports. Document analysis serves to complement observational and interview data, providing evidence to support and triangulate findings (Bowen, 2020).

Data Analysis Techniques

The study employs an interactive qualitative data analysis model, as described by Miles, Huberman, and Saldana (2020), combined with SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis to contextualize findings strategically. The analysis process consists of four main steps:

1. Data Reduction

Raw data obtained from observations, interviews, and documents are systematically selected, focused, and abstracted. Irrelevant or redundant information is filtered out, while relevant data are grouped into meaningful categories or themes related to digital learning implementation.

2. Data Display

The reduced data are presented in the form of narratives, matrices, flowcharts, or tables. This step facilitates the identification of patterns, relationships, and emerging themes, making complex information more interpretable (Miles et al., 2020).

3. SWOT Analysis

After data reduction and display, findings are classified into the four SWOT components: Strengths and Weaknesses (internal factors), and Opportunities and Threats (external factors). This step aids in understanding internal capacities and external challenges influencing the successful implementation of digital transformation within the school.

4. Conclusion Drawing and Verification

Tentative conclusions are drawn based on patterns and insights derived from the data. These conclusions are then verified through triangulationcross-checking information from multiple sources to ensure credibility, reliability, and validity. Final conclusions are justified based on evidence from multiple perspectives (Etikan & Bala, 2021; Patton, 2022).

By systematically applying these methods, the study provides a robust framework to understand how digital learning platforms, guided by the TPACK framework, are integrated into primary school teaching and assessment. This methodology ensures that findings are both holistic and actionable, contributing to improved educational practice and policy.

3. RESULT AND DISCUSSION

Result

Results The implementation of Google Classroom and Google Forms at UPT SD Negeri Pekuwolan demonstrated measurable improvements in teaching, learning, and assessment processes. The study assessed the impact of digital transformation through surveys, student learning outcomes, and reflective teacher discussions.

1. Teacher Creativity and Instructional Design

Teachers reported increased creativity in designing project-based learning, integrating multimedia, and implementing digital reflection exercises. Survey results indicated a mean score of 4.52 (SD = 0.36) on a 5-point scale regarding their confidence in utilizing digital platforms, reflecting a substantial improvement in digital pedagogical competence. These findings align with previous research indicating that technology integration enhances teacher autonomy and instructional creativity (Mahbera et al., 2025; Blyznyuk et al., 2025).

2. Student Engagement and Learning Outcomes

Students demonstrated heightened engagement and responsibility in learning activities. Pre-implementation assessment scores had an average mean of 71.3 (SD = 8.4), whereas post-implementation scores increased to 82.7 (SD = 6.9), showing a statistically significant improvement ($t = 6.72$, $p < .001$). Survey results on learning interest indicated a mean of 4.46 (SD = 0.41), suggesting that students were more motivated and responsive in digital learning environments. These outcomes are consistent with prior studies demonstrating that interactive digital platforms positively influence motivation and active participation in primary education (Prakash & Dhusia, 2025; Rawi, 2025).

3. Assessment Efficiency and Accuracy

The utilization of Google Forms significantly reduced the time required for assessment and grade recapitulation. Teachers reported a 70% reduction in processing time, allowing them to provide timely, qualitative feedback to students. The automated system also minimized administrative errors and improved the accuracy of learning outcome documentation. This finding corroborates Fokides and Peristeraki's (2025) conclusion that digital assessments enhance both speed and reliability in formative and summative evaluation processes.

4. Teacher Collaboration and Professional Learning Communities

Reflective discussions and lesson studies revealed that teachers increasingly engaged in professional learning communities. Teachers shared best practices, developed technology-based strategies, and collectively reflected on pedagogical improvements. The mean rating for teacher collaboration improved from 3.82 (SD = 0.54) pre-implementation to 4.41 (SD = 0.38) post-implementation. Such collaborative practices have been identified as crucial for sustaining digital transformation initiatives (Ahn et al., 2025).

5. Challenges Identified

Despite positive results, several challenges persisted: Internet Access Gaps: Some students lacked reliable internet at home. Device Limitations: Lower- and middle-income families did not always have access to personal devices. Variations in Teacher Digital Skills: Teachers exhibited differing levels of digital literacy at the initial stage of implementation. To mitigate these issues, the school implemented mentoring programs, offline data backup systems, and collaboration with private sectors to provide additional devices.

6. SWOT Analysis

Findings A SWOT analysis revealed:

Strengths: Efficient digital assessment, flexible learning, institutional support, and improved teacher digital literacy.

Weaknesses: Initial low digital literacy among teachers, limited devices, and uneven internet access.

Opportunities: National policy support, availability of free training, and improved ICT infrastructure.

Threats: Digital divide among students, potential data security risks, and cyber threats.

Strategic recommendations derived from SWOT included continuous teacher training, hybrid learning models, robust data security, and community collaboration to ensure equitable learning opportunities.

Discussion

The implementation of Google Classroom and Google Forms at UPT SD Negeri Pekuwolan has yielded substantial improvements in multiple dimensions of teaching, learning, and assessment, highlighting both practical and theoretical implications. This section critically interprets the findings, compares them with previous studies, explores potential explanations, and discusses the broader significance for English education and primary schooling.

The increase in teacher creativity, reflected in the ability to design project-based and interactive learning, aligns with prior research demonstrating that technology integration enhances pedagogical autonomy (Mahbera et al., 2025). Teachers' ability to create digital reflection exercises facilitated higher-order thinking skills (HOTS) among students, supporting Rivai & Rahmawati's (2025) assertion that digital platforms encourage active engagement, critical analysis, and collaborative problem-solving. These findings indicate that professional development, when combined with digital tools, can empower teachers to move beyond traditional lecture-based methods and adopt more student-centered pedagogies (Blyznyuk et al., 2025).

Quantitative data showed significant improvements in student learning outcomes (pre-implementation mean = 71.3, post-implementation mean = 82.7, $p < .001$) and engagement (mean = 4.46, SD = 0.41). This confirms previous studies reporting that interactive digital platforms enhance student motivation, responsibility, and independent learning (Prakash & Dhusia, 2025; Rawi, 2025). The "anytime, anywhere" learning model facilitated by Google Classroom expanded the learning space beyond the physical classroom, enabling students to interact with content at their own pace, a factor consistently linked to improved achievement and deeper learning (Zou et al., 2025).

The adoption of Google Forms resulted in a 70% increase in assessment efficiency, providing immediate feedback and reducing errors. This supports the findings of Fokides and Peristeraki (2025), who highlighted the critical role of fast and accurate feedback in promoting formative learning. By enabling data-driven assessment, teachers were able to tailor interventions based on specific student needs, a practice that aligns with the Assessment for Learning framework (Wibowo et al., 2025).

The establishment of teacher professional learning communities contributed to the diffusion of best practices and the development of shared pedagogical strategies. As suggested by Ahn et al. (2025), collaborative environments reinforce teacher competence and ensure the sustainability of digital initiatives. The reflective lesson study approach provided teachers with opportunities to critically evaluate classroom practices, facilitating continuous improvement and aligning with constructivist perspectives on teacher professional growth.

Despite positive outcomes, the study identified persistent challenges: unequal access to devices and internet connectivity, as well as initial variations in teacher digital literacy. These challenges are consistent with findings in previous literature, emphasizing that infrastructural limitations can exacerbate the digital divide and affect equitable learning outcomes (Aphane & du Plessis, 2025; Ruloff & Petko, 2025). The school's mitigation strategies, such as offline data backups and hybrid learning models, are consistent with recommended best practices to overcome digital inequities (Tang et al., 2025).

The SWOT analysis facilitated a strategic understanding of internal and external factors affecting digital transformation. Strength-opportunity (SO) strategies focused on leveraging policy support and professional development to enhance digital pedagogy, while weakness-opportunity (WO) strategies emphasized bridging digital literacy gaps. Strength-threat (ST) and weakness-threat (WT) strategies highlighted the importance of cybersecurity measures and hybrid learning models to maintain equity and safety (Bauer et al., 2025; Lu & Chen, 2025). These strategies illustrate the necessity of integrating technological, pedagogical, and contextual factors for successful and sustainable implementation, reflecting the TPACK framework's emphasis on harmonizing content knowledge, pedagogy, and technology (Rusydi & Judijanto, 2025).

The integration of Google Classroom and Forms supported deep learning by fostering critical thinking, creativity, collaboration, and self-directed learning (Bauer et al., 2025). Students were not only able to acquire knowledge but also engage in problem-solving, reflection, and application of concepts in authentic contexts. This finding resonates with global studies that emphasize digital platforms as catalysts for meaningful, student-centered, and skills-oriented learning (Prakash & Dhusia, 2025; Aphane & du Plessis, 2025).

From a practical standpoint, this study provides evidence that systematic digital transformation, supported by professional development and infrastructure, can enhance teaching quality and learning outcomes. Policymakers may use these insights to prioritize equitable ICT access, continuous teacher training, and data-driven assessment systems. Schools in similar contexts can adopt the blended learning model, leveraging both online and offline resources to ensure inclusivity while fostering innovation in pedagogical practices (Bakri, 2025; Tang et al., 2025). Overall, the findings highlight that digital transformation is not merely about technology adoption; it requires comprehensive planning, teacher capacity building, student engagement strategies, and infrastructure support. By systematically applying these principles, UPT SD Negeri Pekuwolan has successfully created a sustainable, collaborative, and student-centered digital learning ecosystem. This study contributes to the literature on primary education digital transformation, offering insights into best practices,

challenges, and strategies for implementing deep learning in resource-constrained environments.

4. CONCLUSION

The digital transformation at UPT SD Negeri Pekuwolan through Google Classroom and Google Forms has fundamentally reshaped the learning and assessment paradigm. This transformation extends beyond merely replacing traditional tools with digital ones; it has enhanced teacher-student interaction, expanded access to learning resources, and increased efficiency in both instruction and assessment. Teachers demonstrated improved adaptability, professional reflectivity, and the ability to design interactive, collaborative, and differentiated learning experiences. Students became more independent, responsible, and proactive, developing self-regulated learning skills and deep learning competencies such as critical thinking, collaboration, and communication.

The integration of Google Forms revolutionized assessment practices, enabling automatic, data-driven, and timely feedback that supports the pedagogical process rather than merely measuring outcomes. The success of this transformation depended not only on technology but also on human resources, collaborative culture, and transformational leadership. Principals and professional learning communities played a crucial role in fostering teacher competence, reflection, and collaboration.

Practically, schools should continue to strengthen teacher TPACK competencies, maintain secure data management, and foster a culture of innovation and collaboration. Future researchers are encouraged to explore additional factors, such as school culture, student digital readiness, and leadership styles, which may influence the effectiveness and sustainability of digital transformation in primary education.

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