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Analysis Of Constrains In The Use of IT-Based Learning Media In Elementary School

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Abstract*—This study aims to analyze the constraints in implementing IT-based learning media in elementary schools. The rapid advancement of technology demands the integration of Information Technology (IT) into education; however, many educational institutions still face various obstacles. The research method used was a Systematic Literature Review (SLR). A total of 35 relevant scientific articles were collected, categorized, and analyzed. Data collection focused on the keywords IT-based learning media, digital learning challenges, and elementary school. The results of the study indicate two main constraints in implementing IT-based learning media in elementary schools: the lack of teachers' competence in using technology and limited technological facilities, especially in rural schools. The implication of these findings is that the successful integration of IT-based learning media in elementary education requires a holistic intervention. Such intervention includes continuous professional development for teachers and the establishment of supportive school policies to ensure the effective integration of technology in elementary education.

Keywords- IT based learning media, elementary School, challenges.

I. INTRODUCTION

In the current digital era, the integration of technology into education has become an inevitable development. Information technology (IT)-based learning media serve as tools that enhance the teaching and learning process by utilizing various forms of digital devices, including audio, visual, audio-visual, and multimedia resources (Rahmani et al., 2020). Technology-enhanced learning media offer a range of advantages, such as enhancing students' learning motivation, attracting their attention, facilitating the understanding of complex concepts, and transforming abstract ideas into more concrete and comprehensible forms (Harpeni Dewantara, 2020).

IT-based learning media encompass various types, ranging from audio media such as educational podcasts, visual media such as infographics, to interactive media such as digital educational games (Nabila et al., 2024). IT-based media, such as interactive applications, instructional videos, and digital platforms, enable learning to become more innovative and learner-centered (Novitasari et al., 2020).

Several studies have indicated that IT-based learning media play a significant role in enhancing students' interest and motivation to learn, clarifying the delivery of concepts, and making the learning process more interactive and engaging. For instance, IT-based media assist teachers in designing more varied and appealing learning materials, while students become more actively involved in the learning process and find it easier to understand the subject matter. In addition, IT media also support the development of students' digital literacy and critical thinking skills (Salmiyanti et al., 2022 ; Barokah et al., 2025 ; Karomah et al., 2024)

However, the implementation of IT-based media in elementary schools faces several challenges, such as the limited digital competence of teachers, the lack of supporting facilities and infrastructure, unequal internet access across regions, and insufficient training and material support from schools. Therefore, this literature review analyzes the challenges in implementing IT-based media in elementary schools. The purpose is to understand the potential obstacles that may arise during the implementation of IT-based media in elementary education and to provide recommendations for teachers on how to overcome these challenges.

In line with the objectives of this study, the following research questions are proposed:

1. What are the challenges encountered in the implementation of IT-based learning media in elementary schools?
2. What solutions can be proposed to overcome the challenges in implementing IT-based learning media in elementary schools?

II. RESEARCH METHOD

This study employs a qualitative approach using a literature review method. The literature review was chosen because it allows for an in-depth and comprehensive collection of data through the analysis of various sources relevant to the research topic (Karengga & Suti'ah, 2025). As stated by Heryani et al (2022) "A literature study is a method used to critically review and analyze knowledge, ideas, or findings from previously published written sources." Data collection in this study was carried out through a literature review by examining scholarly journals from Google Scholar that discuss the challenges in implementing IT-based learning media in elementary schools. The criteria for selecting the literature included its relevance to the research topic and publication within the last five years. The keywords used in the search process included "IT-based learning media," "digital learning challenges," and "elementary school.".

The research findings will be presented in the form of a descriptive narrative, which includes the challenges faced by

teachers in implementing IT-based learning media in elementary schools and the solutions to address these challenges. The results of this study are expected to provide insights into the challenges and solutions related to the implementation of IT-based learning media in elementary schools, as well as serve as recommendations for teachers and policymakers in developing strategies for technology integration in elementary education. In addition, this study can serve as a foundation for future research to further explore digital innovations in the primary education system in the modern era.

III. RESULT

A total of 14 studies published between 2020 and 2025 met the inclusion criteria for this review. All studies were conducted in schools in Indonesia (n = 14). Most of the studies employed descriptive qualitative and descriptive quantitative methods (n = 5), followed by literature studies (n = 5), phenomenological qualitative studies (n = 3), and a case study (n = 1). The sample sizes varied, ranging from small classroom groups of 15 students to large-scale surveys.

The characteristics and key findings of the selected representative studies are summarized in Table 1. As shown, the reviewed studies indicate several challenges in the implementation of IT-based media in elementary schools. For instance, Rajagukguk (2022) reported that teachers' competencies and the availability of IT-based learning media were still suboptimal in classroom practice. Similarly, Karengga & Suti'ah (2025) found that elementary schools in rural areas with limited facilities faced restricted access to relevant and high-quality IT media.

Table 1. Summary of Selected Studies on the Challenges in Using IT-Based Learning Media in Elementary Schools

Author(s) & Year	Country	Method	Main findings
(Sari et al., 2025)	Indonesia	Descriptive qualitative	Not all students have adequate devices, and the number of devices available in classrooms is often insufficient.
(Rajagukguk, 2022)	Indonesia	Quantitative non-experimental descriptive method	The availability of learning media in schools remains inadequate. Schools have media, but they are not technology-based.
(Hanannika & Sukartono, 2022)	Indonesia	Qualitative phenomenological method	Teachers experienced difficulties because they had not yet mastered the use of technology effectively
(Karengga & Suti'ah, 2025)	Indonesia	Literature Study	Limited access to digital technology due to inadequate infrastructure.
(An'navi & Sukartono, 2023)(An'navi & Sukartono, 2023)	Indonesia	Qualitative phenomenological method	Teachers lacked sufficient knowledge and skills and found it challenging to teach using IT-based media.
(Pardede & Khairunnisa, 2024)	Indonesia	Case study	Schools in rural areas faced challenges related to limited technological infrastructure.
(Zulfa et al., 2023)	Indonesia	Literature study	Teachers' competencies in IT use were insufficient to meet the demands of learning in the Industry 5.0 era.
(Karna et al., 2025)(Karna et al., 2025)	Indonesia	Literature study	Limited technological facilities and the need for teacher training were identified.
(Putra et al., 2024)	Indonesia	Qualitative descriptive	Teachers were not accustomed to using or managing laptops to create learning media for classroom instruction.
(Nirmala et al., 2023)	Indonesia	Qualitative phenomenological method	Not all teachers were proficient in operating laptops or computers.
(Nisak & Rofi'ah, 2023)	Indonesia	Descriptive qualitative	Teachers were unable to operate digital media and struggled to understand digital tools.
(Tetty et al., 2021)	Indonesia	Literatur study	Teachers lacked sufficient understanding of technology.
(Rahmani et al., 2020)	Indonesia	Literature Study	Teachers' digital literacy in using IT was relatively low.
(Jamilah et al., 2021)	Indonesia	Descriptive quantitative	Teachers demonstrated limited ability in applying information technology in classroom learning.

Thematic analysis of the 14 studies revealed two main challenges in implementing IT-based learning media in elementary schools: (1) teachers' limited competence in using IT (9 studies, 64.3%), and (2) inadequate facilities, including limited internet access in schools (5 studies, 35.7%).

To address these challenges, several solutions are recommended, including conducting regular training on the use of IT-based learning media in elementary schools and promoting collaboration between schools, teachers, and the government to provide IT facilities and internet access, particularly in rural elementary schools.

RQ1 : What are the challenges encountered in the implementation of IT-based learning media in elementary schools?

From the 14 studies included in the review, two main categories emerged. The challenges in implementing IT-based media in elementary schools were identified as follows: teachers' limited competence in using IT (9 studies, 64.3%) and inadequate facilities, including limited internet access in schools (5 studies, 35.7%).

Table 2. Challenges in the Implementation of IT-Based Media in Elementary Schools

Challenge	Number of Studies	% of total	Example Study
Limited teacher competence	9	64,3 %	Tetty et al (2021)Tetty et al (2021) – Teachers' limited understanding of technology
Inadequate school facilities	5	35,7 %	Karengga & Suti'ah (2025)Karengga & Suti'ah (2025) - Limited access to digital technology due to insufficient infrastructure

RQ2 : What solutions can be proposed to overcome the challenges in implementing IT-based learning media in elementary schools?

Several solutions have been reported to address the challenges in implementing IT-based learning media. These include conducting intensive and continuous training on digital literacy and the design of interactive learning media for teachers. To ensure adequate facilities, teachers and schools should collaborate with the government to provide infrastructure and policies that support the integration of IT in elementary education.

Table 3. Solutions to Overcome the Challenges of Using IT-Based Media in Elementary Schools

Challenge	Proposed Solution	Supporting Studies
Limited teacher competence	Conduct intensive and continuous training on digital literacy and the design of interactive learning media for teachers.	(Rahmani et al., 2020); (Putra et al., 2024).
Inadequate facilities	Schools and the government should provide sufficient technological equipment to support IT-based learning and improve internet access.	(Sari et al., 2025) ; (Rajagukguk, 2022) etc.

IV. DISCUSSION

The analysis revealed that the use of IT-based learning media in elementary schools faces several challenges, particularly the lack of teachers' competence in using IT, which is largely due to insufficient training. As noted by Zulfa et al (2023), elementary schools and educational institutions have not yet optimized the provision of workshops or activities that help teachers develop IT skills for the learning process. The limited training opportunities for teachers in utilizing IT-based media have resulted in many schools continuing to rely on traditional teaching methods, which are less engaging for students in the digital era.

The lack of teachers' competence in using IT has also led to the low utilization of various IT-based learning platforms (Rahmani et al., 2020). Teachers who lack sufficient understanding of technology tend to use it merely as a simple instructional aid, such as displaying slides or playing videos, without truly integrating it into the learning process. This limitation hinders innovation in instructional design, which should ideally provide students with more exploratory and in-depth learning experiences (Aulia et al., 2024).

Another challenge identified is the limited availability of facilities that support the use of IT-based learning media in schools. Not all schools have adequate resources to implement IT-based learning, such as projectors, laptops, or stable internet connections (Karna et al., 2025). This condition makes it difficult for teachers to effectively integrate IT-based media into classroom activities. Even when teachers possess the understanding and willingness to innovate, the lack of adequate facilities often prevents these creative ideas from being fully realized.

In addition to the availability of hardware, supporting infrastructure such as electricity networks and internet connectivity often poses major obstacles. In many schools, internet connections remain unstable or, in some cases, are not

available at all (Pardede & Khairunnisa, 2024). This situation limits teachers' and students' access to online learning resources, digital learning platforms, and educational applications that require reliable connectivity. As a result, technology-based learning processes that are intended to be interactive and exploratory become confined to more conventional activities.

In the discussion, the findings of this study indicate that although IT-based learning media have great potential to enhance the quality of education, several challenges must be addressed to achieve effective implementation. To overcome these challenges, more practical and continuous training programs are needed to help teachers develop the IT skills required for effective teaching and learning activities (Hanannika & Sukartono, 2022).

IT training for teachers should not be limited to one-time, short-term workshops. Continuous training with a practice-based approach is necessary to help teachers become more accustomed to using technology effectively in the teaching and learning process (Tetty et al., 2021). For instance, after receiving training on the use of digital learning applications such as Canva, Google Classroom, or Quizizz, teachers can immediately create and test their learning media in the classroom. This hands-on experience enables teachers to identify potential challenges both technical and pedagogical and to develop solutions independently.

In addition, schools and the government should provide adequate technological equipment to support IT-based learning and improve internet accessibility (Sari et al., 2025). Many teachers actually have the willingness to innovate and experiment with IT-based learning media; however, their efforts are often hindered by the lack of facilities such as computers, laptops, projectors, or audiovisual equipment. Without adequate infrastructure support, the implementation of IT-based learning will be difficult to carry out effectively.

Investment in the development of technological infrastructure in schools, particularly in rural areas, is crucial (Pardede & Khairunnisa, 2024). The development of technological infrastructure includes the provision of various facilities such as computers, laptops, projectors, network devices (Wi-Fi), and stable internet access. Beyond that, however, such investment should also encompass the establishment of a supporting ecosystem, including reliable electricity supply, device maintenance systems, and the training of technical staff in schools. With strong infrastructure support, teachers can more easily integrate technology into the learning process, while students can take advantage of diverse digital learning resources to broaden their knowledge and understanding.

V. CONCLUSION

Based on the analysis conducted, it can be concluded that the use of information technology (IT)-based learning media in elementary schools still faces major challenges, namely teachers' limited competence in mastering technology and the lack of supporting facilities in schools. The low ability of teachers to utilize digital media has resulted in learning processes that are not yet optimal or innovative, while the limited availability of equipment such as computers, projectors, and internet access restricts the comprehensive implementation of IT-based learning. These two factors are interrelated and contribute to the low quality of students' learning experiences, which should ideally be more interactive, exploratory, and aligned with the demands of the digital era. Therefore, improving teachers' competence through continuous training, along with investment in technological infrastructure, is essential to overcome these obstacles and realize more effective and modern learning in elementary schools.

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