

INTEGRATING TECHNOLOGY IN 21ST CENTURY LEARNING : A PEDAGOGICAL TRANSFORMATION FOR THE DIGITAL GENERATION (ELEMENTARY SCHOOL)

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Abstract

This study examines the integration of technology in 21st-century learning in elementary schools, with a focus on pedagogical transformation in the digital era. The rapid development of digital technology has significantly changed educational practices, requiring teachers to adapt to more innovative and student-centered learning approaches. The purpose of this study is to analyze the role, impact, and challenges of technology integration in elementary education. This research employs a Systematic Literature Review (SLR) using the PRISMA framework to identify, select, and synthesize relevant articles from Google Scholar, Publish or Perish, and SINTA databases published between 2021 and 2026. A total of 20 selected articles were analyzed. The findings indicate that technology enhances students' motivation, engagement, and conceptual understanding, while also transforming teachers' roles into facilitators of learning. However, challenges such as limited digital competence and infrastructure gaps remain significant. In conclusion, successful technology integration depends on teacher readiness and institutional support.

Keywords: technology integration; 21st century learning; elementary school; systematic literature review

1. INTRODUCTION

The rapid development of digital technology in the 21st century has significantly transformed various aspects of life, including education (Rahayuningsih & Muhtar, 2022; Muti'ah et al., 2024). In elementary education, the integration of technology has become increasingly essential, as students today belong to a digital generation that has been exposed to digital devices, the internet, and interactive media from an early age (Ruswan et al., 2024). This condition necessitates a pedagogical shift from traditional instructional practices toward more adaptive, innovative, and technology-enhanced learning approaches. Such transformation is expected to create a more meaningful, interactive, and student-centered learning process that aligns with the characteristics and learning needs of contemporary learners (Laila & Suardi, 2025).

The integration of technology into 21st-century learning also plays a crucial role in fostering students' critical thinking, creativity, collaboration, and communication skills (Astuti, 2024). At the elementary school level, the use of technology facilitates students' understanding of abstract concepts by providing visualization and more concrete learning experiences (Anirah et al., 2022; Saepudin & Wulandari, 2023). However, the implementation of technology in education still encounters several challenges, including limited digital competence among teachers, unequal infrastructure availability, and low levels of digital literacy among students (Gaol & Simanjuntak, 2023). Therefore, appropriate pedagogical strategies are required to ensure that technology is not merely used as a supporting tool, but becomes an integral component of the learning process (Putri et al., 2026).

Based on previous research, the integration of technology into learning has been extensively studied, particularly in relation to improving students' motivation and learning outcomes (Munawaroh et al., 2023; Hermansah & Jakaria, 2025). However, most studies still focus on the use of specific media without deeply examining the pedagogical transformation experienced by teachers as they adapt to 21st-century learning in elementary schools (Acesta et al., 2024; Basuki & Hidayah, 2025). Therefore, the urgency of this study lies in the need to understand how technology can truly transform teachers' pedagogical practices, rather than merely functioning as a learning aid. The novelty of this study is its focus on the pedagogical transformation of elementary school teachers in integrating technology holistically into 21st-century learning, thereby contributing to the development of a more adaptive, contextual, and student-centered learning model that aligns with the characteristics of digital-native learners.

2. METHODS

This study employs a Systematic Literature Review (SLR) method using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) approach to identify, select, evaluate, and synthesize scientific articles relevant to technology integration in 21st-century learning in elementary schools (Sitanggang, 2025). The SLR method was chosen because it provides a comprehensive and structured overview of research developments within a particular field, ensuring that the findings are not merely descriptive but also analytical and systematic. Meanwhile, the PRISMA approach was applied to ensure that each stage of the review is conducted in a transparent, standardized, and replicable manner, thereby enhancing the validity and reliability of the research outcomes.

The research data was sourced from various reputable scientific databases such as Google Scholar, Publish or Perish, and SINTA, covering publications from 2021 to 2026 to ensure that the analyzed articles are current, up-to-date, and relevant to the latest developments in educational technology. The article search process was conducted using specific, predefined keywords, such as "technology integration," "21st-century learning," "digital learning," "technology integration in elementary school," and "elementary school." These keywords were used in various combinations to broaden the scope of the literature identified, thereby yielding richer and more representative data.

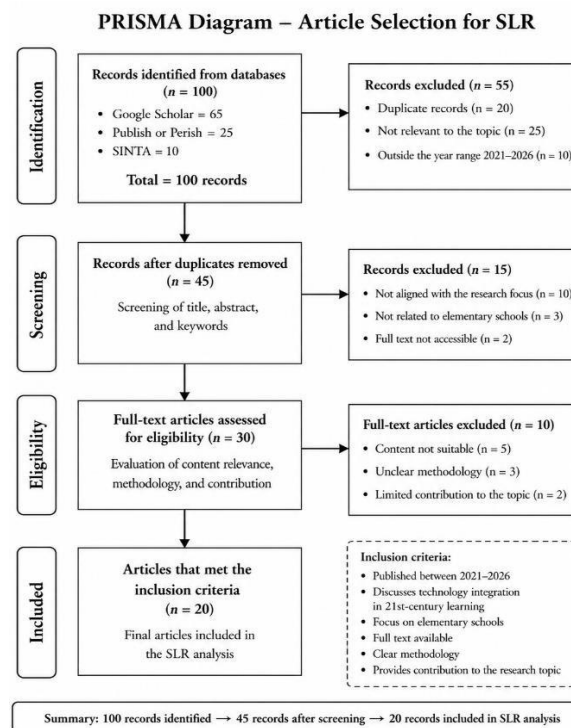


Figure 1. PRISMA Stages of the Systematic Literature Review Process (Sitanggang, 2025)

3. RESULTS AND DISCUSSION

This study examines the integration of technology into 21st-century learning in elementary schools, with a specific focus on pedagogical transformation in the digital era. To support a comprehensive understanding of this topic, the study presents a review of various scholarly articles related to the use of technology in learning, the role of teachers, student motivation, and the challenges of implementation in elementary education. The articles included in this review were selected using a Systematic Literature Review approach to ensure that only relevant, high-quality, and context-appropriate studies were analyzed.

Table 1. Review Article

No	Author & Year	Article Title	Key Findings	Relevance to Study Title
1.	Ummah BK et al. (2025)	The Impact of Interactive Learning Technology Based on the Quizizz Multimedia Platform in Differentiated Learning in Elementary Schools	The use of Quizizz increases student engagement and learning outcomes through interactive learning	Supports the integration of interactive technology in 21st-century elementary education
2.	Tobing et al. (2025)	The Utilization of Digital Media to Enhance Elementary Students' Learning Motivation	Digital media improves students' motivation and participation in learning activities	Demonstrates the impact of technology on elementary students' learning motivation
3.	Nisa et al. (2024)	The Transition from Teacher-Centered to Student-Centered Learning	A shift from teacher-centered to student-centered learning occurs through digital literacy integration	Supports pedagogical transformation in 21st-century learning
4.	Sartika et al. (2026)	The Role of Teachers as Facilitators in Enhancing Students' Digital Literacy	Teachers act as facilitators in digital-based learning environments	Relevant to the changing role of teachers in technology integration
5.	Pare & Murniarti (2024)	Analysis of the Teacher's Role as a Facilitator in the Digital Era	Teachers are no longer the center of learning but act as facilitators	Supports the concept of teacher role transformation
6.	Amelia et al. (2025)	Implementation of TPACK in Elementary School Learning	TPACK effectively integrates technology, pedagogy, and content knowledge	Provides a theoretical foundation for technology integration in learning
7.	Fitriani et al. (2022)	Teachers' Roles and Learning Strategies in 21st-Century Competencies	Teachers need technology-based and collaborative learning strategies	Supports 21st-century teacher competencies
8.	Permana & Suniasih (2021)	Animated Video Learning Media to Improve Learning Motivation	Animated videos increase elementary students' learning motivation	Supports the positive impact of technology on learning motivation
9.	Juhri et al. (2024)	Interactive Multimedia to Improve Elementary Science Learning	Interactive multimedia enhances students' conceptual understanding in science	Supports the effectiveness of multimedia in learning
10.	Widagdo & Rifida (2022)	Interactive Power Point Media in Elementary Indonesian Language Learning	Interactive PPT makes learning more engaging and effective	Supports the use of interactive digital learning media
11.	Mustika et al. (2026)	Digital Teacher or Analog Teacher: Challenges in Technology Use	Low digital competence among teachers is a major barrier	Highlights challenges in technology implementation
12.	Jaelani et al. (2026)	Digital Transformation in Basic Education and Service Inequality	There is a gap in technology access among schools	Supports issues of infrastructure inequality
13.	Praptaningrum et al. (2023)	Analysis of Learning Media Usage in Elementary Schools	Learning media is still used in a relatively simple form	Indicates suboptimal technology utilization

14.	Astuti et al. (2025)	Integration of Educational Technology to Improve Learning Quality	Technology enhances interactive learning quality	Supports positive impacts of technology integration
15.	Faradibah et al. (2025)	IT Training for Elementary School Teachers	Training improves teachers' technological competence	Supports teacher competency development
16.	Sadikin et al. (2025)	AI Training for Elementary School Teachers	AI helps teachers develop more adaptive learning materials	Supports digital competence enhancement
17.	Hutasoit et al. (2025)	Integration of Interactive Technology in Elementary Mathematics Learning	Technology improves the effectiveness of mathematics learning	Supports the effectiveness of technology in instruction
18.	Putri et al. (2022)	Problem-Based Learning Assisted by Interactive Video	Video-based PBL improves students' scientific literacy	Supports technology-based learning approaches
19.	Syahid et al. (2022)	Analysis of Elementary School Teachers' Digital Competence	Teachers' digital competence is still low	Strengthens challenges in technology integration
20.	Panjaitan & Hafizzah (2025)	Teachers' Role as Facilitators in Islamic Elementary Schools	Teachers act as active facilitators in learning	Supports teacher role transformation in learning

This section presents a classification of the main themes derived from various scholarly articles discussing the integration of technology in 21st-century learning in elementary schools, with a particular focus on pedagogical transformation in the digital era. The following classification table is provided to offer a concise overview of the primary research themes, including the transformation of teachers' roles, the enhancement of students' motivation and understanding, the integration of digital media and learning platforms, and the challenges of technology implementation in schools.

Table 2. Classification of Main Themes

No	Main Theme	Sub-Focus	Relevant Studies	Summary of Relevance to Study Title
1.	Transformation of Teachers' Roles in 21st-Century Learning	Teacher-centered to student-centered learning, teacher as facilitator, TPACK	Nisa et al. (2024); Sartika et al. (2026); Pare & Murniarti (2024); Fitriani et al. (2022); Panjaitan & Hafizzah (2025); Amelia et al. (2025)	Indicates pedagogical transformation in which teachers shift from knowledge transmitters to facilitators of technology-based learning
2.	Enhancement of Students' Motivation and Understanding through Technology	Learning motivation, engagement, conceptual understanding	Tobing et al. (2025); Permana & Suniasih (2021); Juhri et al. (2024); Putri et al. (2022)	Shows that technology improves students' motivation, engagement, and conceptual understanding through interactive learning media
3.	Integration of Digital Learning Media and Platforms	Multimedia, LMS, interactive PPT, digital applications, educational games	Ummah BK et al. (2025); Widagdo & Rifida (2022); Hutasoit et al. (2025); Tobing et al. (2025)	Demonstrates that digital technology is widely used as learning media and systems supporting 21st-century education
4.	Challenges and Readiness in Technology Implementation	Teacher competence, infrastructure, digital divide, limited implementation	Syahid et al. (2022); Mustika et al. (2026); Jaelani et al. (2026); Praptaningrum et al. (2023); Faradibah et al. (2025); Sadikin et al. (2025)	Identifies major barriers in the implementation of educational technology in elementary schools

This section presents a classification of the main themes derived from various scholarly articles discussing the integration of technology in 21st-century learning in elementary schools, with a particular focus on pedagogical transformation in the digital era. The following classification table is designed to provide a concise overview of the primary research themes, including the transformation of teachers' roles, the enhancement of students' motivation and understanding, the integration of digital media and learning platforms, and the challenges of technology implementation in elementary education. This classification aims

to facilitate the mapping of research focus and to demonstrate its relevance to the development of technology-based learning in the 21st century.

Based on the results of a literature search conducted using a Systematic Literature Review (SLR) approach in accordance with the PRISMA framework, a total of 20 relevant articles were identified regarding the integration of technology in 21st-century learning in elementary schools. During the identification phase, hundreds of articles were retrieved from Google Scholar, Publish or Perish, and SINTA databases using predefined keywords. Subsequently, through the screening and eligibility stages based on titles, abstracts, and full-text analysis, the articles that met the established inclusion criteria were selected. The selected studies were published between 2021 and 2026 and specifically address the integration of technology in elementary school learning contexts. Thus, only literature that is relevant, up-to-date, and aligned with the research focus was included for further analysis.

The results of the analysis indicate that the integration of technology in elementary education can be categorized into several main forms, namely the use of interactive digital learning media, Learning Management Systems (LMS), educational game-based applications, and audio-visual multimedia (Ummah BK et al., 2025). Most studies suggest that the use of these technologies enhances students' learning motivation, engagement, and conceptual understanding in a more concrete manner (Tobing et al., 2025). Additionally, the findings indicate that pedagogical transformation occurs when teachers shift from conventional teaching methods toward more student-centered, technology-based learning approaches (Nisa et al., 2024). In this context, teachers are no longer the sole source of knowledge but function as facilitators who guide students in effectively utilizing technology in the learning process (Panjaitan & Hafizzah, 2025).

The Transformation of the Teacher's Role in 21st-Century Learning

Research findings indicate that the integration of technology in 21st-century learning in elementary schools has led to significant changes in teachers' roles, shifting from being primarily a source of information to acting as learning facilitators who more actively guide students (Pare & Murniarti, 2024; Sartika et al., 2026). This shift is in line with the TPACK framework, which emphasizes the integration of technology, pedagogy, and content knowledge to create more effective and meaningful learning processes (Amelia et al., 2025). Teachers no longer focus solely on one-way knowledge delivery but also facilitate students' independent and collaborative learning through the use of technology (Fitriani et al., 2022). Overall, it can be concluded that teachers' roles have transformed into facilitators who actively and adaptively support the learning process of students.

The Impact of Technology on Student Motivation and Understanding

The integration of technologies such as interactive multimedia, educational videos, and educational games has been shown to enhance students' motivation and engagement in classroom learning processes (Permana & Suniasih, 2022; Putri et al., 2022). The presentation of learning materials in visual, audio, and interactive formats helps elementary school students understand abstract concepts in a more concrete and accessible way, in accordance with their cognitive developmental stage (Juhri et al., 2024). Furthermore, learning becomes more engaging and less monotonous compared to conventional instructional methods such as lecturing (Widagdo & Rifida, 2022). Overall, it can be concluded that the use of technology in learning increases students' learning motivation while also facilitating a faster and deeper understanding of the subject matter.

Although the integration of technology offers numerous benefits, its implementation in elementary schools still faces various complex challenges, particularly related to teachers' limited digital competencies in pedagogically integrating technology (Syahid et al., 2022; Mustika et al., 2026). In addition, disparities in technological infrastructure among schools remain a significant issue, resulting in unequal access to digital learning experiences for students (Jaelani et al., 2026). In some cases, technology is still used merely as a presentation tool rather than being optimally utilized to support active and interactive learning activities (Praptaningrum et al., 2023). Overall, it can be concluded that the implementation of technology in elementary education is not yet optimal due to limitations in teachers' competencies and the unequal distribution of supporting infrastructure.

In general, research findings indicate that technology integration contributes positively to improving the quality of learning in elementary schools by creating a more interactive, creative, and 21st-century-oriented

learning environment (Astuti et al., 2025; Hutasoit et al., 2025). However, the success of its implementation largely depends on teachers' readiness to master and integrate technology, institutional support, and the availability of adequate infrastructure (Aulia et al., 2025). Therefore, strengthening teachers' competencies through continuous professional development and training is essential to ensure that technology can be utilized more effectively in the learning process (Faradibah et al., 2025; Sadikin et al., 2025). Overall, it can be concluded that technology plays a crucial role in enhancing the quality of education, but its effectiveness is highly dependent on teachers' readiness and supporting facilities to achieve optimal outcomes.

4. CONCLUSION

Overall, the findings indicate that the integration of technology in 21st-century learning in elementary schools has a significant positive impact, particularly in enhancing students' learning motivation, engagement, and conceptual understanding through various interactive digital media. In addition, there has been a transformation in teachers' roles from primary knowledge providers to more adaptive facilitators who support student-centered learning. However, the implementation of technology still faces several challenges, such as limited digital competencies among teachers and unequal infrastructure across schools. Therefore, the success of technology integration largely depends on teachers' readiness, institutional support, and continuous professional development to ensure optimal and sustainable learning outcomes.

REFERENCES

- Acesta, A., Jaelani, A. J., Nurlaelah, I., Sutarsih, S., & Rahmayati, R. (2024). Transformasi PPG: Langkah Strategis Meningkatkan Kompetensi Guru di Abad 21. *Pedagogi: Jurnal Penelitian Pendidikan*, 11(1), 113-121. <https://doi.org/10.25134/pedagogi.v11i1.10863>
- Amelia, A., Marsithah, I., Rahma, A., & Salsabila, A. (2025). Implementasi Teknologi Pedagogical Content Knowledge (TPACK) dalam Pembelajaran di SD Negeri 1 Bireuen. *Jurnal Pendidikan Guru Sekolah Dasar*, 2(4), 10. <https://doi.org/10.47134/pgsd.v2i4.1891>
- Anirah, A., Hisbul, H., & Sukmawati, J. . (2022). Perbandingan Efektivitas Hasil Belajar Menggunakan Media Pembelajaran Visual Pada Siswa Sekolah Dasar: Literature Review. *Jurnal Pendidikan Dan Konseling (JPDK)*, 4(4), 6626–6634.
- Astuti, M.L. 2024. Peran Kecakapan 6C dalam Pembelajaran Abad ke-21 untuk Siswa Sekolah Dasar. *DIDAKTIKA: Jurnal Pendidikan Sekolah Dasar*. 7, 2 (Dec. 2024), 154–161. <https://doi.org/10.21831/didaktika.v7i2.80220>
- Astuti, N. widy, Fathiyah Rachmah, & Arum Fatayan. (2025). Studi Literatur: Integrasi Teknologi Pendidikan untuk Meningkatkan Kualitas Pembelajaran Interaktif di Sekolah Dasar Indonesia. *Didaktik : Jurnal Ilmiah PGSD STKIP Subang*, 11(03), 258 - 269. <https://doi.org/10.36989/didaktik.v11i03.7063>
- Basuki, S. R., & Hidayah, R. (2025). Transformasi Peran Guru Sekolah Dasar pada Pembelajaran Abad 21. In *Social, Humanities, and Educational Studies (SHES): Conference Series* (Vol. 8, No. 3, pp. 1781-1789). <https://doi.org/10.20961/shes.v8i3.107442>
- Faradibah, A., Widyawati, D., Belluano, P. L. L., Tenripada, A. U., Utami, A. P., Fatahillah, F., & Tuasamu, F. A. (2025). Bimbingan IT Fundamental Video Pembelajaran untuk Tenaga Guru di SDN Inpres 133 Pari'risi Kabupaten Takalar. *Society: Jurnal Pengabdian dan Pemberdayaan Masyarakat*, 6(1), 1-7. <https://doi.org/10.31764/jpmb.v8i4.27235>
- Fitriani, A. ., Kartini, A. ., Maulani, M. ., & Prihantini, P. (2022). Peran Guru dan Strategi Pembelajaran dalam Memenuhi Kompetensi Siswa Abad 21. *Jurnal Pendidikan Tambusai*, 6(2), 16491–16498. <https://doi.org/10.31004/jptam.v6i2.5056>
- Gaol, C. A. L., & Simanjuntak, S. (2023). Analisis kesulitan guru menerapkan teknologi dalam proses pembelajaran di SD Negeri 08 Bilah Hilir Labuhan Batu TA 2022/2023. *Journal on Education*, 6(1), 2441-2448. <https://doi.org/10.31004/joe.v6i1.3267>
- Hermansah, H., & Jakaria, J. (2025). Efektifitas Media Pembelajaran Berbasis Digital Terhadap Motivasi Dan Hasil Belajar Siswa Di Sekolah Dasar. *Jurnal Ilmiah Pendidikan Dasar (Jipdas)*, 5(3), 2670-2680. <https://doi.org/10.37081/jipdas.v5i3.3101>
- Hutasoit, G. H., Mutia, S., Hasannah, U., & Simarmata, R. (2025). Integrasi Teknologi Interaktif dalam Pembelajaran Matematika SD Berbasis Kurikulum Merdeka. *Harmoni Pendidikan: Jurnal Ilmu Pendidikan*, 2(3), 296-302. <https://doi.org/10.62383/hardik.v2i3.1843>
- Jaelani, M. N. G., Zulfitri, Z., & Prapantja, Y. (2026). Transformasi Digital Pendidikan Dasar Dan Kesenjangan Layanan Di Indonesia: Systematic Literature Review Terhadap Kebijakan Dan Implementasi. *Edutech*, 25(1), 368-380. <https://doi.org/10.17509/e.v25i1.96662>

- Juhri, D. A., Wanawir, W., & Ahmad, N. A. (2024). Penerapan Multimedia Interaktif untuk Meningkatkan Kemampuan Pembelajaran IPA SD. *Jurnal Pendidikan Tambusai*, 8(2), 21699–21704. <https://doi.org/10.31004/jptam.v8i2.15873>
- Laila, N., & Suardi (2025). Analisis Transformasi Pembelajaran Berbasis Teknologi Digital Di Sdn 193 Mandalan. *Didaktik: Jurnal Ilmiah PGSD STKIP Subang*, 12(01), 183-188. <https://doi.org/10.36989/didaktik.v12i01.11098>
- Munawaroh, L., Rokmanah, S., & Syachruraji, A. (2023). Penggunaan media pembelajaran berbasis Information and Communication Technology (ICT) untuk meningkatkan motivasi belajar peserta didik di sekolah dasar. *Jurnal Pendidikan Dasar*, 14(01), 170-180. <https://doi.org/10.21009/jpd.v14i01.39651>
- Mustika, M., Syahputri, H. K., Azzahrah, M., Kharimah, N., & Safaruddin, S. (2026). Guru Digital atau Guru Analog: Tantangan Penggunaan Teknologi di Sekolah Dasar. *Jurnal Basicedu*, 10(3), 848–859. <https://doi.org/10.31004/basicedu.v10i3.11910>
- Muti'ah, S., Fadel, M., & Afriza, A. (2024). Eksistensi Teknologi dalam Pembelajaran Abad 21. *Jurnal Pendidikan Tambusai*, 8(2), 26859–26868. <https://doi.org/10.31004/jptam.v8i2.16588>
- Nisa, A. K., Tinofa, N. A., Noptario, N., & Abdullah, F. (2024). Transisi Pembelajaran Teacher Centered Menuju Student Centered: Penguatan Literasi Teknologi Siswa Sekolah Dasar. *Ideguru: Jurnal Karya Ilmiah Guru*, 9(3), 1453-1460. <https://doi.org/10.51169/ideguru.v9i3.920>
- Panjaitan, H., & Hafizzah, F. (2025). Peran Guru Sebagai Fasilitator dalam Meningkatkan Kualitas Pembelajaran di SD IT Mutiara Ilmu Kuala. *Edu Society: Jurnal Pendidikan, Ilmu Sosial Dan Pengabdian Kepada Masyarakat*, 5(1), 328-343. <https://doi.org/10.56832/edu.v5i1.790>
- Pare, A., & Murniarti, E. (2024). Analisis peran guru sebagai fasilitator dalam pembelajaran biologi di era digital. *Jurnal Studi Guru Dan Pembelajaran*, 7(2), 660-672. <https://doi.org/10.30605/jsgp.7.2.2024.4087>
- Permana, I. G. A. P., & Suniasih, N. W. (2021). Pentingnya Meningkatkan Motivasi Belajar Siswa Melalui Video Pembelajaran Animasi Berbasis Discovery Learning Kelas V SD. *Mimbar Pendidikan Indonesia*, 2(3), 226-240. <https://doi.org/10.23887/mpi.v2i3.50969>
- Praptaningrum, G., Sukamti, S., & Suhartono, S. (2023). Analisis Penggunaan Media Pembelajaran pada Pembelajaran Tematik Kelas II di SD. *Jurnal Pembelajaran, Bimbingan, Dan Pengelolaan Pendidikan*, 3(2), 124–136. <https://doi.org/10.17977/um065v3i22023p124-136>
- Putri, A. P., Saptono, S., & Utomo, U. (2022). The effectiveness of problem-based learning model assisted by interactive video in improving science literacy of students in elementary school. *Journal of Primary Education*, 11(2), 203-217. <https://doi.org/10.15294/jpe.v11i2.59301>
- Putri, S. E., Yenny, E. N., Har, E., & Suryani, K. (2026). Integrasi Pembelajaran Berbasis Teknologi Melalui Pendekatan Saintifik Dalam Pembelajaran Sekolah Dasar. *Didaktik: Jurnal Ilmiah PGSD STKIP Subang*, 12(01), 43-56. <https://doi.org/10.36989/didaktik.v12i01.11605>
- Rahayuningsih, Y. S., & Muhtar, T. (2022). Pedagogik Digital Sebagai Upaya untuk Meningkatkan Kompetensi Guru Abad 21. *Jurnal Basicedu*, 6(4), 6960–6966. <https://doi.org/10.31004/basicedu.v6i4.3433>
- Ruswan, A., Rosmana, P. S., Nafira, A., Khaerunnisa, H., Habibina, I. Z., Alqindy, K. K., Syavaqilah, W. (2024). Pengaruh Penggunaan Media Pembelajaran Berbasis Teknologi dalam Meningkatkan Kemampuan Literasi Digital Siswa Sekolah Dasar. *Jurnal Pendidikan Tambusai*, 8(1), 4007–4016. <https://doi.org/10.31004/jptam.v8i1.13009>
- Sadikin, I. S., Fatolah, K., Santosa, I., Fadli, M. R., Ulum, M. B., & Sari, Y. (2025). Pelatihan Pembuatan Bahan Ajar Adaptif Berbasis Artificial Intelligence (Ai) Untuk Meningkatkan Kompetensi Digital Guru Di Sd Penggilingan 01 Jakarta . *Jurnal Abdimas Ilmiah Citra Bakti*, 6(2), 377–394. <https://doi.org/10.38048/Jailcb.V6i2.5056>
- Saepudin, A., & Wulandari, F. (2023). Pemanfaatan augmented reality (AR) dalam pembelajaran sains di sekolah dasar. *Jurnal Primary Edu*, 1(3), 355-367. Sartika, S. D., Afriandini, M., Muhtadin, A., & Ikmalawati, I. (2026). Peran Guru sebagai Fasilitator dalam Meningkatkan Literasi Digital Siswa pada Pembelajaran Abad ke-21: Studi Literatur. *Jurnal Pendidikan Tambusai*, 10(2), 10683–10691. <https://doi.org/10.31004/jptam.v10i2.38448>
- Sitanggang, R. (2025). Systematic Literatur Review Dengan Metode Prisma: Meningkatkan Efektivitas Pengelolaan SDM Melalui Evidence-Based HR Dan Teknologi Informasi. *Journal of Science Education and Management Business*, 4(3), 710-719. <https://doi.org/10.62357/joseamb.v4i3.794>
- Syahid, A. A., Hernawan, A. H., & Dewi, L. (2022). Analisis Kompetensi Digital Guru Sekolah Dasar. *Jurnal Basicedu*, 6(3), 4600–4611. <https://doi.org/10.31004/basicedu.v6i3.2909>
- Tobing, F. B., Pinem, I., Daeli, C. V., Ginting, R. A. B., Laia, K. M. W., Sitompul, M., ... Tobing, I. M. B. (2025). Pemanfaatan Media Digital untuk Meningkatkan Motivasi Belajar Siswa SD. *Jurnal Pendidikan Tambusai*, 9(2), 21247–21251. <https://doi.org/10.31004/jptam.v9i2.29912>

- Ummah BK, M. K., Hamna, H., Hidayat, S., & Sari, N. I. (2025). Dampak Penggunaan Teknologi Pembelajaran Interaktif Berbasis Platform Multimedia Quizizz dalam Pembelajaran Berdiferensiasi di Sekolah Dasar. *Jurnal Basicedu*, 9(2), 351–362. <https://doi.org/10.31004/basicedu.v9i2.9614>
- Widagdo, A., & Rifida, O. C. (2022). Pengembangan Media PPT Interaktif Dalam Pembelajaran Bahasa Indonesia Kelas II SD. *Joyful Learning Journal*, 11(4), 195-200. <https://doi.org/10.15294/jlj.v11i4.67100>