e-Learning Acceptance: A Hybrid Systematic Literature Review And Bibliometric Analysis

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Abstract— The-accelerated adoption of e-learning technologies in higher education, particulary in response to the COVID-19 pandemic, has heightened the need to understand how users accept and engage with digital learning systems. This research applies a hybrid approach that integrates Systematic Literature Review (SLR) and bibliometric analysis to provide a comprehensive synthesis of e-learning acceptance research. Unlike prior works that relied solely on bibliometric mapping or qualitative synthesis, this paper combine both to capture conceptual dept and quantitative trends. Drawing form 58 Scopus database-indexed studies (2019-2025), the review identifies three major research clusters: (1) technology oriented studies grounded in TAM models, (2) learner-centered perspective focusing on motivation, self regulation, and digital readiness, and (3) contextual studies emphasizing institutional support and post pandemic adaption. Southeast Asia emerges as a regional hub, reflecting the rapid digital transformation of higher education. The research contributes by mapping global and regional knowledge structures, identifying gaps in theory and methodology, and outlining a future research agenda that connect theoretical models with practical strategies. These insights offer value for scholars, educators, and policymakers designing inclusive and sustainable digital learning ecosystems.

Keywords—e-learning acceptance, systematic literature review, bibliometric analysis, digital readiness, higher education

I. INTRODUCTION

Technological advancements have radically reshaped the ways education is delivered shifting from traditional, face-to-face instruction toward flexible and digitally mediated environments [1], [2]. This transformation became particularly pronounced during the COVID-19 pandemic, which positioning e-learning as a central modality in higher education worldwide [3], [4], [5], [6], [7], [8]. Beyond serving as an emergency solution, e-learning has now become a strategic pillar of higher education, supported by diverse platforms such as learning management systems (LMS), mobile learning, and immersive technologies [3], [9], [10], [11], [12], [13]. This global shift highlights not only the adoption of digital tools but also the pressing need to understand the learners and Institutions accept and sustain e-learning [3], [4], [10], [12], [14].

The ongoing evolution of e-learning technologies reflects not only a change in delivery methods but also fundamental pedagogical transformation toward more interactive, personalized, and data-driven learning Advances in ICT have enabled more accessible, engaging, and self-paced learning models [15], [16], [17]. [18], [19], [20]. The ubiquity of e-learning, enabled by rapid advances in ICT, represents a global movement toward more accessible, engaging, and learner-centered models. However, the long-term impact of e-learning hinges on acceptance factors including perceived usefulness, ease of use, digital literacy, institutional support, and content quality. Understanding these factors have been studied extensively. But often fragmented

and context-specific ways, underscoring the need for a comprehensive synthesis that consolidates current knowledge and highlights critical gaps.

To overcome these issues, this research utilizes a combined methodology that integrates a Systematic Literature Review (SLR) with bibliometric analysis. While prior works have typically applied either descriptive bibilometric mapping or qualitative reviews, or hybrid design enables both conceptual synthesis and quantitative trend analysis[13], [21], [22]. This dual perspective allows us to capture not only the intellectual structure of e-learning acceptance research, but also its thematic cluster, geographical distribution, and methodological directions. In doing so, this research provides new insights for theory development, institutional practise, and future research agenda in higher education. The research questions posed are:

RQ1 : To what extent does research on e-learning acceptance remain a significant and envolving domain in educational technology, and what factors its relevance?

RQ2: What dominant research themes, contexts, and methodological trends characterise current studies on e-learning acceptance?

RQ3:What theoretical contributions and practical implications can be drawn from existing work to guide future research and inform institutional and policy practice?

Therefore, this research to synthesize how e-learning acceptance has been conceptualized, analyzed, and evolved over time. By integrating systematic and bibliometric evidence, the paper not only maps research output but also identifies conceptual gaps and future direction. In doing so, the study contributes to technological, pedagogical, and policy decisions, particularly in the context of emerging economies where digital transformation is both urgent and uneven.

II. LITERATURE REVIEW

E-learning acceptance is defined as the extent to which individuals are willing and prepared to adopt and actively use digital learning systems, particularly in higher education. The acceptance is influenced by a range of factors that shape their perception of e-learning as both beneficial and useful for their educational needs [23], [24], [25], [26], [27]]. Research has consistently identified several determinant factors such as perceived usefulness, which refers to the belief that e-learning improves learning outcomes, perceived ease of use which reflects the ease with which individuals can navigate and use e-learning platforms, and user characteristics such age, gender, prior digital experience, which can influence one's comfort with technology. These determinants are frequently studied through theoretical lenses such as the Technology Acceptance Model (TAM), which have been widely applied and extended in the context of e-learning [[23], [28], [29], [30], [31].

Beyond technical adoption, acceptance is also tied to broader pedagogical and institutional factors. For students, this involves self regulated learning, perceived relevance of the content, and overall usability of the system [29], [32], [33], [34]. In essence the degree to which people are willing and prepared to incorporate e-learning into their educational practices depends on a complex interplay between systemic and personal elements [12], [35], [36], [37]. ŧ Thus, e-learning acceptance reflects a multi-level construct, shaped by the interaction between individual, technological, and systemic dimensions [7], [38], [39], [40], [41]. However, despite a growing body of research findings remain fragmented across contexts and methodologies, highlighting the need for a comprehensive synthesis that maps not only factors but also how they interrelate within educational ecosystems.

Table 1. Definitions Of e-Learning Acceptance with Categories

No	Defintions of e-learning acceptance	Categories	Reference
1	E-Learning acceptance is the	Technology-driven	[7], [26],

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No	Defintions of e-learning acceptance	Categories	Reference
	extent to which students are willing to use online learning systems, influenced by factors such as perceived workload, fatigue, and system quality		[42]
2	E-learning acceptance is defined as the willingness of individuals to utilize e-learning systems, influenced by various factors.	Technology-driven	[13], [23], [28], [29]
3	E-learning acceptance is defined as the degree to which individuals perceive e-learning as beneficial and useful in their educational contex	Technology-driven	[24], [25], [43]
4	E-learning acceptance refers to the readiness and willingness of individuals to adopt and use e-learning technologies, which is crucial for the effective implementation of Learning Management Systems (LMS) in educational settings	Context-driven	[29], [44], [45]
5	E-learning acceptance is defined as the degree to which students are willing to engage with and utilize e-learning environments, influenced by various factors such as reflection, self-regulated learning, perceived relevance, and system usability	Learner-driven	[30], [41], [46]
6	E-learning acceptance is defined within the context of the e-learning acceptance model (e-LAM), which evaluates the factors influencing students' willingness to adopt social media platforms (SMPs) for educational purposes	Technology-driven	[25], [31]
7	E-learning acceptance refers to the way users would accept e-learning to be implemented, which is one of the three dimensions used to measure e-learning readiness	Context-driven	[47], [48]
8	E-learning acceptance is described as the level to which learners are willing to engage with and utilize online learning environments	Learner-driven	[42], [49]
9	E-learning acceptance refers to the willingness of students and educational institutions to embrace e-learning technologies and methodologies.	Context-driven	[50], [51], [52]
10	E-learning acceptance refers to the willingness of individuals to engage with and utilize e-learning solutions.	Learner-driven	[38], [53], [54]

As summarized in Table 1, definitions of e-learning acceptance fall into three thematic clusters: (1) technology-driven, which emphasize system quality, usability, and TAM constructs, (2) learner-driven, focusing on motivation, self regulated learning, and user perception, and (3) context-driven, which highlight institutional readiness, LMS integration, and organizational support. This categorization indicates that while most studies prioritize technological aspects, relatively fewer integrate learner-centered or contextual perspectives. The imbalance suggests a gap in the literature namely, the lack of a holistic framework that simultaneously addresses technology,

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learner, and institutional factors. Addressing this gap is central to the contribution of the present research.

In summary, prior studies on e-learning acceptance provide valuable insights into determinants at the individual, technological, and institutional levels. However, the literature suffers from three limitations: (i) conceptual fragmentation, as TAM and related models are often applied without integrating contextual or motivational construct, (ii) methodological limitations, with most studies relying on cross-sectional surveys, and (iii) geographical bias, as much of the research originates from Asia and the Middle East, while longitudinal and cross-cultural studies remain scarce. This paper addresses these gap through a hybrid SLR and bibliometric approach, aiming to consolidate fragmented findings, map thematic clusters, and propose a future research agenda.

III. METHOD

This research adopts a hybrid methodological approach by integrating a Systematic Literature Review (SLR) and bibliometric analysis. A bibliometric technique is used in a systematic literature review to quantitatively evaluate the literature in order to identify important research entities, trends, and patterns with a discipline [11], [55]. The SLR component enables a comprehensive synthesis of prior studies to identify conceptual gaps and patterns, while the bibliometric component offers quantitative mapping of publications trends, author networks, and keyword cluster. This combination addresses the limitations noted in prior literature-namely conceptual fragmentation, methodological narrowness, and geographical bias-by providing both dept and breadth of analysis. The overall aim is to generate an integrated understanding of how e-learning acceptance has been conceptualized and evolved across context.

To achieve these objectives, the research guided by three research questions:

RQ1 : To what extent does e-learning acceptance remain a significant and envolving domain in educational technology, and what factors sustain its relevance?

RQ2: What dominant research themes, contexts, and methodological trends characterise current studies on e-learning acceptance?

RQ3:What theoretical contributions and practical implications can be drawn from existing work to guide future research and inform institutional and policy practice?

The review process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure transparency, replicability, and methodological rigor. The SLR enabled a structured screening and synthesis of relevant articles, while the bibliometric analysis provide a macro-level visualization of the intellectual structure of the field. [20], [22]. This hybrid approach, also adopted in recent studies [56], [57], allows us to go beyond descriptive mapping by systematically connecting conceptual insights with quantitative evidence of publication dynamics, author collaborations, and keyword co-occurrence.

Relevants studies were identified using a top-down keyword strategy: starting with broad terms “e-learning” AND “acceptance”, then narrowing to specific variants. Given the fragmentation observed in the literature, the phrase “e-learning acceptance” was adopted as the primary search keyword, ensuring consistency across title, abstract, and keyword fields. The Scopus database was selected as the main source because of its comprehensive coverage of peer-reviewed journals, consistent indexing practices, and wide use in bibliometric studies. Scopus has also been validating in previous educational technology reviews as a reliable database for mapping research landscape

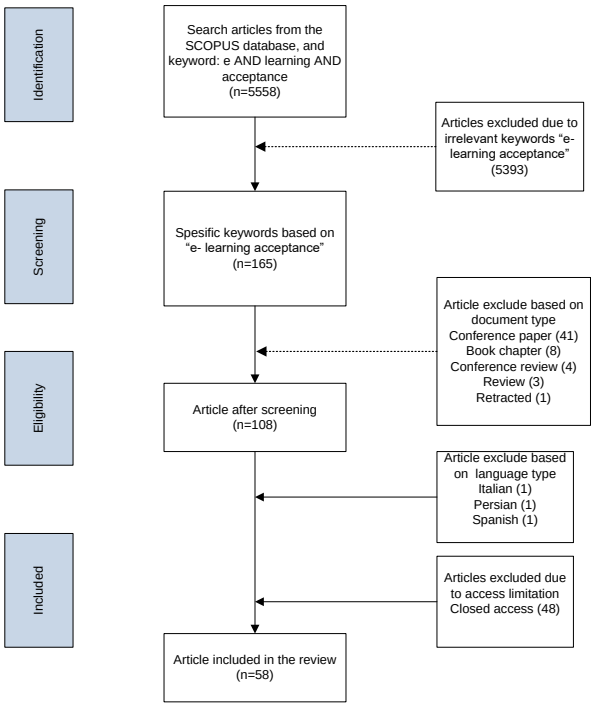

Figure 1. Systematic Literature Review information flow using PRISMA

The search process yielded 5,558 article from published up until May, 19, 2025. Inclusion criteria were:, (1) focus on e-learning acceptance, (2) publication in English, and (3) peer-reviewed journal articles. After applying these criteria, 165 articles remained. A further screening process excluded irrelevant or inaccessible studies, resulting in 58 articles for full review. For bibliometric analysis, VOSviewer software [21], [58] was used to generate visualisations of citation networks, author collaborations, and keyword co-occurences, enabling us to uncover the intellectual and thematic structure of the field (see Figure1)

Taken together, this hybrid design ensures that our review not only summarizes prior findings but also situates them within broader intellectual and geographical landscapes. By combining systematic synthesis with bibliometric mapping, the methodology directly supports the study's objectives, to consolidate fragmented findings, reveal thematic clusters, and propose a research agenda that bridges theory and practice in e-learning acceptance

IV. RESULTS AND DISCUSSION

This section presents the findings of a systematic literature review of 58 Scopus indexed articles on e learning adoption in higher education. The analysis begins with descriptive publication trends (Figure 2), followed by insights into authorship, geographical distribution, and disciplinary contexts. Together, these findings address RQ1 by assessing the continuing relevance of e-learning acceptance as a research dominant and identifying the factors sustaining its significance, particularly within the framework of the Technology Acceptance Model (TAM).

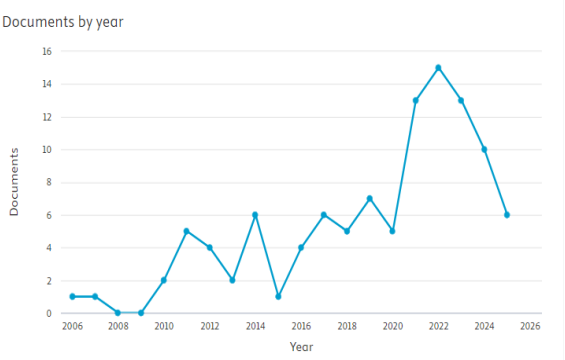

Figure 2. Document by year

According to Figure 2, research on e-learning acceptance has demonstrated a fluctuating but generally upward trajectory. In the early phase (2006-2009) research activity on this topic only one or no document appeared annually, reflecting limited scholarly attention. A gradual increase began in 2010, with notable peaks in 2011 and 2013, indicating growing recognition of e-learning adoption as an academic concern. The most pronounced surge occurred in 2020, when publication output reached its peak with approximately 15 articles, coinciding with the COVID-19 pandemic that accelerated global reliance on digital learning. Although s decline in publication numbers followed after 2022, the volume of publications remains significantly higher than in the pre-2006 period. This pattern demonstrated that e-learning acceptance continues to be a prominent and evolving domain in educational technology. In particular, the persistence of TAM-based studies within these publications underscores

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the model's relevance for explaining technology adoption, even amidst shifting educational context. These findings confirm that RQ1 is addressed e-learning acceptance remains a critical and evolving research area. Its relevance is sustained by both external pressures, such as the pandemic driven transition to online learning and the continued applicability os TAM as a theoretical framework for explaining technology adoption in education.

RQ2: What dominant research themes, contexts, and methodological trends characterise current studies on e-learning acceptance?

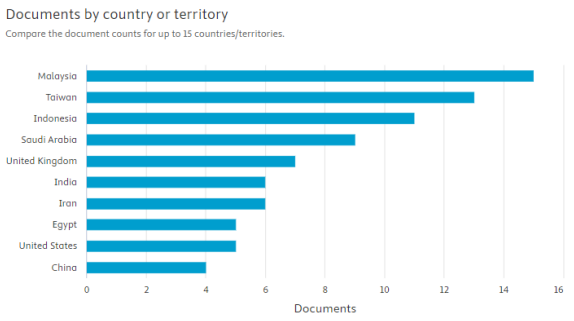
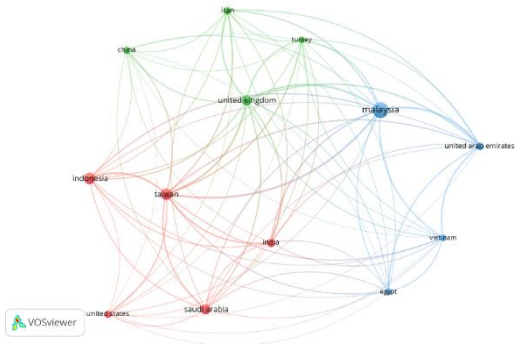


Figure 3. . Documents by country



Source: Output VOSviewer software

Figure 4. Network country visualization

As shown in Figure 3 and Figure 4, research on e-learning acceptance is geographically concentrated in Southeast Asia and East Asia, with Malaysia (15), followed closely by Taiwan (13) and Indonesia (12) leading in publication output. This regional dominance reflect both strong governmental initiatives in digital education and the urgency of higher education institutions in these regions to adopt online learning. By contrast, contributions from the United States and Europe remain more limited, suggesting that in developed contexts, e-learning acceptance may be perceived as a mature issue, whereas in emerging economies it continues to attract scholarly attention. This regional skew indicates that TAM based studies are predominantly shaped by sociocultural and institutional realities of developing countries, raising questions about cross-cultural generalizability.

The leading institutional contributors include Chaoyang University of Technology (4), University of KwaZulu-Natal (3), National Central University (3), Universiti Malaya with (3), National Chiao Tung University (2), Mazandaran University of Medical Science (2), Universiti Malaysia Sabah (2), Silpakan University (2), Brunei University London (2), and University of Macau (2) (see Fig. 5).

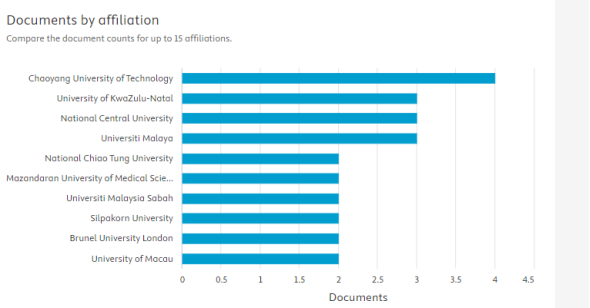


Figure 5. Documents by affiliation

The dominance of Asian institutions underscores the region's central role in shaping the discourse on e-learning acceptance, while contributions from African institutions highlight emerging interest beyond Asia. However, the relatively low number of outputs per institution suggests that research efforts are fragmented, with no single institution serving as a sustained hub of TAM-related inquiry. This fragmentation reinforces the need for cross-institutional and cross-national collaborations to consolidate findings and strengthen theoretical integration.

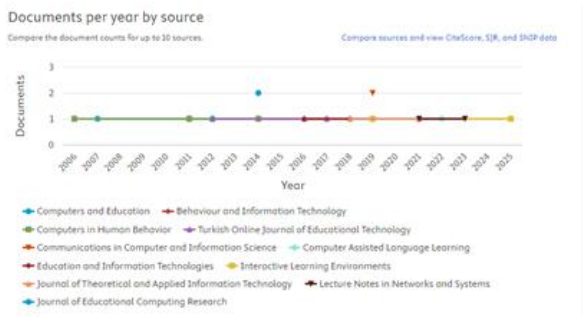


Figure 6. Documents by source

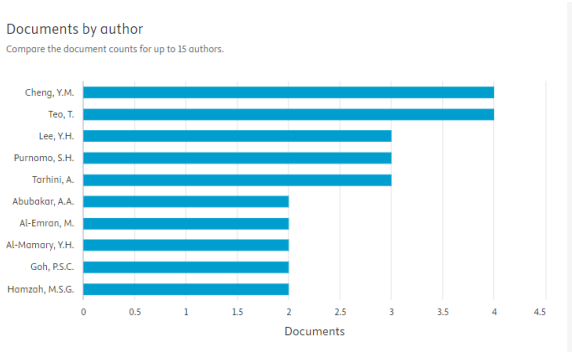


Figure 7. Count of publications by authors

The Figure 6 shows that although publication output per journal is modest, e-learning acceptance studies appear in high-impact outlets such as Computers and Education, Computers in Human Behaviour, and Education, and Information Technologies, among others. This placement indicates that the topic aligns with mainstream discussions in educational technology and behavioral science. The spread of publications across multiple journals also points to the multidisciplinary relevance of TAM, briding education, psychology, and information systems. Such dispersion, however, makes it difficult to build cumulative theoretical contributions, since insights are scattered across disciplines.

Prominent contributors to e-learning acceptance research include Cheng, Y.M. and Teo, T., each with four articles, both of whom are widely recognized for extending TAM in educational settings. Other active authors, such Lee, Y.H., Purnomo, S.H., and Tarhini, A. further diversify the landscape by applying TAM across different cultural and institutional contexts (see Fig. 7). Collectively, these authors demonstrate that TAM remains the dominant framework, but their extensions also reveal efforts to adopts it to local realities. The dispersion of contributions, however, again highlights a lack of theoretical consolidation while TAM is consistently applied, its extensions vary, preventing the emergence of a unified extended model.

RQ3:What theoretical contributions and practical implications can be drawn from existing work to guide future research and inform institutional and policy practice?

To uncover the intellectual structure of e-learning acceptance research, a keyword co-occurrence analysis was conducted using VOSviewer (Figure 8). Each node represents a keyword, with the size indicating the frequency and link strength representing co-occurrence relationships. The results show that “e-learning”, “technology acceptance model”, “perceived usefulness”, and “e-learning acceptance” are the most central terms, reaffirming TAM as the dominant theoretical foundation in this field. However, the relatively weaker presence of terms such as motivation and institutional readiness highlights underexplored areas, indicating opportunities to extend TAM with learner-related and contextual variables.

Notably, "Covid-19" emerges as a major keyword, illustrating how the pandemic accelerated the adoption of e-learning shifted research toward online learning, distance learning, and self-efficacy. This indicates a broadening of the field beyond TAM’s technological focus on toward psychological and contextual perspectives.

Theoretical contributions of these findings include reaffirming TAM’s central role while revealing opportunities to integrate motivational and contextual constructs for a more holistic framework. Practical implications suggest that higher education and policymakers should not only invest in technological infrastructure, but also foster learner motivation, institutional support, and

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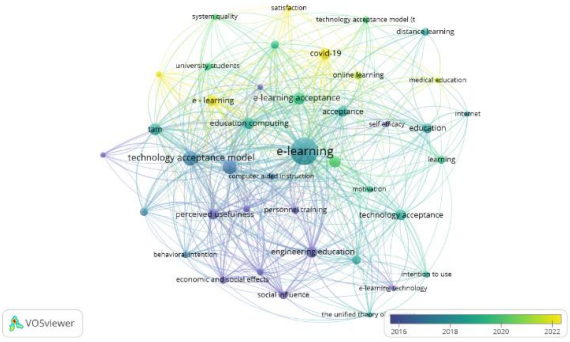
long-term readiness to enhance e-learning acceptance.



Source: Output VOSviewer software

Figure. 8. Co-occurrence framework and representation key of term

Table 2. Keyword By Co-Occurence

Rank	Keyword	Link Strength
1	e-Learning	505
2	Learning systems	211
3	Technology acceptance model	183
4	Educating computing	145
5	Covid-19	128
6	Engineering education	122
7	Higher education	110
8	Perceived usefullness	98
9	e-Learning acceptance	63
10	Motivation	60

Table 2 summarized the top ten keywords identified through co-occurrence analysis using VOSviewer software. As expected, "e-learning" emerged as the most dominant keyword with the highest link strength of 505, confirming its foundational role in the research domain. Closely linked terms such as "Technology acceptance model" (183), and "Perceived Usefulness" (98) reaffirm TAM as the prevailing theoretical framework guiding e-learning acceptance studies. However, the relatively weaker presence of "Motivation (ranked 10th) indicates that learner-driven constructs remain underexplored, pointing to a gap for future research. Interestingly, the emergence of "Covid-19" as a significant keyword demonstrates the contextual shift that accelerated digital adoption, highlighting the influence of external shocks on of e-learning acceptance. Other terms such as "Engineering Education" and "Higher Education" emphasize the disciplinary spread of research, suggesting that TAM applications have moved beyond general education settings into more specialized domains. Taken together, these findings contribute theoretically by showing how TAM continues to dominate but also needs enrichment through motivational and contextual variables. Practically, the result suggests that institutions should not only improve technological systems but also address learner motivation and institutional readiness to ensure sustainable e-learning adoption..

V. CONCLUSIONS

This research offers an extensive overview of e-learning acceptance research in higher education by combining a systematic literature review with bibliometric analysis. Addressing the first research question, the findings confirm that e-learning acceptance remains a significant and evolving domain, particularly reinforced by the global shift to online learning during the Covid-19 pandemic. Addressing the second research question, the analysis revealed that research is geographically concentrated in Asia, with TAM as the prevailing theoretical framework, and a multidisciplinary spread across fields such as engineering and medical education. Regarding the third research question, the study contributes theoretically by reaffirming TAM's central role while identifying opportunities to integrate motivational and contextual factors. Practically, the results suggest that institutions and policymakers should not only invest in technological infrastructure, but also foster learner motivation, institutional readiness, and long-term support systems to sustain e-learning adoption. Methodologically, this hybrid SLR and bibliometric approach demonstrates the value of combining systematic synthesis with network mapping to consolidate fragmented findings, reveal thematic

clusters, and propose a forward-looking research agenda. Taken together, these insights provide both theoretical enrichment and practical guidance for advancing the field of e-learning acceptance.

Although this research applied a robust hybrid approach combining a systematic literature review and bibliometric analysis, several limitations should be acknowledged. First, the literature search was limited to a single academic database (Scopus), which may have excluded relevant studies indexed in other repositories such Science Direct, Web of Science, or Google Scholar. Second, while bibliometric mapping offer valuable insights into publication trends, author networks, and keyword clusters, it did not enable deep contextual interpretation of qualitative findings within individual's studies. Third, the focus on higher education institutions may restrict the generalizability of findings to other educational sectors.

Based on the result and limitations, several promising directions for future research identified. First, adopting a multi-database approach and extending the publication window would ensure broader coverage and reduce selection bias. Second, qualitative meta-synthesis could complement bibliometric mapping by capturing experiential and contextual nuances of e-learning acceptance across cultural and institutional settings. Third, longitudinal research designs are needed to assess sustained behavioral outcomes of e-learning adoption, such as learner persistence, and skill transfer. Finally, future research should enrich the Technology Acceptance Model by incorporating motivational, self-efficacy, and equity-related constructs, as well as expanding the geographical focus to underexplored regions such as Africa and Latin America.

REFERENCES

[1] S. Fabriz, J. Mendzheritskaya, and S. Stehle, "Impact of Synchronous and Asynchronous Settings of Online Teaching and Learning in Higher Education on Students' Learning Experience During COVID-19," *Front. Psychol.*, vol. 12, no. October, 2021, doi: 10.3389/fpsyg.2021.733554.

[2] K. A.-S. Al-Harbi, "e-Learning in the Saudi tertiary education: Potential and challenges," *Appl. Comput. Inform.*, vol. 9, no. 1, pp. 31–46, 2011, doi: 10.1016/j.aci.2010.03.002.

[3] M. A. Tamal, M. F. H. Sarker, M. K. Islam, and M. E. Hossain, "Acceptance of E-Learning Among University Students During Covid-19 Crisis: Bangladesh Perspective," *Int. J. Emerg. Technol. Learn.*, vol. 17, no. 6, pp. 152–162, 2022, doi: 10.3991/ijet.v17i06.28033.

[4] Y.-H. Lee, C. Hsiao, and S. H. Purnomo, "An empirical examination of individual and system characteristics on enhancing e-learning acceptance," *Australas. J. Educ. Technol.*, vol. 30, no. 5, pp. 562–579, 2014, doi: 10.14742/ajet.381.

[5] R. D. Mahande and J. D. Malago, "An e-learning acceptance evaluation through utaut model in a postgraduate program," *J. Educ. Online*, vol. 16, no. 2, 2019, doi: 10.9743/jeo.2019.16.2.7.

[6] S. R. Natasia, Y. T. Wiranti, and A. Parastika, "Acceptance analysis of NUADU as e-learning platform using the Technology Acceptance Model (TAM) approach," *Procedia Comput. Sci.*, vol. 197, no. 2021, pp. 512–520, 2021, doi: 10.1016/j.procs.2021.12.168.

[7] J. Sjarief, "E-learning Acceptance Model in a Pandemic Period with an Expansion to the Quality of Work Life and Information Technology Self-Efficacy Aspects," *CommIT J.*, vol. 16, no. 2, pp. 117–127, 2022, doi: 10.21512/commit.v16i2.8145.

[8] H. Outada, H. Belaouidel, A. Jaddar, A. Chetouani, and A. Dafali, "E-Learning Acceptance in the Post COVID-19 Period: A Case Study," *J. High. Educ. Theory Pract.*, vol. 23, no. 4, pp. 211–221, 2023, doi: 10.33423/jhetp.v23i4.5901.

[9] S. F. H. Zaidi, V. Osmanaj, O. Ali, and S. A. H. Zaidi, "Adoption of mobile

technology for mobile learning by university students during COVID-19," *Int. J. Inf. Learn. Technol.*, vol. 38, no. 4, pp. 329–343, 2021, doi: 10.1108/IJILT-02-2021-0033.

[10] T. Teo, W. S. Luan, T. Thammetar, and W. Chattiwat, "Assessing e-learning acceptance by university students in Thailand," *Australas. J. Educ. Technol.*, vol. 27, no. 8, pp. 1356–1368, 2011, doi: 10.14742/ajet.898.

[11] M. Chugh, R. Upadhyay, and N. Chugh, "An Empirical Investigation of Critical Factors Affecting Acceptance of E-Learning Platforms: A Learner's Perspective," *SN Comput. Sci.*, vol. 4, no. 3, 2023, doi: 10.1007/s42979-022-01558-3.

[12] A. Balog, "Acceptance of e-Learning systems: A serial multiple mediation analysis," *Stud. Inform. Control*, vol. 24, no. 1, pp. 101–110, 2015, doi: 10.24846/v24i1y201511.

[13] R. Baki, B. Birgoren, and A. Aktepe, "A Meta Analysis of Factors Affecting Perceived Usefulness and Perceived Ease of Use in The Adoption of E-Learning Systems," *Turk. Online J. Distance Educ.*, pp. 4–42, Oct. 2018, doi: 10.17718/tojde.471649.

[14] L.-Y.-K. Wang, S.-L. Lew, and S.-H. Lau, "An empirical study of students' intention to use cloud e-learning in higher education," *Int. J. Emerg. Technol. Learn.*, vol. 15, no. 9, pp. 19–38, 2020, doi: 10.3991/ijet.v15i09.11867.

[15] M. I. Baig, L. Shuib, and E. Yadegaridehkordi, "E-learning adoption in higher education: A review," *Inf. Dev.*, vol. 38, no. 4, pp. 570–588, 2022, doi: 10.1177/02666669211008224.

[16] S. A. Salloum, A. Qasim Mohammad Alhamad, M. Al-Emran, A. Abdel Monem, and K. Shaalan, "Exploring students' acceptance of e-learning through the development of a comprehensive technology acceptance model," *IEEE Access*, vol. 7, pp. 128445–128462, 2019, doi: 10.1109/ACCESS.2019.2939467.

[17] T. Z. Z. Al Arif, D. Kurniawan, and R. Handayani, "EFL University Students' Acceptance and Readiness for e-Learning: A Structural Equation Modeling Approach," *Electron. J. E-Learn.*, vol. 22, no. 1, pp. 1–16, 2024, doi: 10.34190/ejel.22.1.3063.

[18] J. Cabero Almenara, J. M. Fernández Batanero, and J. Barroso Osuna, "Adoption of augmented reality technology by university students," *Heliyon*, vol. 5, no. 5, pp. e01597–e01597, 2019, doi: 10.1016/j.heliyon.2019.e01597.

[19] Y. H. S. Al Mamary, "Why do students adopt and use Learning Management Systems?: Insights from Saudi Arabia," *Int. J. Inf. Manag. Data Insights*, vol. 2, no. 2, pp. 100088–100088, 2022, doi: 10.1016/j.jjimei.2022.100088.

[20] M. Yan, R. Filieri, and M. Gorton, "Continuance intention of online technologies: A systematic literature review," *Int. J. Inf. Manag.*, vol. 58, no. July 2020, pp. 102315–102315, 2021, doi: 10.1016/j.ijinfomgt.2021.102315.

[21] M. Levidze, "Mapping the research landscape: A bibliometric analysis of e-learning during the COVID-19 pandemic," *Heliyon*, vol. 10, no. 13, pp. e33875–e33875, 2024, doi: 10.1016/j.heliyon.2024.e33875.

[22] J. A. López-Sánchez, J. C. Patiño-Vanegas, A. Valencia-Arias, and J. Valencia, "Use and adoption of ICTs oriented to university student learning: Systematic review using PRISMA methodology," *Cogent Educ.*, vol. 10, no. 2, 2023, doi: 10.1080/2331186X.2023.2288490.

[23] M. M. Zalat, M. S. Hamed, and S. A. Bolbol, "The experiences, challenges, and acceptance of e-learning as a tool for teaching during the COVID-19 pandemic among university medical staff," *PLoS ONE*, vol. 16, no. 3 March, 2021, doi: 10.1371/journal.pone.0248758.

[24] A. Costa, A. Costa, and I. A. S. Olsson, "Students' acceptance of e-learning approaches in Laboratory Animal Science Training," *Lab. Anim.*, vol. 54, no. 5, pp. 487–497, 2020, doi: 10.1177/0023677219879170.

[25] B. Koyu, R. J. Singh, and R. Singh, "Acceptance of an E-learning Module on Climate-smart Horticulture: A Structural Equation Model," *Indian J. Agric. Res.*, no. Of, Jan. 2022, doi: 10.18805/IJARe.A-5900.

[26] H. A. Abbas, K. Rouibah, and A. M. Baqer, "Why people in kuwait do not prefer online learning systems: The role of burnout and poor system quality support," *J. Glob. Inf. Manag.*, vol. 31, no. 1, 2023, doi: 10.4018/JGIM.332782.

[27] F. Effendy, O. D. Kurniawati, and G. Priambada, "Factor Affecting E-Learning User Acceptance: A Case Study of AULA," in *J. Phys. Conf. Ser.*, Rahim R., Siregar D., Mesran M., Supriyanto null, Hidayat R., and Diansyah T.M., Eds., IOP Publishing Ltd, 2021. doi: 10.1088/1742-6596/1783/1/012122.

[28] Q. T. Pham and T. P. Tran, "The acceptance of e-learning systems and the learning outcome of students at universities in Vietnam," *Knowl. Manag. E-Learn.*, vol. 12, no. 1, pp. 63–84, 2020, doi: 10.34105/j.kmel.2020.12.004.

[29] N. Al-Qaysi, A. Granić, M. Al-Emran, T. Ramayah, E. Garces, and T. U. Daim, "Social media adoption in education: A systematic review of disciplines, applications, and influential factors," *Technol. Soc.*, vol. 73, p. 102249, May 2023, doi: 10.1016/j.techsoc.2023.102249.

[30] R. Gaupp, G. Fabry, and M. Körner, "Self-regulated learning and critical reflection in an e-learning on patient safety for third-year medical students," *Int. J. Med. Educ.*, vol. 9, pp. 189–194, 2018, doi: 10.5116/ijme.5b39.d5a8.

[31] M. M. Alshammari, Y. H. Al-Mamary, and A. A. Abubakar, "Revolutionizing education: unleashing the power of social media in Saudi Arabian public universities," *Humanit. Soc. Sci. Commun.*, vol. 11, no. 1, 2024, doi: 10.1057/s41599-024-03313-w.

[32] A. Segura-Robles, M. E. Parra-González, and J. J. Leiva-Olivencia, "Translation, adaptation, and validation of the e-learning acceptance measure (ELAM)," *Form. Univ.*, vol. 15, no. 4, pp. 1–8, 2022, doi: 10.4067/S0718-50062022000400001.

[33] S. Zhou, Y. Zhou, and H. Zhu, "Predicting Chinese University Students' E-Learning Acceptance and Self-Regulation in Online English Courses: Evidence From Emergency Remote Teaching (ERT) During COVID-19," *SAGE Open*, vol. 11, no. 4, 2021, doi: 10.1177/21582440211061379.

[34] A. H. A. Rahman, M. N. Yaacob, N. S. A. Samad, S. R. Mohamad, and N. A. A. Sabri, "Post-COVID-19 e-learning acceptance and its impact on community college students in Kelantan, Malaysia: A quantitative analysis," *Int. J. Innov. Res. Sci. Stud.*, vol. 6, no. 2, pp. 366–373, 2023, doi: 10.53894/ijirss.v6i2.1446.

[35] S. Dhendup and W. Thinley, "EXPLORING UNIVERSITY STUDENTS' ACCEPTANCE OF E-LEARNING USING E-LEARNING ACCEPTANCE MEASURE (ELAM) IN BHUTAN: A VALIDATION STUDY," *J. Educ. Online*, vol. 20, no. 4, 2023, doi: 10.9743/JEO.2023.20.4.6.

[36] O. Solomon, "Exploring the facets of e-learning acceptance in developing country," *Kasetsart J. Soc. Sci.*, vol. 42, no. 4, pp. 854–861, 2021, doi: 10.34044/j.kjss.2021.42.4.20.

[37] E. Amankwa and E. K. Asiedu, "Emergency e-learning acceptance in second-cycle institutions in Ghana: a conditional mediation analysis," *SN*

Soc. Sci., vol. 2, no. 4, 2022, doi: 10.1007/s43545-022-00338-3.

[38] J. Ejdys, "Factors Influencing Satisfaction and Future Intention to Use E-Learning at the University Level," *Foresight STI Gov.*, vol. 16, no. 2, pp. 52–64, 2022, doi: 10.17323/2500-2597.2022.2.52.64.

[39] M. S. A. Latip, M. Tamrin, I. Noh, F. A. Rahim, and S. N. N. A. Latip, "Factors affecting e-learning acceptance among students: The moderating effect of self-efficacy," *Int. J. Inf. Educ. Technol.*, vol. 12, no. 2, pp. 116–122, 2022, doi: 10.18178/ijiet.2022.12.2.1594.

[40] I. Y. Alyoussef, "E-learning acceptance: the role of task–technology fit as sustainability in higher education," *Sustain. Switz.*, vol. 13, no. 11, 2021, doi: 10.3390/su13116450.

[41] S. H. Purnomo and T. Nastiti, "Does management support matter in elucidating the linkage of individual characteristics and E-learning acceptance?," *Asian Acad. Manag. J.*, vol. 24, no. 1, pp. 83–110, 2019, doi: 10.21315/aamj2019.24.1.4.

[42] R. Estriegana, J.-A. Medina-Merodio, R. Robina-Ramírez, R. Barchino, and C. De-Pablos-Heredero, "E-learning Acceptance in Face-to-Face Universities due to COVID-19," *SAGE Open*, vol. 13, no. 4, 2023, doi: 10.1177/21582440231214873.

[43] A. Al-Hunaiyyan, R. Alhajri, and A. Bimba, "Towards an Efficient Integrated Distance and Blended Learning Model: How to Minimise the Impact of COVID-19 on Education," *Int. J. Interact. Mob. Technol.*, vol. 15, no. 10, pp. 173–193, 2021, doi: 10.3991/ijim.v15i10.21331.

[44] A. Belew *et al.*, "Acceptance of e-learning and associated factors among postgraduate medical and health science students at first generation universities in Amhara region, 2023: using modified technology acceptance model," *BMC Med. Educ.*, vol. 24, no. 1, p. 838, Aug. 2024, doi: 10.1186/s12909-024-05834-z.

[45] N. K. Ibrahim *et al.*, "Medical students' acceptance and perceptions of e-learning during the Covid-19 closure time in King Abdulaziz University, Jeddah," *J. Infect. Public Health*, vol. 14, no. 1, pp. 17–23, 2021, doi: 10.1016/j.jiph.2020.11.007.

[46] K. Chrysafiadi, M. Virvou, and G. Tsihrintzis, "A Fuzzy-Based Evaluation of E-Learning Acceptance and Effectiveness by Computer Science Students in Greece in the Period of COVID-19," *Electronics*, vol. 12, no. 2, p. 428, Jan. 2023, doi: 10.3390/electronics12020428.

[47] M. A. B. Aryani, M. H. Santosa, and P. E. Dambayana, "PREPARING FOR NEW LEARNING: PUBLIC VOCATIONAL HIGH SCHOOL STUDENTS' AND TEACHERS' E-LEARNING READINESS IN THE EFL INSTRUCTION," *LLT J. J. Lang. Lang. Teach.*, vol. 25, no. 2, pp. 505–519, 2022, doi: 10.24071/llt.v25i2.3060.

[48] C. G. Gemmano, M. B. Ligorio, and A. Manuti, "Contributo alla validazione del Digital Mindset Questionnaire in un campione di studenti universitari italiani," *Qwerty - Open Interdiscip. J. Technol. Cult. Educ.*, vol. 17, no. 2, Dec. 2022, doi: 10.30557/QW000060.

[49] A. Al-Azawei and A. Alowayr, "Predicting the intention to use and hedonic motivation for mobile learning: A comparative study in two Middle Eastern countries," *Technol. Soc.*, vol. 62, p. 101325, Aug. 2020, doi: 10.1016/j.techsoc.2020.101325.

[50] S. A. Al-Hajri, S. Ghayas, and A. Echchabi, "Investigating the e-learning acceptance in Oman: Application of structural equation modelling approach," *J. Comput. Sci.*, vol. 14, no. 3, pp. 368–375, 2018, doi: 10.3844/jcssp.2018.368.375.

[51] E. Bizzo, "Acceptance and resistance to e-learning adoption in developing

countries: a literature review," *Ens. Aval. E Políticas Públicas Em Educ.*, vol. 30, no. 115, pp. 458–483, Jun. 2022, doi: 10.1590/s0104-403620220003003342.

[52] A. Rodziah, S. M. Hasan, A. Rusli, and C. Noraini, "Integrated Model for E-Learning Acceptance," in *IOP Conf. Ser. Mater. Sci. Eng.*, Zwiggelaar R., Yusup S., and Taha Z., Eds., Institute of Physics Publishing, 2016. doi: 10.1088/1757-899X/105/1/012016.

[53] S. Duggal, "Factors impacting acceptance of e-learning in India: learners' perspective," *Asian Assoc. Open Univ. J.*, vol. 17, no. 2, pp. 101–119, 2022, doi: 10.1108/AAOUJ-01-2022-0010.

[54] H. Mastour, R. Yousefi, and S. Niroumand, "Exploring the acceptance of e-learning in health professions education in Iran based on the technology acceptance model (TAM)," *Sci. Rep.*, vol. 15, no. 1, 2025, doi: 10.1038/s41598-025-90742-5.

[55] C. Shen and J. Ho, "Technology-enhanced learning in higher education: A bibliometric analysis with latent semantic approach," *Comput. Hum. Behav.*, vol. 104, p. 106177, Mar. 2020, doi: 10.1016/j.chb.2019.106177.

[56] M. A. Rojas-Sánchez, P. R. Palos-Sánchez, and J. A. Folgado-Fernández, *Systematic literature review and bibliometric analysis on virtual reality and education*, vol. 28, no. 1. Springer US, 2023, p. 192. doi: 10.1007/s10639-022-11167-5.

[57] M. A. Fauzi, "E-learning in higher education institutions during COVID-19 pandemic: current and future trends through bibliometric analysis," *Heliyon*, vol. 8, no. 5, pp. e09433–e09433, 2022, doi: 10.1016/j.heliyon.2022.e09433.

[58] J. Martins, R. Gonçalves, and F. Branco, "A bibliometric analysis and visualization of e-learning adoption using VOSviewer," *Univers. Access Inf. Soc.*, vol. 23, no. 3, pp. 1177–1191, Aug. 2024, doi: 10.1007/s10209-022-00953-0.