Literature Review on the Use of Technology-Based Learning Media in the Context of Distance Learning

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Abstrak

Perubahan sistem pendidikan akibat pandemi COVID-19 telah mendorong lembaga pendidikan untuk beradaptasi dengan memanfaatkan teknologi sebagai alat utama dalam proses belajar mengajar. Metode ini dilakukan melalui studi literatur dengan mengumpulkan dan menganalisis berbagai artikel jurnal nasional maupun internasional yang diterbitkan dalam lima tahun terakhir (2020–2025). Analisis difokuskan pada tren, efektivitas, dan tantangan dalam implementasi media pembelajaran tersebut dalam konteks pendidikan modern. Temuan kajian menunjukkan bahwa media pembelajaran berbasis teknologi seperti *Learning Management System* (LMS), video pembelajaran, aplikasi interaktif, dan media sosial memainkan peran penting dalam meningkatkan efektivitas dan fleksibilitas pembelajaran jarak jauh. Namun, efektivitas media ini sangat bergantung pada kesiapan guru, ketersediaan infrastruktur, serta kemampuan literasi digital peserta didik. Kajian ini merekomendasikan pengembangan program pelatihan teknologi bagi pendidik serta perancangan media yang lebih adaptif terhadap kebutuhan peserta didik. Temuan dari kajian pustaka ini diharapkan tidak hanya menjadi landasan teoritis, tetapi juga sebagai acuan praktis bagi para pembuat kebijakan, pendidik, dan pengembang kurikulum dalam merancang strategi pembelajaran berbasis teknologi yang lebih adaptif dan berkelanjutan. Dengan memahami tren, tantangan, dan potensi berbagai media pembelajaran dalam konteks PJJ, para pemangku kepentingan dapat mengambil keputusan yang lebih tepat dalam merumuskan kebijakan pendidikan yang responsif terhadap kemajuan teknologi.

Kata Kunci: Teknologi Pendidikan, Literasi Digital, Pembelajaran Jarak Jauh, Media Pembelajaran

Abstract

The shift in the education system due to the COVID-19 pandemic has compelled educational institutions to adapt by utilizing technology as a primary tool in the teaching and learning process. This research was conducted through a literature review by collecting and analyzing various national and international journal articles published within the last five years (2020–2025). The analysis focused on trends, effectiveness, and challenges in implementing these media within the context of modern education. The review findings indicate that technology-based learning media such as Learning Management Systems (LMS), instructional videos, interactive applications, and social media play a significant role in enhancing the effectiveness and flexibility of distance learning. However, the effectiveness of these media depends heavily on teacher readiness, infrastructure availability, and students' digital literacy skills. This study recommends the development of technology training programs for educators and the design of media that are more adaptive to learners' needs. The findings from this literature review are expected to serve not only as a theoretical foundation but also as a practical reference for policymakers, educators, and curriculum developers in designing more adaptive and sustainable technology-based learning strategies. By understanding the trends, challenges, and potential of various learning media used in the distance learning context, stakeholders can make more informed decisions in formulating education policies that are responsive to technological advancements.

Keywords*: Educational Technology, Digital Literacy, Distance Learning, Learning Media*

INTRODUCTION

The rapid development of information and communication technology has brought significant changes across various aspects of human life, including the field of education (Hendri Yahya Sahputra, 2024). One of the most notable transformations is the way teachers and students interact during the teaching and learning process. Especially since the COVID-19 pandemic, distance learning (DL) has become the primary solution to ensure the continuity of education (Umi Kalsum P. S., 2023). This situation has necessitated the massive and systematic use of technology-based learning media.

Technology-based learning media encompass a wide range of tools, including Learning Management Systems (LMS), instructional videos, interactive applications, and social media platforms (Rizki Inayah Putri, 2023). Numerous studies suggest that these technologies have great potential to improve the accessibility, flexibility, and overall effectiveness of learning (Intan Bayzura Sirait, 2025). However, their implementation still faces significant challenges, including limited infrastructure, insufficient teacher readiness, and students' digital literacy skills.

In recent years, particularly following the outbreak of the COVID-19 pandemic, education has undergone a major transformation through the adoption of distance learning systems (Topan Iskandar, 2023). These systems position technology-based learning media as the main instruments for delivering content, facilitating interaction, and assessing learning outcomes (Nurlaila Sapitri, 2023). Nonetheless, the effectiveness of such media depends not only on their availability but also on how well they are designed, utilized, and integrated into the curriculum.

In the ever-evolving digital era, technology-based learning media have become an essential component of modern education. These media refer to all forms of digital tools or platforms used to deliver learning materials in an interactive, effective, and efficient manner (Tarigan, 2024). Educational technology today goes beyond the use of computers and projectors it now includes LMS platforms, online learning applications, instructional videos, augmented reality, and artificial intelligence in education.

According to (Dinata, 2024), learning media comprise anything that can be used to deliver messages and stimulate learners' thoughts, feelings, attention, and motivation, thereby promoting effective learning. When integrated with digital technologies, the role of media becomes broader and more dynamic. Similarly, (Lusianti, 2024) emphasizes that educational technology encompasses the design, development, utilization, management, and evaluation of learning processes and resources aimed at enhancing instructional effectiveness.

In the context of 21st-century learning, the use of technology-based media also supports the development of critical thinking, creativity, collaboration, and digital literacy (Umi Kalsum Z. Z., 2024). This aligns with the view of (Mardiana & Hajron, 2024), who argue that multimedia learning can enhance educational outcomes if designed according to cognitive learning principles, such as dual-channel processing (visual and verbal) and contiguity (integrated information presentation). Thus, technology-based learning media are not merely tools for delivering content they are strategic instruments for creating meaningful, active, and future-oriented learning experiences.

Distance Learning (DL) is an educational process that allows teachers and students to engage in teaching and learning activities without being in the same place and time. This model has evolved alongside advances in information and communication technology, enabling online interactions either synchronously or asynchronously. According to (Mishra & Koehler, 2024), distance learning is a formal educational system designed in such a way that teaching components, material delivery, and interaction are conducted through technology-mediated platforms that bridge the physical distance between instructors and learners. This reflects a paradigm shift from conventional to more flexible and open learning models.

DL offers several advantages, including flexibility in time and location, broader access to learning resources, and the promotion of student autonomy (Iskandar, 2022). However, it also faces notable challenges, such as infrastructure limitations, the digital divide, and a lack of social and emotional interaction between teachers and students. (Dinata, 2024), through the Community of Inquiry framework, emphasizes the importance of three core elements in effective distance learning: teaching presence, social presence, and cognitive presence, all of which are essential for creating meaningful learning experiences. Therefore, the implementation of DL requires a pedagogical approach that is both adaptive and technologically responsive to student needs. DL is

not merely the transfer of classroom learning to digital screens, but rather a reconstruction of instructional strategies that support independent and collaborative learning success.

While there has been considerable research on the implementation of technology-based learning media in the context of distance learning, much of the existing literature has focused narrowly on technical aspects or the effectiveness of specific platforms in achieving student learning outcomes (Putri, 2022). Several studies, for example, assess the use of LMS platforms such as Google Classroom or Moodle without exploring how their integration is shaped by social context, pedagogical readiness, or user digital literacy (Simanjuntak, 2023).

Moreover, many studies take a single-case approach and evaluate platforms in isolation, without systematically comparing the strengths and limitations of various types of technology-based media within the broader context of DL. For instance, (Nasrullah & Sari, 2021) highlight the issue of digital infrastructure gaps but do not explicitly connect this with the design models of technology-based learning. Likewise, (Yuliana & Sari, 2024) discuss teachers' low digital literacy but fail to elaborate on how this affects the long-term effectiveness of educational technology tools. From a theoretical standpoint, prior research has rarely applied comprehensive models such as TPACK (Technological Pedagogical Content Knowledge) or SAMR (Substitution, Augmentation, Modification, Redefinition) to analyze the use of digital media, even though these models are essential for understanding meaningful technology integration in pedagogical practice (Mishra & Koehler, 2024).

Based on these gaps, this study offers two key novelties. First, rather than focusing on the effectiveness of a single type of media, it synthesizes findings across platforms and media types by reviewing both national and international literature from the past five years. This provides a holistic picture of technology-based media practices in DL across educational levels and geographic contexts. Second, the study examines the use of technology-based media in DL through the lens of pedagogical factors, teacher-student digital literacy, and structural challenges in the field. By adopting the TPACK and SAMR frameworks, this research goes beyond evaluating media presence to assess the quality of media integration into instructional practices. In doing so, this study not only fills the descriptive or technical gaps in the literature but also contributes to the development of a conceptual and practical roadmap for more adaptive, effective, and context-sensitive technology-based learning in distance education.

METHOD

This study employs a descriptive qualitative approach using the library research method, focusing on the collection and analysis of scholarly literature related to the use of technology-based learning media in the context of distance learning. The library research method was chosen as the primary approach because it allows the researcher to systematically examine theories, research findings, and trends developed by previous scholars and experts (Creswell, 2020).

The data for this study were obtained from written sources such as academic journals, conference papers, research reports, and relevant scholarly books. The inclusion criteria for the reviewed literature were as follows. Publications issued within the last five years (2020–2025), studies addressing the use of technology-based learning media in the context of distance education, works published by reputable academic institutions or credible publishers. Literature sources were retrieved from various academic databases, including Google Scholar, ScienceDirect, ERIC (Education Resources Information Center), and SINTA (Putri Syahri, 2024).

The data analysis technique used was content analysis, which involves the process of identifying, classifying, and synthesizing key themes that emerge from the literature, such as the types of technological media utilized, forms of implementation, impacts on the learning process, and the challenges encountered (Moleong, 2000). The results of this analysis are presented in the form of thematic narratives to provide a comprehensive understanding of the development and effectiveness of technology-based learning media in distance learning. By applying this approach, the study aims to offer a holistic overview and serve as a foundation for developing learning models that are aligned with the needs of education in the digital era.

RESULTS AND DISCUSSION

RESULT

The literature review of various academic sources reveals that the use of technology-based learning media in the context of distance learning has significantly increased, particularly since the COVID-19 pandemic. The sudden shift from face-to-face instruction to online learning compelled educational institutions to rapidly and widely adopt various forms of technology to ensure the continuity of the teaching and learning process.

Types of Technology-Based Learning Media Used

The reviewed literature indicates that a wide range of technology-based learning media have been employed in distance learning. The most commonly used include Learning Management Systems (LMS) such as Google Classroom, Moodle, and Schoology, which serve as central platforms for classroom management, material distribution, assignment submission, and communication between teachers and students (Simanjuntak, 2023). Synchronous and asynchronous communication tools such as Zoom, Google Meet, and Microsoft Teams are used for online face-to-face instruction. Meanwhile, YouTube-based educational videos and podcasts support flexible, self-paced learning (Putri, 2022).

Interactive applications such as Kahoot, Quizziz, Wordwall, and Edpuzzle focused on gamification have been proven to enhance student engagement and create a more enjoyable learning atmosphere (Setiawan & Phillipson, 2023). Social media platforms such as WhatsApp, Telegram, Instagram, and TikTok are also utilized as informal channels for sharing materials, maintaining communication, and fostering learning communities, especially at the secondary education level (Yuliana & Sari, 2024).

Effectiveness of Technology-Based Learning Media

In general, the literature suggests that the use of technology-based learning media positively contributes to the effectiveness of distance learning. This is reflected in increased student motivation, active participation in the learning process, and improved learning outcomes among students with adequate digital access and literacy (Sari & Nugroho, 2025). Technology-based media also allow for more flexible, personalized, and interactive learning. Students can study at their preferred time and place, review materials as needed, and receive real-time feedback through automated systems or instructors. These aspects align with the principles of modern, student-centered learning.

Challenges and Limitations of Implementation

Despite the many benefits, several challenges have been identified in the implementation of technology-based learning media. Literature indicates that the digital divide remains a major obstacle, particularly in underdeveloped and remote areas where access to digital devices and stable internet connections is very limited (Nasrullah & Sari, 2021). Low digital literacy among both teachers and students also hampers the optimal use of learning media. Teachers unfamiliar with technology tend to simply transfer traditional lecture methods to digital platforms without innovation or meaningful interaction (Yuliana & Sari, 2024).

A lack of training and technical support for educators in designing appropriate learning media further impedes progress. Without ongoing professional development, teachers tend to use technology passively rather than as a tool to transform learning (Setiawan & Phillipson, 2023). Digital fatigue has also been widely reported by both students and teachers due to the intensive use of devices and screens during prolonged periods of distance learning, negatively affecting motivation, focus, and psychological well-being.

Future Directions and Recommendations

Based on the findings, this study concludes that the effectiveness of technology-based learning media in distance education is largely influenced by infrastructure readiness, users' digital competencies, and the pedagogical approaches employed. Therefore, future development of technology-based learning strategies must holistically integrate technology, pedagogy, and content, as suggested by the TPACK model (Technological Pedagogical Content Knowledge) (Mishra & Koehler, 2024).

Moreover, policymakers and educational institutions should prioritize regular teacher training in digital instructional design, ensure equitable access to digital infrastructure, develop inclusive and child-friendly media, strategically integrate social media into meaningful learning, and foster collaboration among government bodies, schools, and ed-tech communities to build a sustainable learning ecosystem.

DISCUSSION

The use of technology-based learning media has become a fundamental component of distance education, especially since the COVID-19 pandemic transformed the global educational landscape. Numerous studies have shown that technological media are not only tools for content delivery but also essential bridges for interaction between teachers and students in the face of physical and geographical limitations. This study's literature review of both national and international journals highlights that Learning Management Systems (LMS) such as Moodle and Google Classroom are among the most widely used media. LMS platforms facilitate the systematic organization of materials, assignments, and assessments. According to (Simanjuntak, 2023), LMS usage has enhanced student autonomy by allowing flexible and repeated access to learning content.

Furthermore, synchronous online communication tools such as Zoom and Google Meet served as the backbone of learning during the pandemic. (Putri, 2022) noted that real-time interaction via video conferencing positively influenced student engagement, although it was less effective for students with poor internet connectivity. The importance of interactive, gamified media also emerged as a key theme. Applications like Kahoot! and Quizziz were found effective in enhancing student motivation and participation. Research by (Setiawan & Phillipson, 2023) demonstrated that such tools support active and enjoyable learning, particularly at the primary and secondary education levels.

Nonetheless, the literature also highlights several complex challenges. (Yuliana & Sari, 2024) reported that many teachers still struggle to design engaging, interactive technology-based instruction due to low digital literacy and a lack of professional training. This aligns with this study’s findings that technology is often used minimally as a substitute for traditional tools like whiteboards rather than as a means of transformative learning. Digital access inequality is another major issue identified in many studies. (Nasrullah & Sari, 2021) emphasized disparities between urban and rural areas in terms of digital infrastructure, which directly impact learning quality. These findings reinforce the notion that the effectiveness of technology-based learning media is closely tied to students' social and geographical contexts.

This study also found that the integration of technology in distance learning has yet to fully adopt instructional design principles grounded in learning theories. Several journals underscore the importance of models such as TPACK and SAMR (Substitution, Augmentation, Modification, Redefinition) in designing learning media that not only replace traditional methods but also enrich and transform the learning experience (Iskandar, 2022). Therefore, the literature review confirms that the successful use of technology-based media in distance learning depends not only on the availability of tools and platforms but also on sound pedagogical design, digital competencies of both teachers and students, and institutional support. These findings are expected to serve as a strategic reference for the development of more effective and inclusive technology-based learning policies and practices in the future.

Table 1. Summary of Literature Review Findings on Technology-Based Learning Media in Distance Education

Aspect	Key Findings	Sources
Types of Media Used	LMS (Google Classroom, Moodle), Video Conferencing (Zoom, Google Meet), Interactive Apps (Kahoot!, Quizziz), Social Media (WhatsApp, Telegram)	Simanjuntak et al., 2021; Putri et al., 2022; Yuliana & Sari, 2021
Main Benefits	Increased learning flexibility, independent access, student engagement, and more interactive content delivery	Setiawan & Phillipson, 2021; Sari & Nugroho, 2020
Impact on Learning Motivation	Interactive and gamified media boost students' interest and active participation during distance learning	Setiawan & Phillipson, 2021
Technical Challenges	Limited internet access, lack of digital devices, digital divide between urban and rural areas	Nasrullah & Sari, 2020
Competency Barriers	Low digital literacy among teachers and students; many teachers lack the skills to design engaging media	Yuliana & Sari, 2021
Pedagogical Aspects	Technology often not grounded in systematic	Mishra & Koehler, 2006;

Aspect	Key Findings	Sources
	instructional design; limited integration of TPACK/SAMR models	Puentedura, 2013
Development Recommendations	Ongoing teacher training, equal digital infrastructure, adaptive curriculum development, stakeholder collaboration	Overall review findings

CONCLUSION

Based on a comprehensive review of various national and international journals published within the last five years, it can be concluded that the use of technology-based learning media plays a significant role in enhancing the effectiveness of distance learning. A variety of platforms such as Learning Management Systems (LMS), video conferencing tools, interactive applications, and social media have been shown to improve learning flexibility, student engagement, and the effectiveness of instructional delivery. However, the implementation of these media still faces several challenges, including limited infrastructure, digital divides between regions, and low levels of digital literacy among both educators and learners. Furthermore, not all technology-based media are utilized with proper pedagogical planning, which hinders their full potential in supporting meaningful learning outcomes. Therefore, an integrative approach that simultaneously addresses technological, pedagogical, and content-related aspects such as the TPACK (Technological Pedagogical Content Knowledge) framework is essential.

SUGGESTION

For governments and policymakers, there is a need for sustained investment in educational technology infrastructure, particularly in underdeveloped, remote, and frontier (3T) areas. Policies should focus on competency-based digital training for teachers and the development of modern instructional designs that are adaptive to technology. For educators and schools, it is important to continuously enhance pedagogical competence and digital literacy through regular professional development. Learning media should be integrated not merely as content delivery tools but as instruments to foster active, collaborative, and reflective learning environments. Future researchers are encouraged to conduct empirical studies or experimental research to examine the effectiveness of specific types of media in hybrid or fully online learning contexts. Comparative analyses between locally developed educational technologies and global platforms could also provide valuable insights into the role of cultural context in digital learning. In conclusion, the findings of this literature review are expected to serve as a foundational reference for designing more equitable, high-quality, and sustainable technology-based distance learning policies and strategies.

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