Exploring Criteria for Enhancing E-Learning Implementation among Teachers through Thematic Analysis

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ABSTRACT

With the rapid advancement of technology, e-learning has become a crucial aspect of enhancing student engagement and performance. The low adoption rate of e-learning among teachers requires attention, as teachers play a critical role in ensuring the success of e-learning implementation. This study aims to identify the knowledge, skills, and motivation criteria necessary to enhance e-learning implementation among teachers. A systematic literature review (SLR) followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. A total of 44 articles from Scopus and Web of Science were identified and analyzed using a deductive thematic analysis approach. The findings reveal three criteria related to teachers' knowledge, three for teachers' skills, and two for teachers' motivation. Each criterion was formed based on relevant elements. These elements, criteria, and dimensions are key factors in identifying the requirements for enhancing e-learning implementation among teachers. This study gives researchers and education practitioners deeper insights into how specific elements and criteria in knowledge, skills, and motivation contribute to improving e-learning implementation and effectiveness. Additionally, it offers focused strategies for strengthening e-learning adoption among teachers. Future research could explore other factors, such as student engagement and school administrators' roles, in advancing e-learning implementation.

Keywords: e-learning, enhancement criteria, thematic analysis, teachers' knowledge, skills, and motivation.

INTRODUCTION

The integration of e-learning into the education system has gained increasing attention in recent years. This shift aligns with rapid technological advancements and the global transition toward digital learning environments. E-learning, which refers to using technology to deliver educational content, has become essential to modern education (Garrison & Anderson, 2020). According to Rethabile et al. (2023), e-learning is a broad approach to education that utilizes electronic platforms and technology for teaching and learning purposes. Fikri et al. (2021) assert that e-learning implemented by teachers enhances students' literacy skills, equipping them with 21st-century competencies, including technological and information literacy skills.

Despite its potential benefits, research indicates that teachers encounter numerous challenges in adopting and implementing e-learning effectively (Mohamad et al., 2024). Kumar et al. (2019) emphasize that teachers play a pivotal role as Critical Success Factors (CSFs) in successfully executing e-learning initiatives. However, there remains a need to identify the specific criteria that must be strengthened among teachers to enhance e-learning implementation. Prior studies have acknowledged these challenges but have not comprehensively identified the knowledge, skill, and motivational factors contributing to successful e-learning adoption. Without a clear understanding of these criteria, improving e-learning implementation may remain ineffective. Therefore, this study addresses this gap by identifying the essential criteria influencing teachers' effective implementation of e-learning.

Therefore, this study aims to identify the essential knowledge, skills, and motivational criteria teachers need to strengthen to enhance e-learning implementation. By analyzing recent studies published between 2019 and 2024 using a thematic analysis approach, this study evaluates the critical factors influencing e-learning adoption. Specifically, it seeks to answer the following research questions:

i. What are the knowledge criteria necessary for enhancing e-learning implementation among teachers?
ii. What are the skill criteria necessary for enhancing e-learning implementation among teachers?
iii. What are the motivation criteria necessary for enhancing e-learning implementation among teachers?

The findings of this study will provide valuable insights for educators, policymakers, and researchers seeking to improve e-learning implementation in schools. By identifying the knowledge, skill, and motivational criteria, this study contributes to efforts to strengthen digital education strategies, ensuring more effective teaching and learning experiences.

METHODOLOGY

This study employs a qualitative research design through a Systematic Literature Review (SLR) approach, analyzing previous studies relevant to the research objectives. The methodology follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, which have been widely applied in prior research (Abdullah et al., 2022; Nagaraj & Mahmud, 2023), as illustrated in Figure 1.

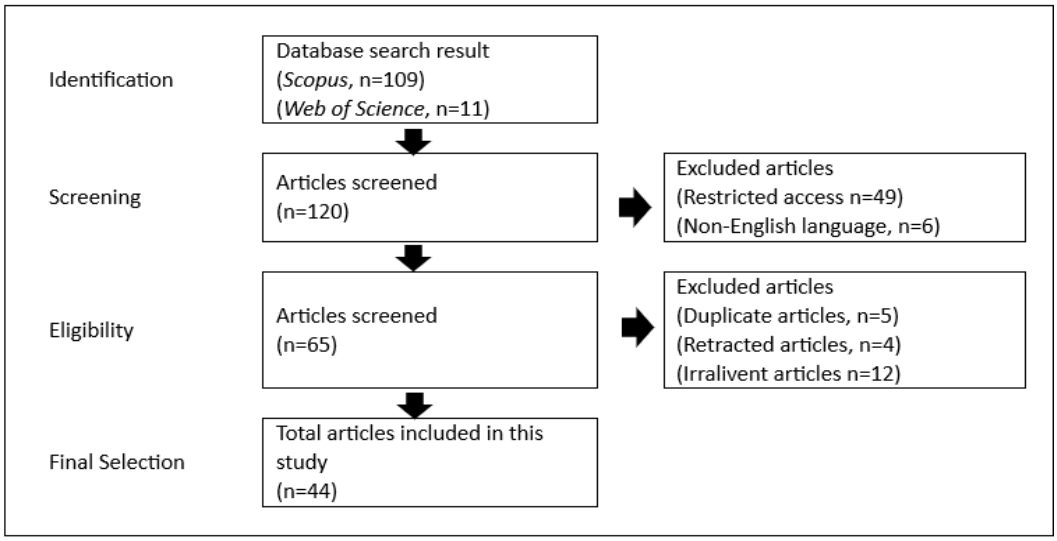

Fig. 1 PRISMA Flowchart for the Sample Identification Process (Page et al., 2021).

This paper is structured into identification, screening, eligibility, and selection. The criteria for enhancing e-learning implementation among teachers will be identified and discussed. Systematic Literature Review (SLR) is a relevant evaluation method that enables a systematic assessment of subjects with specific importance (Koumetio Tekouabou et al., 2023). This study refers to the criteria for improving e-learning implementation among teachers.

Identification

The identification phase involves selecting articles for inclusion in this study. According to Akinlolu et al. (2020), three key criteria are essential in conducting a systematic literature review: (i) database selection, (ii) keyword selection, and (iii) type of publication.

For this study, Scopus and Web of Science were chosen as the primary databases for data collection, as these sources contain high-quality, peer-reviewed academic publications (Idrissi Gartoumi & Koumetio Tekouabou, 2023). These databases are widely recognized and accepted among academic researchers.

The second criterion involves keyword selection. The following three sets of search terms were applied:

i. "e-learning" AND "enhancement" AND "teacher"
ii. "e-learning" AND ("enhancement" OR "improvement" OR "implementation") AND "criteria" AND "teacher"
iii. "e-learning" AND "criteria" AND ("knowledge" OR "skill" OR "motivation") AND "teacher"

The selected keywords were used in the Title/Abstract/Keywords fields to ensure comprehensive coverage of relevant studies. Articles were not restricted by publication year to maintain data integrity. This search strategy identified and organized 120 articles published between 2019 and 2024 using the Zotero reference management software.

Screening

One hundred twenty articles identified in the initial phase underwent a screening process. During this phase, 49 articles with restricted access and six non-English articles were excluded, leaving 65 articles for further evaluation.

Eligibility

The eligibility phase involved the exclusion of 5 duplicate articles, four retracted articles, and 12 irrelevant articles. After this phase, 44 articles remained for the next study stage.

Final Selection

The final selection phase involved analyzing the 44 selected articles using thematic analysis to identify key criteria for enhancing e-learning implementation among teachers.

Data Analysis

Thematic analysis is a qualitative research method used to identify, analyze, and report patterns (themes) within data (Braun & Clarke, 2006; 2019; 2020). This method allows researchers to gain a deeper understanding of collected data, whether from interviews or other sources.

This study applies a deductive thematic analysis approach, where predefined themes were established based on the research questions. Braun and Clarke (2020) state that a deductive approach ensures that the analysis remains focused and relevant to the study objectives.

Based on the research questions, three key themes were identified:

i. Teachers' Knowledge (K)
ii. Teachers' Skills (S)
iii. Teachers' Motivation (M)

These themes served as a guide for examining the selected articles. The thematic analysis process followed the steps outlined in Figure 2.

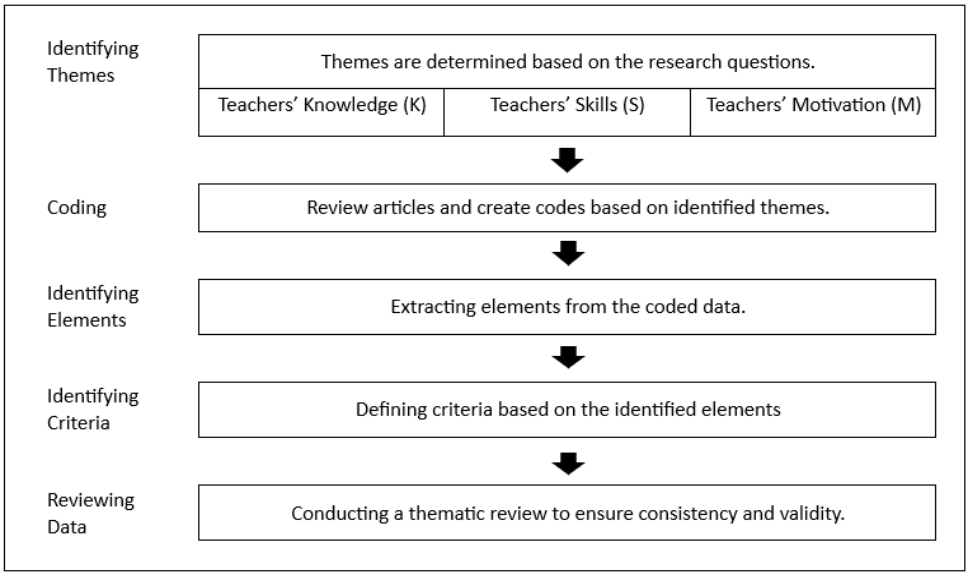

Fig. 2 Deductive Thematic Analysis Process (Braun & Clarke, 2020).

RESEARCH FINDINGS

This section presents the findings derived from the thematic analysis conducted in this study. Key criteria were identified based on a detailed examination of elements extracted from the selected articles. The analysis results are categorized into three main themes: Teachers' Knowledge, Teachers' Skills, and Teachers' Motivation. Each theme consists of specific criteria that contribute to enhancing the implementation of e-learning among teachers.

Theme: Teachers' Knowledge

Three key knowledge criteria were identified based on relevant elements. Pedagogical knowledge was the most comprehensive, containing four elements, whereas technological and content knowledge had two elements each, as shown in Figure 3.

Theme	Criteria	Elements	References
Teachers' Knowledge	Technological Knowledge	1. Digital Technology	Dong et al., 2022; Naveed et al., 2020; Ntalindwa et al., 2022; Masharova et al., 2020; Hawamdeh et al., 2022; Haidi & Hamdan, 2023; Liu et al., 2023; Sinlapaninman et al., 2023
		2. Virtual Learning Platforms	Zhenchenko et al., 2022; Berényi et al., 2021; Liu et al., 2023; Dong et al., 2022; Nikunlassi et al., 2021
	Content Knowledge	1. Digital Content	Ignacia et al., 2024; Ntalindwa et al., 2022; Naveed et al., 2020; Salmani et al., 2022; Helsa & Juandi, 2023; Masharova et al., 2020
		2. Content Management	Berényi et al., 2021; Zhenchenko et al., 2022; Ntalindwa et al., 2022; Bekmanova et al., 2021
	Pedagogical Knowledge	1. Teaching Strategies	Almufarreh et al., 2023; Wang et al., 2023; Liu & Pang, 2023; Naveed et al., 2020; Wei et al., 2023
		2. Student Learning Styles	Alamri, 2023; Rabelo & Isaías, 2019; Salmani et al., 2021
		3. Classroom Management	Dong et al., 2022; Wang et al., 2023; Mao et al., 2023
		4. Intervention Strategies	Liu & Pang, 2023; Aust et al., 2024; Bekmanova et al., 2021; Wang et al., 2023

Fig. 3 Data on Elements and Criteria in the Theme of Teachers' Knowledge.

Theme: Teachers' Skills

Three key skill criteria were identified. Among these, technological skills had the highest number of elements (four), followed by pedagogical skills (three elements) and content skills (two elements), as presented in Figure 4.

Theme	Criteria	Elements	References
Teachers' Skills	Technological Skills	1. Learning Applications (Software)	Rodríguez-Gonzálvez & Rodríguez-Martín, 2021; Wang & Wang, 2021; Haidi & Hamdan, 2023
		2. Learning Hardware	Haidi & Hamdan, 2023; López-Noguero et al., 2021; Mao et al., 2023; Alamri, 2023
		3. Artificial Intelligence (AI) Technology	Liu et al., 2023; Dong et al., 2022
		4. Learning Platforms	Liu et al., 2023; Nikunlassi et al., 2021; Lopes et al., 2022; Berényi et al., 2021; López-Noguero et al., 2021; Zhenchenko et al., 2022
	Pedagogical Skills	1. Instructional Design	Baluarte-Araya et al., 2021; Jurado-Castro et al., 2023; Haidi & Hamdan, 2023; Almufarreh et al., 2023
		2. Learning Management	Mojtahedzadeh et al., 2024; Jose & Jose, 2023; Masharova et al., 2020
		3. Intervention Strategies	Wang & Wang, 2021; Ilkou et al., 2023; Liu & Pang, 2023
	Content Skills	1. Developing Learning Materials	Smirnova et al., 2019; Razak et al., 2023; Kiegaldie et al., 2022; Helsa & Juandi, 2023
		2. Managing Learning Content	Berényi et al., 2021; Masharova et al., 2020

Fig. 4 Data on Elements and Criteria in the Theme of Teachers' Skills.

Theme: Teachers' Motivation

Two key motivation criteria were identified. Extrinsic motivation contained more elements (four) than intrinsic motivation (three). Extrinsic motivation contained more elements (four) than intrinsic motivation (three), as detailed in Figure 5.

Theme	Criteria	Elements	References
Teachers' Motivation	Intrinsic Motivation	1. Self-Confidence	Buragohain et al., 2024; Berényi et al., 2021; Lopes et al., 2022
		2. Creativity	Naveed et al., 2020; López-Noguero et al., 2021
		3. Commitment	Lopes et al., 2022; Walsh et al., 2023
	Extrinsic Motivation	1. Recognition and Appreciation	López-Noguero et al., 2021; Almufarreh et al., 2023
		2. Rewards	Almufarreh et al., 2023
		3. Professional Development	Razak et al., 2023; Liu et al., 2023; Alamri, 2023; Almufarreh et al., 2023; Dong et al., 2022; López-Noguero et al., 2021
		4. Support from Various Stakeholders	Lopes et al., 2022; Naveed et al., 2020; Kiegaldie et al., 2022; Wang & Wang, 2021

Fig. 5 Data on Elements and Criteria in the Theme of Teachers' Motivation.

DISCUSSION

Knowledge Criteria for Enhancing E-Learning Implementation Among Teachers

Teachers' knowledge serves as the foundation for improving e-learning implementation. To effectively integrate e-learning, teachers must understand technological, content, and pedagogical knowledge, ensuring structured and effective digital learning. According to Molotsi and Goosen (2023), teachers need Technological Pedagogical and Content Knowledge (TPACK) to implement e-learning successfully. Technological knowledge refers to teachers' familiarity with digital tools, applications, and software that support teaching and learning (Mishra & Koehler, 2006). Mastery of digital technologies and virtual learning platforms enables teachers to enhance student engagement and deliver content effectively (Haidi & Hamdan, 2023; Liu et al., 2023).

In addition to technological expertise, teachers must develop content knowledge, including understanding how to create, manage, and deliver digital learning materials. This involves the ability to structure and curate educational content to enhance accessibility and student comprehension (Masharova et al., 2020; Ntalindwa et al., 2022). Meanwhile, pedagogical knowledge is equally essential, as it enables teachers to design and implement effective instructional strategies, adapt to students' learning styles, manage online classrooms, and apply intervention techniques when necessary (Koehler & Mishra, 2008; Wang et al., 2023). Strengthening these knowledge dimensions is crucial for ensuring a smooth transition to e-learning, as teachers must understand the subject matter and know how to deliver it effectively using digital tools.

Skill Criteria for Enhancing E-Learning Implementation Among Teachers

Teachers' skills play a critical role in determining the effectiveness and sustainability of e-learning implementation. This study identifies three essential skill categories—technological, pedagogical, and content-related skills—each of which is crucial for ensuring successful digital learning experiences. Technological skills enable teachers to effectively operate educational software, hardware, artificial intelligence (AI) technology, and learning platforms (Bećirović, 2023). The ability to utilize AI-powered tools, for instance, allows teachers to enhance adaptive learning experiences and provide personalized feedback to students (Liu et al., 2023).

Beyond technological proficiency, pedagogical skills are equally important. Teachers must be able to design and manage online learning effectively, ensuring that instructional materials are engaging, well-structured, and tailored to students' needs (Srinivasa, 2022; Mojtahedzadeh et al., 2024). This includes instructional design, classroom management, and intervention strategies that help address students' learning difficulties in virtual settings. Additionally, content skills refer to teachers' ability to develop and organize digital learning materials to promote accessibility and effective knowledge transfer (Ignacia et al., 2024; Bekmanova et al., 2021). Among these skill categories, technological skills emerge as the most critical, as digital proficiency is a prerequisite for effective online instruction. Teachers who lack digital competencies may struggle to engage students effectively and leverage online learning tools to their full potential.

Motivation Criteria for Enhancing E-Learning Implementation Among Teachers

Teachers' motivation significantly influences their willingness and ability to integrate e-learning into their teaching practices. This study identifies intrinsic and extrinsic motivation as key factors driving teachers' engagement in digital education. Intrinsic motivation refers to self-driven factors such as self-confidence, creativity, and commitment (Bandura, 1997). Teachers with higher self-confidence are more likely to experiment with new technologies, overcome digital challenges, and innovate their teaching methods (Berényi et al., 2021). On the other hand, creativity allows teachers to develop engaging and interactive digital learning experiences, thereby enhancing student engagement and comprehension (López-Noguero et al., 2021). Commitment is another critical element, as teachers who are dedicated to integrating e-learning into their pedagogy are more likely to persist in overcoming challenges associated with digital education.

While intrinsic motivation plays a significant role, extrinsic motivation also strongly influences teachers'

adoption of e-learning. Factors such as recognition and appreciation, rewards, professional development, and support from various stakeholders contribute to sustaining teachers' motivation (Deci & Ryan, 1985). Professional development opportunities provide teachers with essential training in digital pedagogy, equipping them with the skills necessary to implement e-learning effectively. Furthermore, institutional recognition and structured incentives, such as promotions and financial rewards, help reinforce teachers' engagement in digital teaching practices (Almufarreh et al., 2023; Alamri, 2023). The findings of this study indicate that extrinsic motivation plays a slightly more decisive role than intrinsic motivation, highlighting the importance of external support, structured incentives, and training programs in encouraging teachers to adopt e-learning actively.

CONCLUSION

The rapid advancement of digital technology continues to reshape the educational landscape. As a result, teachers play a crucial role in ensuring the successful implementation of e-learning, aligning with current technological developments. Recognizing that e-learning can significantly impact students' learning quality, teachers must continuously enhance their knowledge, skills, and motivation to remain relevant in the evolving education system.

This study successfully addressed its three research questions by identifying the key criteria related to knowledge, skills, and motivation that contribute to improving e-learning implementation among teachers. The findings highlight that knowledge, skills, and motivation dimensions require focused attention to strengthen e-learning adoption.

Each dimension consists of specific criteria derived from relevant elements, demonstrating that efforts to enhance e-learning implementation must start at the foundational level. Strengthening individual elements leads to the formation of more comprehensive criteria, which, in turn, shape the broader dimensions necessary for e-learning success.

This study was limited to three primary dimensions: knowledge, skills, and motivation. Future research could explore additional factors, such as the role of school administrators and students' perspectives, to enhance e-learning implementation in educational settings.

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