

Digital Technology-Based Education Transformation in The Capital of The Archipelago

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ARTICLE HISTORY	ABSTRACT
<p>Received : January 18th 2026 Revised : February 28th 2026 Accepted : March 20th 2026</p> <p>Keywords: Digital Education Transformation; Smart City; Digital Literacy; Human Resource Readiness; Indonesian Capital City</p>	<p><i>The rapid advancement of digital technology has significantly transformed various sectors, including education, requiring adaptive and innovative approaches to learning systems. This study aims to analyze the transformation of digital technology-based education in the Indonesian Capital City (IKN) and to examine the readiness of the community to adapt to such transformation. Using a qualitative approach with a literature review method, this research synthesizes findings from relevant academic sources, policy documents, and previous studies related to digital education, smart city development, and human resource readiness. The results indicate that the transformation of education in IKN is closely linked to the integration of digital infrastructure, such as e-learning platforms and hybrid learning systems, which enhance accessibility, flexibility, and learning effectiveness. Furthermore, the implementation of digital education supports the broader vision of IKN as a smart city by fostering a digitally literate and innovation-oriented society. However, several challenges remain, including unequal access to digital infrastructure, varying levels of digital literacy, and limited institutional readiness. These challenges highlight the importance of comprehensive strategies that integrate technological development with human resource capacity building. The study also finds that community readiness plays a crucial role in determining the success of digital education transformation, as it influences the adoption and sustainability of technology-based learning. Therefore, the government and educational institutions must prioritize digital literacy programs, infrastructure development, and inclusive policies to ensure equitable access to education. This research contributes to the existing literature by providing a comprehensive analysis of digital education transformation within the context of a newly developed capital city and offers practical implications for policymakers and stakeholders in designing sustainable and inclusive education systems in the digital era.</i></p>

INTRODUCTION

The development of digital technology has significantly contributed to the advancement of modern societies by fostering the emergence of a digital ecosystem that balances rapid global changes. One notable concept is Society 5.0, introduced by Japan, which integrates cyberspace and physical space through artificial intelligence to enhance human well-being and productivity (Ayu et al., 2022). Indonesia has also demonstrated a strong commitment to digital transformation across various sectors, including education. The relocation of the national capital from Jakarta to Nusantara presents a strategic opportunity to redesign and modernize the education system. In this context, digital technology-based educational transformation is expected not only to improve the quality of education but also to expand

accessibility and relevance in addressing contemporary global challenges.

Education plays a fundamental role in preparing human resources capable of responding to dynamic global demands and achieving sustainable national development. The effectiveness of an education system can be analyzed through its core components, namely input, process, and output, which collectively determine educational quality (Zulkarmain, 2021). Technological advancements require individuals to possess adaptive skills and competencies that align with innovation and digital transformation. In the digital era, the development of such competencies is crucial to enhance participation in economic, social, and cultural activities (Ambarwati et al., 2022). Therefore, education systems must continuously evolve to ensure that learners are equipped with relevant knowledge and skills needed for the future workforce.

The rapid development of information and communication technology has made educational transformation inevitable, leading to a paradigm shift in teaching and learning processes. The integration of technology in education extends beyond the use of digital tools and encompasses fundamental changes in pedagogical approaches and learning environments (Rachmi, 2024). This transformation has introduced both challenges and opportunities within the education sector. Challenges include disparities in access to technology, shifts in learning culture, and concerns regarding data security and privacy. On the other hand, opportunities arise in the form of educational innovation, access to global knowledge resources, and the development of future-oriented skills that are essential in the digital economy.

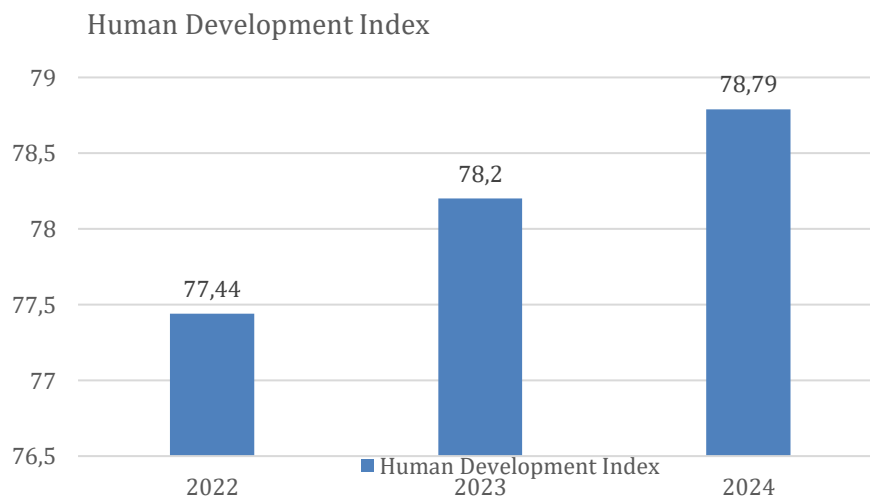


Figure 1. IPM Diagram in East Kalimantan

Source: <https://kaltim.bps.go.id>

East Kalimantan has shown a steady improvement in human resource quality, as reflected in the Human Development Index (HDI), which reached 78.79 in 2024. This achievement indicates that the region has relatively strong human capital potential to support the development of the new capital city. However, the relocation of the capital is expected to significantly increase population density and create higher demand for educational infrastructure and services. In areas such as North Penajam Paser Regency, particularly Sepaku District, several educational institutions still face limitations in adopting digital-based

learning facilities (Muharam, 2023). Consequently, the development of digital infrastructure, including internet connectivity and technology-based learning systems, becomes essential in supporting the vision of the Indonesian Capital City as a smart city.

The transformation of digital technology-based education in the Indonesian Capital City is designed to equip the community with the necessary skills and knowledge to adapt to technological advancements. This transformation encompasses various aspects, including innovative learning methods, the integration of digital platforms, and curriculum development that is responsive to technological changes. By leveraging digital technology, education systems in IKN are expected to become more flexible, inclusive, and efficient. Furthermore, this transformation aims to enhance the quality of human resources, enabling them to compete in a globalized and technology-driven world. Thus, education becomes a key pillar in supporting the long-term sustainability of the new capital city.

Despite the promising prospects of digital transformation, several structural and systemic challenges remain in its implementation. Unequal access to digital infrastructure, limited availability of technological devices, and varying levels of digital literacy among educators and students continue to hinder the effectiveness of digital education (Ambarwati et al., 2022). In the context of IKN, these challenges are further compounded by the transitional nature of the region, which is still undergoing development. Additionally, institutional readiness and policy alignment play critical roles in ensuring successful implementation. Without comprehensive planning and coordination, digital transformation efforts may not achieve their intended outcomes.

Furthermore, the integration of digital technology in education requires a shift from traditional teacher-centered approaches to more student-centered learning models. These models emphasize critical thinking, collaboration, creativity, and digital competence as essential skills in the 21st century (Ma'arif & Nursikin, 2024). Digital platforms such as e-learning and hybrid learning environments provide opportunities for more interactive and flexible learning experiences. However, the effectiveness of these platforms depends on the ability of educators to design and deliver engaging digital content. Therefore, continuous professional development and training for teachers are crucial to support the successful implementation of digital education.

In addition, the concept of a smart city, which underlies the development of the Indonesian Capital City, requires strong integration between the education sector and technological ecosystems. A smart city utilizes information and communication technologies to improve efficiency, sustainability, and quality of life (Setiawan et al., 2025). Within this framework, education plays a strategic role in developing a digitally literate and adaptive society. The alignment between education and smart city initiatives ensures that human resource development keeps pace with technological advancements. Therefore, educational transformation in IKN must be positioned as a central component of the smart city development strategy.

Moreover, there remains a significant research gap in understanding the readiness of local communities to adapt to digital transformation in newly developed regions such as IKN. Existing studies tend to focus on technological innovation and infrastructure development, while limited attention is given to socio-cultural readiness, including community awareness,

attitudes, and adaptability toward digital education (Muharam, 2023). This gap is crucial, as community readiness significantly influences the success and sustainability of digital transformation initiatives. Without adequate preparation, digital education may exacerbate inequality rather than promote inclusivity. Therefore, this study aims to analyze not only the transformation of digital education but also the readiness of the community in embracing technological changes in the Indonesian Capital City.

This research aims to analyze the transformation of education and digital-based learning media, as well as the readiness of the community to adopt digital technology in the Indonesian Capital City. By exploring these aspects, the study seeks to provide insights into the development of an adaptive and inclusive education system. The findings are expected to contribute to the formulation of policies and strategies that support digital education transformation. In addition, this study is intended to serve as a reference for stakeholders in designing technology-based educational systems. Ultimately, the transformation of education in the era of Society 5.0 is expected to create a more innovative, responsive, and sustainable future for Indonesia.

LITERATURE REVIEW

Transformative Learning Theory

Transformative Learning Theory was first introduced by Mezirow in the late 20th century as a response to traditional educational paradigms that positioned learners as passive recipients of knowledge. This theory emphasizes that learning is a process of critical reflection, where individuals reassess their assumptions, beliefs, and experiences to construct new meaning (Mezirow, 1997; Taylor, 2008). In this perspective, learners are active agents who engage in reflective thinking and dialogue to transform their frames of reference. The theory has been widely adopted in adult education and has influenced contemporary approaches to learner-centered education (Cranton, 2016). Furthermore, transformative learning is considered essential in addressing the complexities of modern society, where adaptability and critical thinking are crucial competencies.

The distinction between learning and education is also an important aspect of transformative theory. Learning is often defined as an internal cognitive and reflective process, while education refers to structured activities designed to facilitate that process (Verawati et al., 2023; Illeris, 2018). This distinction highlights the importance of designing educational systems that go beyond knowledge transmission and instead focus on developing higher-order thinking skills. In transformative learning, the emphasis is placed on the learner's ability to question assumptions, engage in critical discourse, and make informed decisions. As such, education systems must create environments that encourage exploration and intellectual autonomy. This shift represents a move away from teacher-centered approaches toward more participatory and reflective learning models.

Transformative learning is also closely related to changes in educational paradigms, particularly in the context of globalization and digitalization. The integration of digital technologies has expanded opportunities for interactive and collaborative learning, enabling

learners to access diverse sources of information (Siemens, 2005; Bates, 2019). These developments support the principles of transformative learning by facilitating critical engagement and knowledge construction. However, the effectiveness of such approaches depends on the ability of educators to design meaningful learning experiences. Therefore, the role of educators is not only to deliver content but also to guide learners through reflective and transformative processes.

In the context of the Indonesian Capital City (IKN), transformative learning theory provides a relevant framework for developing an adaptive and future-oriented education system. The rapid development of IKN as a smart city requires human resources who are not only knowledgeable but also capable of critical thinking and innovation (Setiawan et al., 2025). By applying transformative learning principles, education in IKN can better respond to societal changes and technological advancements. This approach encourages the development of graduates who are flexible, creative, and able to navigate complex challenges. Consequently, transformative learning becomes a key foundation for educational reform in the digital era.

Digital Education and Technology Integration Theory

The integration of digital technology in education has led to the emergence of new theoretical frameworks that emphasize the role of technology in learning processes. One of the most influential theories is the Technology Acceptance Model (TAM), which explains how users adopt and use technology based on perceived usefulness and ease of use (Davis, 1989; Venkatesh & Davis, 2000). In the context of education, this model is widely used to analyze the acceptance of e-learning systems and digital platforms. The successful implementation of digital education depends on the readiness of both educators and students to adopt technological innovations. Therefore, understanding user acceptance is essential for designing effective digital learning environments.

Another important framework is the concept of digital literacy, which refers to the ability to access, evaluate, and utilize digital information effectively (Ng, 2012; Eshet-Alkalai, 2012). Digital literacy is a fundamental requirement in the digital era, as it enables individuals to participate in knowledge-based societies. In educational settings, digital literacy is closely linked to students' ability to engage in online learning and collaborative activities. Moreover, educators must also possess digital competencies to facilitate technology-enhanced learning. Without adequate digital literacy, the potential benefits of digital education cannot be fully realized.

The use of digital technology in education also aligns with constructivist learning theory, which emphasizes active knowledge construction through interaction and experience (Jonassen, 1999; Duffy & Cunningham, 1996). Digital platforms such as e-learning systems, virtual classrooms, and collaborative tools provide opportunities for learners to engage in meaningful learning experiences. These tools support interactive learning, problem-solving, and knowledge sharing among students. Furthermore, hybrid and blended learning models combine the advantages of online and face-to-face learning, offering flexibility and accessibility (Garrison & Kanuka, 2004; Hidayat, 2019). This approach is particularly relevant

in the context of modern education systems that require adaptability and innovation.

In the Indonesian Capital City, the integration of digital technology in education is a critical component of development strategies. The implementation of e-learning and hybrid learning models supports the vision of creating a technologically advanced and inclusive education system (Setiawan et al., 2019; Sumakul et al., 2024). However, challenges such as infrastructure limitations and unequal access to technology must be addressed to ensure equitable implementation. In addition, continuous training and capacity building for educators are necessary to maximize the effectiveness of digital learning. Therefore, the integration of technology in education must be accompanied by comprehensive planning and support systems.

Smart City and Education Development Theory

The concept of a smart city has gained significant attention in recent years as a framework for sustainable urban development. A smart city utilizes information and communication technologies to enhance efficiency, improve public services, and promote sustainable growth (Caragliu et al., 2011; Albino et al., 2015). Within this framework, education plays a crucial role in developing human capital that can support smart city initiatives. The integration of digital technology in education is essential for preparing individuals to participate in technologically advanced environments. Therefore, education systems must align with the broader objectives of smart city development.

Education in a smart city context is not limited to formal institutions but also includes lifelong learning opportunities and community-based education (Komninos, 2013; Hollands, 2008). This approach emphasizes the importance of continuous learning and skill development to adapt to changing technological landscapes. In addition, smart cities promote the use of digital platforms to facilitate knowledge sharing and collaboration among citizens. This creates a more inclusive and participatory learning environment. As a result, education becomes a dynamic and integral part of urban development.

The relationship between smart cities and education is further strengthened by the concept of knowledge-based economies. In such economies, human capital is a key driver of innovation and competitiveness (Florida, 2002; OECD, 2016). Education systems must therefore focus on developing skills that are relevant to the digital economy, such as critical thinking, creativity, and technological competence. This requires a shift from traditional education models to more flexible and adaptive learning systems. Moreover, collaboration between government, educational institutions, and industry is essential to ensure that education aligns with labor market demands.

In the case of the Indonesian Capital City, the development of a smart city requires a comprehensive approach that integrates education with technological and economic strategies. The transformation of education in IKN is expected to support the development of a digitally literate and innovative society (Setiawan et al., 2025; Muharam, 2023). However, challenges such as digital inequality and limited infrastructure must be addressed to achieve this goal. By aligning education with smart city development, IKN can create a sustainable and competitive urban environment. Therefore, education is a key pillar in realizing the vision of a smart and

inclusive capital city.

Human Resource Development and Digital Readiness Theory

Human resource development is a critical factor in determining the success of digital transformation in education. The theory of human capital emphasizes the importance of investing in education and skills development to enhance productivity and economic growth (Becker, 1993; Schultz, 1961). In the digital era, this concept extends to the development of digital competencies and technological skills. Individuals must be equipped with the ability to adapt to rapid technological changes and participate in digital environments. Therefore, education systems must prioritize the development of relevant and future-oriented skills.

Digital readiness refers to the extent to which individuals and institutions are prepared to adopt and utilize digital technologies effectively (Warner & Wäger, 2019; Kane et al., 2015). This concept includes factors such as digital literacy, access to technology, and institutional support. In the context of education, digital readiness is essential for the successful implementation of technology-based learning. Without adequate readiness, digital transformation initiatives may face resistance and limited effectiveness. Consequently, efforts to improve digital readiness must involve both technical and behavioral aspects.

The development of digital skills is also closely linked to social inclusion and equity in education. Unequal access to technology can create disparities in learning opportunities and outcomes (Van Dijk, 2020; Warschauer, 2004). This issue is particularly relevant in developing regions, where infrastructure limitations may hinder access to digital resources. Therefore, policies aimed at digital transformation must address issues of accessibility and inclusivity. Ensuring equal access to technology is essential for creating a fair and inclusive education system.

In the Indonesian Capital City, the readiness of the community to embrace digital transformation is a key determinant of success. While the region has shown positive indicators of human development, challenges related to digital literacy and infrastructure remain (Muharam, 2023; Ambarwati et al., 2022). Efforts to improve digital readiness must include training programs, infrastructure development, and policy support. By enhancing human resource capabilities, IKN can maximize the benefits of digital education transformation. Ultimately, the success of educational transformation depends on the ability of individuals and institutions to adapt to technological change.

METHODS

This study provides an in-depth explanation of the phenomena occurring within the context of digital technology-based educational transformation. This study employs a literature study method, collecting data through document analysis to understand key aspects of digital technology-based educational transformation in the Indonesian capital. (According to Creswell, 2014), A literature review is a crucial step in the research process. It helps researchers identify topics for research, build a theoretical foundation, establish a research

focus, and provide context and relevance to the object under study (Yusuf, 2023:14).

The data collection process involved searching for significant and relevant documents related to the development of the smart city program in the IKN. These documents included various complicating matters, scientific journals, and policies relevant to the research context.

RESULTS AND DISCUSSION

Transformation of Education and Digital Technology-Based Learning Media in the Indonesian Capital

Internet infrastructure management in the Indonesian Capital City (IKN) is focused on building a reliable and high-tech telecommunications network, including the implementation of 5G and the Internet of Things (IoT) to support the smart city concept and technology-based education in the capital. With effective management, internet infrastructure in a smart city can provide significant benefits to the community, such as improving quality of life, efficient use of resources, and increasing the city's competitiveness.

In the field of education, the development of digital infrastructure presents its own challenges, particularly in terms of educational limitations. Educators play a key role in preparing the next generation to integrate technology into learning. However, various challenges remain, such as developing a thorough understanding of the curriculum before integrating technology, the availability of facilities, and teachers' ability to use technology.

Media plays an effective role in learning situations that occur without a teacher. Media often serves as a "fund" to achieve learning objectives. In this situation, objectives are presented, resources are organized, and measurement or assessment tools are included. This type of teaching material is also called "independent materials." This learning material functions as a subject, requiring textbooks, teaching materials, computers, and equitable distribution of information technology to support educational activities in the Indonesian Capital City. In this situation, the teacher or instructor acts as a learning facilitator (Sumakul, Tendean, and Lonto, 2024). Digital platforms in the Indonesian Capital City are as follows:

E-learning

E-learning is widely used to save time and resources in academic activities. E-learning is an educational method that allows learning materials to be delivered to students through the internet, intranet, or other computer networks. E-learning is defined as an educational system that uses electronic applications to support the learning process via the internet, computer networks, and stand-alone computers (Hartley in Setiawan, 2019:52).

The implementation of e-learning in the Indonesian capital city is currently an integral part of efforts to achieve the goals of digitalization and intelligence in sustainable smart city development. The government has prioritized the development of the Indonesian capital city (IKN) as a major strategy to achieve the goals of a golden Indonesia by 2045.

The presence of e-learning is a crucial part of improving human resource intelligence

to compete globally. In this context, the New Capital City (IKN) is designed to be a sustainable, smart city. Its development relies on advanced technology, including e-learning, as part of the smart forest city concept, a smart city that prioritizes environmental sustainability. The IKN also implements a smart city concept that incorporates e-learning as a strategy to improve the intelligence and quality of human resources in Indonesia.

The implementation of e-learning in the Indonesian capital is currently a crucial part of efforts towards digitalization, intelligence, and sustainable smart city development. The impact of e-learning, for example, is driven by advances in digital technology, which enable more interactive learning experiences.

E-learning platforms offer advanced features such as discussion forums, online quizzes, and collaborative learning, enabling students to actively participate in learning. E-learning also increases student motivation because the material is presented in an engaging and interactive format. This makes students more motivated to learn and develops an interest in the subject matter. Various studies have shown that the use of e-learning can contribute to improved learning outcomes. E-learning provides students with the facility to access learning materials anytime and anywhere, allowing them to study independently without being tied to a specific time or location.

Hybrid

The Indonesian capital is designed as a smart city with robust digital infrastructure. Hybrid learning can be an effective method for preparing the next generation to understand, manage, and develop smart city infrastructure. By reducing the need for physical classrooms and travel, hybrid learning can contribute to a more environmentally friendly education system. This learning method is attractive, allowing students to develop skills because it offers the flexibility to collaborate with institutions and experts worldwide.

The advantage of this learning model is that it combines both online and face-to-face learning, allowing learning to take place anytime and anywhere. Both will help make learning more effective, efficient, and easy. Blended learning makes it easier for students to access teaching materials (Hidayat, 2019:141). Meanwhile, in the IKN (Indonesian capital city), hybrid learning still requires the development of internet network infrastructure to optimize the implementation of hybrid learning effectively and efficiently.

The Readiness of the Residents of the Capital City of the Archipelago to Face Educational Transformation

The Indonesian Capital City (IKN) promises a brighter future for Indonesia, including in the field of education. However, the readiness of IKN residents to face educational transformation remains a shared concern, making it crucial for them to be prepared. The public must have a strong awareness and understanding of the importance of education in the digital age. They must also be ready to adapt to changes in the education system and new learning methods.

The government needs to guarantee equal access to education for all residents and provide scholarships for students in need. Furthermore, residents of the new capital city (IKN)

need to have adequate digital skills to participate in technology-based learning. The government and educational institutions are responsible for offering digital training and education programs to the community, especially those less familiar with technology. Through these efforts, the education system in the new capital city is built on consideration of local cultural values and ensures that the education provided is relevant to the needs and characteristics of the local community.

The Indonesian capital city has great potential to become a Smart City. The Smart City concept itself focuses on utilizing digital technology to improve efficiency, sustainability, and the quality of life for its citizens. However, in its transition to a Smart City, the IKN faces several challenges. Inequality in digital access is a major obstacle, primarily due to the low digital literacy of the surrounding community. Furthermore, limited digital infrastructure, threats to data security and privacy, and low-quality human resources are also inhibiting factors. Therefore, the development of the new capital city must also consider ecological sustainability to avoid environmental damage and develop quality digital-based education (Setiawan et al., 2025:3).

The condition of human resources around the IKN is relatively good, as seen from the Human Development Index in East Kalimantan reaching 78.79% in 2024. With the relocation of the IKN in East Kalimantan, the population in East Kalimantan will experience a significant increase, thus requiring the development of broader educational infrastructure to be able to meet the demand for quality and competitive educational facilities.

CONCLUSION

The digital technology-based educational transformation in the Indonesian capital is designed to equip the community with the skills and knowledge to adapt to technology. Digital technology-based education in the Indonesian capital not only improves the quality of education but also enhances its accessibility and relevance in the modern era. Educational transformation in the digital era has significant implications for education in the Indonesian capital.

Integrated digital technology-based educational transformation will be key to supporting the sustainability and development of the Indonesian Capital City (IKN) as a responsive, innovative, and competitive Smart City. E-learning and hybrid learning methods aim to improve educational quality. Effective use of digital technology requires the community to possess adequate digital knowledge and skills. The success of this educational transformation depends heavily on the readiness of the Indonesian Capital City's community to adapt and utilize technology in the learning process.

The government is expected to accelerate the development of technological infrastructure and provide equitable internet access throughout the capital city. Furthermore, digital literacy training programs for the community are needed to improve their ability to utilize technology.

The people of the Indonesian capital are required to have a strong awareness and understanding of the importance of education in the digital age, as well as a readiness to adapt to changes in the education system and new learning methods. The implementation of digital

technology in education in the Indonesian capital is expected to support a more dynamic, communicative, and responsive learning process, thereby contributing to the advancement of human resources in the digital era.

REFERENCE

- Albino, V., Berardi, U., & Dangelico, R. M. (2015). Smart cities: Definitions, dimensions, performance, and initiatives. *Journal of Urban Technology*, 22(1), 3–21.
- Ambarwati, D., et al. (2022). Studi literatur: Peran inovasi pendidikan pada pembelajaran berbasis teknologi digital. *Jurnal Inovasi Teknologi Pendidikan*, 8(2), 173–184.
- Ayu, I. W., Zulkarnaen, Z., & Fitriyanto, S. (2022). Budaya digital dalam transformasi digital menghadapi era society 5.0. *Jurnal Pengembangan Masyarakat Lokal*, 5(1), 20–25.
- Bates, T. (2019). *Teaching in a digital age: Guidelines for designing teaching and learning*. BCcampus.
- Becker, G. S. (1993). *Human capital: A theoretical and empirical analysis with special reference to education* (3rd ed.). University of Chicago Press.
- Caragliu, A., Del Bo, C., & Nijkamp, P. (2011). Smart cities in Europe. *Journal of Urban Technology*, 18(2), 65–82.
- Cranton, P. (2016). *Understanding and promoting transformative learning: A guide to theory and practice*. Stylus Publishing.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.
- Duffy, T. M., & Cunningham, D. J. (1996). Constructivism: Implications for the design and delivery of instruction. In *Handbook of research for educational communications and technology* (pp. 170–198).
- Eshet-Alkalai, Y. (2012). Thinking in the digital era: A revised model for digital literacy. *Issues in Informing Science and Information Technology*, 9, 267–276.
- Florida, R. (2002). *The rise of the creative class*. Basic Books.
- Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, 7(2), 95–105.
- Hidayat, D. (2019). Blended learning dalam pembelajaran pendidikan tinggi. *Jurnal Pendidikan*, 141, 135–145.
- Hollands, R. G. (2008). Will the real smart city please stand up? *City*, 12(3), 303–320. <https://doi.org/10.1080/13604810802479126>
- Illeris, K. (2018). *Contemporary theories of learning: Learning theorists in their own words*. Routledge.
- Jonassen, D. H. (1999). Designing constructivist learning environments. *Instructional Design Theories and Models*, 2, 215–239.
- Kane, G. C., Palmer, D., Phillips, A., Kiron, D., & Buckley, N. (2015). Strategy, not technology, drives digital transformation. *MIT Sloan Management Review*.
- Komninos, N. (2013). What makes cities intelligent? In *Smart cities and innovation networks*. Routledge.
- Ma'arif, A. I., & Nursikin, M. (2024). Pendidikan nilai di era digital: Tantangan dan peluang. *Afeksi: Jurnal Penelitian dan Evaluasi Pendidikan*, 5(2), 326–335.
- Mezirow, J. (1997). Transformative learning: Theory to practice. *New Directions for Adult and Continuing Education*, 74, 5–12.

- Muharam, S. (2023). Urgensi infrastruktur pendidikan sebagai wajah peradaban baru ibu kota negara Indonesia menuju generasi emas 2045. *Journal Education Innovation*, 1(1), 106–113.
- Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education*, 59(3), 1065–1078.
- OECD. (2016). *The knowledge-based economy*. OECD Publishing.
- Rachmi, A. (2024). Transformasi pendidikan di era digital. *Jurnal Pendidikan Modern*, 53, 50–60.
- Schultz, T. W. (1961). Investment in human capital. *The American Economic Review*, 51(1), 1–17.
- Setiawan, A., et al. (2019). Pengembangan e-learning sebagai media pembelajaran pendidikan vokasi. *Jurnal Pendidikan Vokasi*, 52–56.
- Setiawan, A., et al. (2025). Tantangan dan peluang ibu kota nusantara menuju smart city di era society 5.0. *Jurnal Ilmiah Mahasiswa Ekonomi Manajemen*, 10(1), 1–10.
- Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*, 2(1), 3–10.
- Sumakul, H. I., Tendean, S. V., & Lonto, A. L. (2024). Pemanfaatan teknologi informasi dan komunikasi sebagai media pembelajaran. *Tumoutou Social Science Journal*, 1(1), 21–30.
- Taylor, E. W. (2008). Transformative learning theory. *New Directions for Adult and Continuing Education*, 119, 5–15.
- Van Dijk, J. (2020). *The digital divide*. Polity Press.
- Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model. *Management Science*, 46(2), 186–204.
- Verawati, U. J., et al. (2023). Implementasi pembelajaran e-learning sebagai transformasi pendidikan di era digital. *Social Science Academic*, 1(2), 221–228.
- Warschauer, M. (2004). *Technology and social inclusion: Rethinking the digital divide*. MIT Press.
- Zulkarmain, L. (2021). Analisis mutu pendidikan (input, proses, output). *Manazhim*, 3(1), 17–31. <https://doi.org/10.36088/manazhim.v3i1.946>
- Yusuf, M., Julianingsih, D., & Ramadhani, T. (2023). Transformasi pendidikan digital 5.0 melalui integrasi inovasi IPTEK. *Jurnal Mentari*, 2(1), 11–19.