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Education Transformation: Paradigm Shifts in Learning in the Age of Technology

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ABSTRACT

The transformation of education in the era of digital technology presents both challenges and opportunities in improving the quality of learning. This research aims to analyze the community's response to the changing learning paradigm influenced by the integration of digital technology. The research method used is descriptive qualitative with a literature study approach. The results show that educational transformation does not only include the use of digital devices, but also a paradigm shift from teacher-centered learning to active, collaborative and flexible learning models that are learner-oriented. The community shows a positive response to the utilization of applications such as Quizizz, Canva, as well as Augmented Reality (AR) and Virtual Reality (VR) technologies, which are considered capable of creating an interactive, fun learning atmosphere and encouraging student creativity. This finding shows that conventional approaches are falling behind in meeting the demands of 21st century learning. Therefore, progressive education policies, improved teacher competencies, and equitable access to digital infrastructure at all levels and regions of education are needed.

1. Introduction

The transformation of education in the digital era is not only technological, but also touches on social, cultural and pedagogical aspects. The learning process that was previously centered on the teacher as the only source of information is now shifting to a two-way approach that is more collaborative, flexible, and based on digital technology. Platforms such as Learning Management System (LMS), video conferencing, and other interactive media allow students and teachers to interact dynamically beyond the constraints of time and space (Sinaga & Firmansyah, 2024). This phenomenon is very important because it requires readiness from various elements of education: educators, students, institutions, and even state policies. Unpreparedness in terms of infrastructure and digital competence is a major problem in the implementation of digital learning. The shift not only brought

technical changes in learning methods, but also reshaped the whole education paradigm. In early 2020, more than 1.6 billion students in 190 countries were affected by school closures due to the COVID-19 pandemic, forcing educational institutions to shift to online learning systems. This has led to an acceleration in the digitalization of education globally, although many countries still face challenges in equitable access to technology and digital education infrastructure readiness (UNESCO, 2020).

The digital divide, limited teacher training and lack of curriculum readiness are major challenges that educational institutions face in the digital adaptation process. This not only impacts the quality of learning, but also widens the gap between learners who have access to technology and those who do not (Picauly, 2024). National data supports these findings, with a joint Ministry of Education and Culture and Ministry of Research and Technology survey showing that only 52.2% of students own laptops, 24.1% own computers and 21.2% own tablets. This gap is influenced by economic background, where students from underprivileged families have limited access to devices and internet connections (Putri, 2023). This condition emphasizes that digital transformation in education is not only a technological challenge, but also a social justice issue that must be addressed systematically and sustainably.

Educational transformation has become a major current in the dynamics of the global learning system, especially since the acceleration of information and communication technology (ICT) began to penetrate all aspects of life. Relevant research entitled “Education Transformation in the Digital Age: Challenges and Opportunities” highlights that education transformation in the digital era is not just about changing learning media to online, but also changing the learning ecosystem structurally from classroom management to the relationship between teachers and students (Picauly, 2024). The public response to this transformation is mixed. Some community groups welcome the presence of technology that opens up wider and more flexible access to learning. However, many have experienced systemic shock due to unprepared infrastructure, lack of digital literacy, and socio-economic disparities. In this context, educational transformation becomes a complex issue and needs to be seen as a social process that is not linear, but full of resistance, adaptation and innovation.

In the digital era, the traditional teacher-centered approach is shifting to a student-centered approach (Septiana et al., 2022). The research entitled “The Influence of Technology in Learning Change in the Digital Era” explains that the role of teachers is now more as facilitators and companions, while students become active actors in the learning process through independent exploration and utilization of learning technology (R. A. Putri, 2023). This change is in line with the demands of the Industrial Revolution 5.0, which emphasizes collaboration between humans and technology while maintaining human values, inclusiveness, and sustainability. In this context, education is not only required to keep up with technological developments, but is also responsible for instilling social values, empathy and adaptive skills so that students are ready to face the complexities of 21st century life.

Various studies have discussed the impact of digital transformation on education. However, most of them still focus on technical aspects, such as the utilization of technology and learning media. Meanwhile, important aspects such as gaps in access to technology, infrastructure readiness, and the social impact of changes in learning have not been discussed in depth. Previous studies have highlighted educational transformation as a comprehensive change in practice, but have not explained how this change can be measured or assessed (Volta & Nahdiyah, 2023). In fact, changes in education in this digital era are not only about technology, but also about changes in values, social relations, and the education system itself. Therefore, further research is needed that not only discusses technology, but also understands the changing social and educational conditions due to digital transformation.

This paper responds to this void with three main objectives: (1) to examine the public response to the transformation of education that takes place in the technological era, (2) to identify the fundamental reasons for the need to transform education in the context of a digital society, (3) to analyze changes in the learning paradigm from the aspects of methodology, media, and learning models. By critically and structurally reviewing various previous research results, this paper is expected to be able to provide a new, more comprehensive perspective on the dynamics of education today. This research also highlights the inequality of public perceptions related to the adoption of educational technology as a reflection of the readiness of infrastructure and different learning cultures.

Based on these objectives, this study argues that the transformation of education in the digital era is not just the adoption of technology, but reflects a paradigm shift in learning processes and dynamics. Education now emphasizes flexibility, collaboration, and personalized learning that adapts to students' needs. Thus, the success of educational transformation is not simply measured by the use of digital devices, but also by where the values of learning independence, critical thinking, and the active role of students are developed. This study argues that public acceptance of digital education is influenced by technological readiness and the existing learning culture. Therefore, the success of this change requires an integrative approach that brings together technological innovation and educational paradigm transformation.

2. Methodology

a. Research Design

This research was conducted using a descriptive qualitative method with a library research approach, where secondary data was used as the main source of analysis. Secondary data in this study refers to data that has been previously available and obtained by researchers indirectly through intermediary media (Ahmad et al., 2024). The main data sources consist of reputable national and international journal articles, scientific books, education policies, and reports on previous research results relevant to the issue of educational transformation (Sari & Asmendri, 2020).

As additional data, this research also analyzes public comments from social media such as YouTube and TikTok. This data serves as a contextual illustration to reflect the perception and dynamics of public discourse related to digital learning in the era of technology.

b. Data source

The data sources in this study were obtained from various credible scientific databases. The selection of data sources was done purposively by considering several criteria, namely: (1) relevant to the topic of educational transformation and digital learning, (2) published within the last five to ten years, and (3) from accredited or academically reputable sources. Meanwhile, supporting data sources in the form of comments from YouTube and TikTok social media were selected based on the suitability of the substance to the issue of digital learning and responses to technology-based education policies. The selection was done thematically and contextually with the aim of describing the reality of public discourse.

c. Collection Technique

The data collection technique in this research was carried out through the documentation method, which includes the process of searching, identifying, selecting, and classifying literature sources according to the focus of the study. The search was conducted using a number of keywords, including: “educational transformation”, ‘digital learning’, ‘21st century learning paradigm’, and ‘educational technology’. Each source is critically analyze to obtain information that is valid, relevant, and scientifically sound. In addition, the researcher also applied bibliographic recording and annotation techniques to ensure the accuracy of the quotations, as well as supporting the process of organizing and analyze based on the focus of the study. Data from social media was obtained through non-participatory observation of open comments that were thematically and contextually selected based on their relevance to the issues under study.

d. Data Analysis

The analysis technique used in this research is content analysis. This technique is used to examine the relationship between ideas, mindsets, and scientific findings from literature sources that have been collected (Winarni, 2018). The analysis was carried out with the following steps: data coding (filtering essential information), data presentation (thematic classification), and conclusion drawing (concept synthesis and argumentation). This approach allows researchers to gain a full conceptual understanding of the direction and impact of the transformation of the learning paradigm in the technological era.

3. Result and Discussion

a. Public Response to the Transformation of Education in the Age of Technology

The transformation of education in the digital era has had a significant impact on the approach and participation in the learning process. This is reflected in the findings that the public has responded positively to the use of digital technology, both through scientific journal articles and user comments on social media platforms such as YouTube and TikTok. Data from these two sources provide an overview of how technology is used to create a more interactive, personalized and enjoyable learning experience. The findings from both types of sources are summarized and presented systematically in Table 1.

Table 1. Public Response to the Transformation

Source	Data Content	Coding
Similar Journal Articles	- AI integration enables more personalized learning, develops critical and analytical thinking skills, and expands access to education (Apriadi & Sihotang, 2023). - Implementation of kahoot as a digital game-based learning media can increase student learning independence (Prenawa et al., 2021).	AI integration supports critical thinking, while Kahoot enhances learning independence.
YouTube and TikTok comments	The utilization of technology in learning such as Quizizz, ICT, Canva, as well as AR and VR, encourages active participation of learners through an inspiring and fun approach. This innovation creates an interesting, creative, modern learning atmosphere and provides an immersive learning experience.	The use of Quizizz, ICT and Canva creates an interesting, creative and modern learning atmosphere, while the application of AR and VR provides an immersive learning experience for learners.

Public response shows that the phenomenon of digital education transformation can be classified into three main categories. First, the transformation of teaching media with the integration of interactive digital technologies such as AI, game-based learning, and visual-based multimedia. Second, strengthening the character of independent learning, namely the growth of students' proactive attitude in managing learning strategies autonomously through digital approaches. Third, the change in digital learning culture is reflected in public responses on social media, where learners show emotional and social engagement with modern technology-based learning models. This finding shows that the public response to educational transformation is not just a form of acceptance, but also a form of active participation in shaping a learning ecosystem that suits the digital era. Third, changes in digital learning culture are reflected in public responses on social media, where learners show emotional and social engagement with modern technology-based learning models. This finding shows that public response to education transformation does not only reflect a form of passive acceptance, but also active participation in shaping a learning ecosystem that is adaptive to the demands of the digital era.

Education Transformation emerges within the framework of national education policies that encourage the implementation of the Merdeka Curriculum, a policy that provides flexibility to education units in developing learning based on student

needs (Wang et al., 2023). This curriculum opens up space for the development of learning that adapts to local potential, individual learning styles, and technological advances (Windy Hastasasi et al., 2024). The government is also actively launching digital platforms such as merdeka Mengajar as a form of systemic support for teachers and learners (Kemendikbudristek, 2023). However, the dynamics of public response also reflect challenges that have not been fully resolved, especially in the frontier, outermost, underdeveloped (3T) areas. Limited digital infrastructure and ICT literacy are still major obstacles in these areas (Jayanthi & Dinaseviani, 2022). But in areas with adequate internet access and training, the integration of technology in education led to a significant increase in student engagement. This finding underscores the importance of equitable digital access and training as a condition for the success of comprehensive education transformation.

Public response to the transformation of education in the digital era shows significant appreciation for technology-based learning approaches. Public comments through social media such as YouTube and TikTok reveal that the use of interactive media, animation, 3D, and AR/VR technology makes the learning process more interesting, less monotonous, and more humanistic. Like the research conducted by Nisa et al., (2024) that this success is supported by training, collaboration, technical support, and the use of technologies such as AR and AI, which are proven to improve teacher competence and creativity. In the context of digital learning, technology provides opportunities for learners to interact more dynamically and interactively with learning content (Putri Safira et al., 2024). However, in areas with sufficient digital access, the benefits of this strategy are even more pronounced, both in terms of student engagement and flexibility of learning (Nashrullah et al., 2025). Public expectations of education in the digital era have grown, and this response shows that the transformation of education has real support from the community as a form of hope for a better direction of change.

b. Urgency of Education Transformation in the Age of Technology

Transformation of education in the digital era is a strategic urgency in improving the quality, competitiveness and relevance of learning. Public responses through social media and the results of scientific studies show that the use of technology encourages a more adaptive and innovative learning process. Data findings related to these views are presented in Table 2.

Table 2. Urgency of Education Transformation

Source	Data Content	Coding
Similar Journal Articles	Transforming education is important to improve quality, strengthen the competitiveness of educational institutions, and adjust to national policies (Basri, 2019).	Education improves quality and competitiveness, while digitalization promotes inclusivity, quality and readiness of future generations.
	Digital education transformation is a learning revolution that drives inclusivity, quality and readiness of future generations (Hasnida et al., 2024).	

YouTube and TikTok comments	The public considers the use of technology such as interactive media, animation and 3D to make learning more interesting, humanistic and not monotonous. Teachers who innovate are considered agents of educational change.	Transformation of education is needed to make the learning process more adaptive, enjoyable and responsive to technological developments.
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The transformation of education in the technological era shows a close relationship between several important dimensions, namely improving the quality of learning, shifting the role of educators, and the integration of digital technology as a whole. The quality of learning is the main benchmark that is influenced by the extent to which educators are able to adapt teaching approaches with appropriate technological support. The role of teachers has also been transformed from material deliverers to facilitators, mentors, and even designers of technology-based learning experiences. Technological elements such as online platforms, interactive media, and data-driven learning analytics not only facilitate access to learning, but also encourage active engagement of learners in a more personalized and flexible manner. This relationship is mutually enabling; the quality of education improves when teachers have good digital literacy and technology can be accessed and utilized optimally. The synergy between teacher training, digital infrastructure, and collaborative and interactive learning approaches is key to the success of education transformation in the complex and fast-changing digital era (Hasnida et al., 2024).

The relationship between education quality, digital innovation and the role of teachers occurs in the context of rapid technological development and changing learning needs in the post-pandemic era. The public, as recorded in comments on social media such as TikTok and YouTube, shows appreciation for teachers who are able to implement technology-based learning, as it is considered more humane and less monotonous. This shows that the digital innovation factor only has a positive impact if it is carried out by education actors who have adequate digital literacy and an adaptive mindset. To improve teaching quality, technology training and teacher capacity building need to be an integral part (Wati & Nurhasannah, 2024). In addition to facing the rapid development of technology, teachers are also faced with the challenge of integrating technology pedagogically, not just technically (Pare & Murniarti, 2024). This means that it is not enough for teachers to be proficient in using digital tools, but they must also understand how the technology can be used appropriately to support learning objectives, increase student engagement and deepen understanding of the material in a meaningful way.

The transformation of education in the technological era is a must in facing the challenges of the 21st century which is marked by digitalization in various aspects of life. The integration of technology in education not only improves the quality of learning, but also expands access and flexibility of the teaching and learning process. As expressed by Judijanto et al., (2025) the use of technology enables more interactive, personalized and adaptive learning experiences through fun digital tools and efficient evaluation methods. However, this transformation also demands an increase in educators' digital competencies. Teachers need to develop technology-based pedagogical skills to create inclusive and responsive learning (Solihin et al., 2024).

At this time, digital literacy is a crucial aspect that must be possessed by all elements of education, including students and parents, to ensure the wise and productive use of technology (Purnawanto, 2021). Furthermore, curriculum transformation that is adaptive to technological developments, such as the implementation of Computing Curricula 2020, can improve students' technical competencies and soft skills, preparing them to adapt to the global workforce (Priyani et al., 2024). However, it is important to remember that technological transformation in education also presents ethical and philosophical dilemmas, so a holistic approach that combines technological advances with human values is needed (Setiawati et al., 2023). Thus, the urgency of transforming education in the technological era lies not only in the adoption of digital tools, but also in building an educational ecosystem that is sustainable, inclusive, and oriented towards character development and 21st century competencies.

c. Aspects of Change in the Learning Paradigm in the Age of Technology

Development of technology has pushed the learning paradigm towards more interactive, collaborative and flexible. Data from social media and literature review show the shifting roles of teachers and students, as well as infrastructure challenges in its implementation. Related findings are presented in Table 3.

Table 3. Changes in the learning paradigm in the Age of Technology

Source	Data Content	Coding
Similar Journal Articles	- The learning paradigm shift from one-way to collaborative and interactive. The role of the teacher transforms into a facilitator, while students are required to be more independent with more flexible access to learning (Sinaga & Firmansyah, 2024). - Education Transformation reflects significant changes in the way education is conducted, especially in terms of its goals, methods, and outcomes (Yunita et al., 2023).	The transformation of education is changing learning goals, methods and outcomes, with learning now more collaborative, teachers as facilitators and students more independent.
YouTube and TikTok comments	The transformation of education is changing learning objectives, methods and outcomes, with learning now more collaborative, teachers as facilitators and students more independent. The use of learning technologies such as Canva, ICT, 3D media, AR/VR and smart boards shows a shift towards more interactive, creative and contextual learning. However, there are still obstacles such as limited infrastructure and concerns about screen dependency.	Changes in learning approaches to be interactive; increased teacher creativity; and challenges in digital infrastructure readiness.

The findings of this study indicate that there has been a significant shift in the learning paradigm in the technological era, characterized by a change in approach from a one-way model to more collaborative and interactive learning. The transformation of the learning paradigm demands changes in educational strategies that are not only technological, but also pedagogical. One of the relevant strategies

is the shift in the role of teachers from instructors to learning facilitators, as well as empowering students to learn more independently and collaboratively. This strategy needs to be supported by the utilization of learning technologies such as Canva, ICT tools, 3D media, augmented reality (AR), and smart boards, which allow the learning process to be more interactive and contextual. However, the success of this strategy is highly dependent on the readiness of digital infrastructure and continuous teacher training. Another implication is the need for education policies that are inclusive and adaptive to technological developments. As also emphasized by Lembong et al., (2023) that education policy transformation involves changes in the learning paradigm, curriculum, teaching methods, evaluation, assessment, and management of the education system.

The main value of technology integration strategies and shifting teacher roles lies in creating a more active, flexible and student-centered learning experience. Facts from social media such as YouTube and TikTok that have been analyze in the data show that people appreciate interactive learning models that utilize technology creatively, as they are considered more humanistic and less monotonous. This suggests that such strategies not only increase interest in learning, but also open up opportunities to create an inclusive digital education ecosystem. The importance of digital learning platforms designed to improve student engagement and academic performance through adaptive and responsive approaches to individual needs (Brugliera, 2024).

Also, the study by Asna et al., (2025) highlighted that good use of technology can significantly increase student motivation, engagement and understanding. Research by Silvester et al., (Silvester et al., 2024) emphasizes that Technological Pedagogical Content Knowledge (TPACK) competency is essential for teachers in implementing digital-based learning effectively and transformation. These competencies include teachers' ability to integrate technology with pedagogical knowledge and subject matter content, thus creating a more relevant and interactive learning experience for students. Thus, the strategy for developing teachers' digital competencies focuses not only on innovating learning methods, but also on improving the quality of education that is equitable, adaptive and sustainable in the digital era.

4. Conclusion

The transformation of education in the technological era is not just about adopting digital tools into the learning process, but reflects a deeper paradigm shift, from teacher-centered learning to a learner-centered approach. Based on the findings, the public responded positively to the use of technology in learning. Platforms such as Quizizz, Canva, and AR/VR-based technology are considered capable of creating a more interactive, creative and fun learning atmosphere. This shows that there is social support for changes in the learning system that are more in line with the characteristics of the digital generation. The reason for the need for educational transformation is also revealed through the limitations of conventional approaches in facing the challenges of the 21st century. The traditional learning system is

considered not flexible enough and less adaptive to the needs of today's learners. Therefore, educational transformation is a strategic step to improve the relevance, quality and competitiveness of national education. Furthermore, this research also found that there is a shift in the learning paradigm, where teachers no longer act as information centers, but facilitators, and students become more independent and active. Learning has changed from one-way to collaborative, flexible and technology-based. In conclusion, this research successfully addressed all the objectives set. Future work can focus on developing policies that support teacher training, equitable provision of digital infrastructure and technology-based learning models that are adaptive to different regional contexts and education levels.

References

- Ahmad, Fachrurrazy, M., Hartati, S. Y., Amalia, M., Fauzi, E., Gaol, S. L., Siliwandi, D. N., & Takdir. (2024). *Buku Ajar Metode Penelitian & Penulisan Hukum* (1st ed.). PT. Sonpedia Publishing Indonesia.
- Apriadi, R. T., & Sihotang, H. (2023). Transformasi Mendalam Pendidikan Melalui Kecerdasan Buatan: Dampak Positif bagi Siswa dalam Era Digital. *Jurnal Pendidikan Tambusai*, 7(3), 31742–31748. <http://repository.uki.ac.id/id/eprint/13653>
- Asna, A., Amaliah, N., Lestari, P., & Annadzira, Z. (2025). Pengaruh Teknologi terhadap Motivasi Belajar Siswa. *Islamic Education Journal*, 2(2), 103–111. <https://doi.org/https://doi.org/10.61132/reflection.v2i2.658>
- Basri. (2019). Urgensi Transformasi Terhadap Peningkatan Kualitas Pendidikan Islam. *Jurnal Dedikasi Pendidikan*, 3(2), 147–159. <https://doi.org/https://doi.org/10.30601/dedikasi.v3i2.282>
- Brugliera, P. (2024). The Effectiveness of Digital Learning Platforms in Enhancing Student Engagement and Academic Performance. *Journal of Education, Humanities, and Social Research*, 1(1), 26–36.
- Hasnida, S. S., Adrian, R., & Siagian, N. A. (2024). Transformasi Pendidikan Di Era Digital. *Jurnal Bintang Pendidikan Indonesia*, 2(1), 110–116. <https://doi.org/https://doi.org/10.55606/jubpi.v2i1.2488>
- Jayanthi, R., & Dinaseviani, A. (2022). Kesenjangan Digital dan Solusi yang Diterapkan di Indonesia selama Pandemi COVID-19. *Jurnal Ilmu Pengetahuan Dan Teknologi Komunikasi*, 24(2), 187–200. <https://doi.org/https://doi.org/10.17933/iptekkom.24.2.2022.187-200>
- Judijanto, L., Mata, R., & Putra, H. R. F. (2025). Transformasi Digital di Dunia Pendidikan: Integrasi Teknologi dalam Kurikulum Sekolah. *Jurnal Ilmiah Edukatif*, 11(1), 37–46. <https://doi.org/https://doi.org/10.37567/jie.v11i1.3569>
- Kemendikbudristek. (2023). *Ruang Guru dan Tenaga Kependidikan (GTK)*. Kemdikbudristek. <https://guru.kemdikbud.go.id>
- Lembong, J. M., Lumapow, H. R., & Rotty, V. N. J. (2023). Implementasi Merdeka Belajar Sebagai Transformasi Kebijakan Pendidikan. *Jurnal Educatio*, 9(2), 765–777. <https://doi.org/https://doi.org/10.31949/educatio.v9i2.4620>
- Nashrullah, M., Rahman, S., Majid, A., Hariyati, N., & Budiyo. (2025). Transformasi Digital Dalam Pendidikan Indonesia: Analisis Kebijakan dan

-
- Implikasinya Terhadap Kualitas Pembelajaran. *Jurnal Manajemen Pendidikan*, 7(1), 52–59. <https://doi.org/https://doi.org/10.55352/mudir.v7i1.1290>
- Nisa, C., Rahmawati, F. P., Kaltsum, H. U., & Hidayat, M. T. (2024). Penguatan kompetensi Guru SD melalui integrasi teknologi AR dan AI dalam pembelajaran. *Penamas: Journal of Community Service*, 4(1), 148–157. <https://doi.org/10.53088/penamas.v4i1.925>
- 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/https://doi.org/10.30605/jsgp.7.2.2024.4087>
- Picauly, V. E. (2024). Transformasi Pendidikan di Era Digital: Tantangan dan Peluang. *Indonesian Research Journal On Education*, 4(3), 1528–1535. <https://doi.org/https://doi.org/10.31004/irje.v4i3.1278>
- Prenawa, W. N., Setiawati, N., & Lahirni, B. C. F. (2021). Pengaruh Implementasi Kahoot Sebagai Media Pembelajaran Berbasis Digital Game Based Learning Terhadap Kemandirian Belajar Siswa SMAN 1 Basarang Kabupaten Kapuas Tahun Pelajaran 2020 / 2021. *Jurnal Teknologi Pendidikan*, 1(2), 1–7. <https://doi.org/https://doi.org/10.37304/jtekipend.v1i2.3017>
- Priyani, N., Putri, N. R., Nazarius, A., & Parhusip, J. (2024). Transformasi Kurikulum Pendidikan Untuk Meningkatkan Kompetensi Teknologi. *Jurnal Teknik Informatika Dan Multimedia*, 4(2), 8–12. <https://doi.org/https://doi.org/10.51903/informatika.v4i2.824>
- Purnawanto, A. T. (2021). Urgensi Literasi Digital Bagi Guru, Siswa dan Orang Tua. *Jurnal Ilmiah Pedagogy*, 17(1), 85–98. <https://doi.org/https://doi.org/10.63889/pedagogy.v14i2.97>
- Putri, N. N. (2023). *Kesenjangan Digital Dalam Pendidikan: Tantangan dan Solusi*. PanturaNews. <https://panturanews.com/index.php/panturanews/baca/261642>
- Putri Safira, F., Anestya, D. P., Kurniawan, H., Zahro, S. K., Gustira, N. G., & Nugraha, J. T. (2024). Persepsi Mahasiswa Terhadap Dampak Teknologi Dan Informasi Yang Mempengaruhi Kualitas Pembelajaran. *Journal of Information Systems Management and Digital Business*, 1(3), 345–354. <https://doi.org/10.59407/jismdb.v1i3.760>
- Sari, M., & Asmendri. (2020). Penelitian Kepustakaan (Library Research) dalam Penelitian Pendidikan IPA. *Jurnal Natural Science*, 6(1), 41–53. <https://doi.org/https://doi.org/10.15548/nsc.v6i1.1555>
- Septiana, M., Hidayati, D., Rauf, A. S., & Ratnasari, D. (2022). Kepemimpinan Guru Dalam Pembelajaran Di Era Digital. *Manajemen Pendidikan*, 17(2), 101–116. <https://doi.org/10.23917/jmp.v17i2.19354>
- Setiawati, R., Yolandha, W., & Herlambang, Y. T. (2023). Transformasi Teknologi Dalam Pendidikan di Era Revolusi Industri 4.0: Dilema Teknologi Dalam Perspektif Filosofis. *Jurnal Pendidikan Dan Pengajaran*, 1(5), 219–225.
- Silvester, Sumarni, M. L., & Saputro, T. V. D. (2024). Pengaruh Kompetensi Technological Pedagogical Content Knowledge (TPACK) terhadap Keterampilan Guru dalam Mengimplemtasikan Pembelajaran Berbasis Digital. *Journal of Education Research*, 5(4), 4958–4965. <https://doi.org/https://doi.org/10.37985/jer.v5i4.1697>
-

- Sinaga, W. M. B. B., & Firmansyah, A. (2024). Perubahan Paradigma Pendidikan di Era Digital. *Jurnal Teknologi Pendidikan*, 1(4), 10. <https://doi.org/10.47134/jtp.v1i4.492>
- Solihin, D. A., Rosdiana, & Amaliah, A. (2024). Upaya Peningkatan Kompetensi Guru Dalam Pemanfaatan Teknologi Proses Pembelajaran. *Jurnal Bening*, 11(2), 422–428. <https://doi.org/https://doi.org/10.33373/bening.v11i2.7099>
- UNESCO. (2020). *Education: From COVID-19 school closures to recovery*. <https://en.unesco.org/covid19/educationresponse/consequences>
- Volta, A. S., & Nahdiyah, A. C. F. (2023). Transformasi Pendidikan di Era 4.0 : Intelektualitas Guru Tercipta Kualitas Sekolah Terjaga. *Jurnal Kepengawasan, Supervisi Dan Manajerial*, 1(4), 143–151. <https://doi.org/https://doi.org/10.61116/jksm.v1i4.260>
- Wang, C., Zhang, M., Sesunan, A., & Yolanda, L. (2023). Peran Teknologi dalam Transformasi Pendidikan di Indonesia. *Kemdikbud*, 4(2), 1–7.
- Wati, S., & Nurhasannah, N. (2024). Penguatan Kompetensi Guru Dalam Menghadapi Era Digital. *Jurnal Review Pendidikan Dasar : Jurnal Kajian Pendidikan Dan Hasil Penelitian*, 10(2), 149–155. <https://doi.org/10.26740/jrpd.v10n2.p149-155>
- Winarni, E. W. (2018). *Teori dan Praktik Penelitian Kuantitatif, Kualitatif, PTK, R&D* (1st ed.). Indonesia: Bumi Aksara.
- Windy Hastasasi, Tracey Yani Harjatanaya, Kristiani, A. D., Anggraena, Y., & Saad, Y. (2024). *Panduan Pengembangan Kurikulum Satuan Pendidikan* (Revisi 2). Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi. <https://kurikulum.kemdikbud.go.id>.
- Yunita, S., Pratama, D. E., Silalahi, M. M., & Sembiring, T. (2023). Implikasi Teknologi Era Digital Terhadap Transformasi Pendidikan Di Siderejo Hilir Kacamata Medan Tembung Sumatera Utara. *Jurnal Darma Agung*, 31(1), 745–755. <https://doi.org/http://dx.doi.org/10.46930/ojsuda.v31i1.3083>

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