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Adoption of E-Learning Technologies: A Literature Synthesis of Influencing Factors

Samuel Narter Tawiah^{1*}, David Doe Fiergbor², Kwesi Hughes-Lartey¹

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ABSTRACT

This study examines the use of e-learning in Colleges of Education and the barriers that deter its adoption and use. Since the number of digital resources present in the educational environment is rising, it is useful to know the promoters and obstacles that interfere with the adoption of e-learning in these organisations. Results also show that, although technology infrastructure remains problematic, faculty readiness, as well as institutional leadership and support structures, are pivotal to e-learning adoption. In addition, cultural and contextual aspects like perceived ease of use and relevance of e-learning system also have a significant influence on the rate of propagation. Emphasizing the need for specific interventions, the research offers practical implications to policymakers, school practitioners, and institutional officials to gain a full comprehension of conditions and tactics to improve practice. The study is closed with a set of actionable recommendations for scholars and practitioners and suggests future research to fill the holes within e-learning adoption and to explore new trends.

INTRODUCTION

The integration of e-learning technologies in Colleges of Education has been a focus of researchers, as virtual tools are increasingly being used as instructional aids (Aduloju & Adodo, 2025; Pal & Patra, 2021; Almaiah *et al.*, 2020). This increased demand for education in digital literacy by educators was further exacerbated within the emergence of the COVID-19 pandemic resulting in the global transition toward online education (Pal & Patra, 2021). Despite this thrust, COEs in several parts of the world still encounter problems such as inadequate Technological Infrastructure, lack of institutional support, and resistance to change by both faculty and students (Ansong *et al.*, 2017; Almaiah *et al.*, 2020). Although, the use of TAM and UTAUT has been used to assess e-learning adoption in different institutions in many contexts elsewhere, there are few studies which apply them on e-learning adoption with respect to Colleges of Education in Ghana. Additionally, the e-learning system is also developed and considered don the basis of understanding the specific challenges, and encouragers for the adoption of the same in these institutes (Pal & Patra, 2021; Ansong *et al.*, 2017; Almaiah *et al.*, 2020). Similarly, Tarhini *et al.* (2017) and Venkatesh *et al.* (2003) have drawn attention to the significance of variables such as performance expectancy, effort expectancy and facilitating conditions in technology acceptance, while their applicability to teacher training institutions has yet to be established. Hence, this study's main goal is to systematically synthesize the various factors that would affect e-learning adoption in Colleges of Education to be able to obtain a holistic lens about how they interact within the context of the institution and the culture of this institution. This research, by synthesizing multiple

studies, fills not just a gap in literature but also serves as useful advice to policy makers, institutional leaders, and teachers.

LITERATURE REVIEW

E-Learning Technologies and Adoption

E-learning technologies refer to all types of digital resources such as Learning Management Systems (LMS), virtual classrooms and mobile learning apps that have changed the process of teaching and learning (Ain *et al.*, 2016; Wu *et al.*, 2020). While these technologies have been globalized, their take-up has been divergent across regions (Wu *et al.*, 2020), reflecting differences in technological infrastructure, cultural norms and organizational support. Furthermore, researches conducted in the developed countries, like Almaiah *et al.* (2020) and Al-Adwan *et al.* (2022), show that e-learning is widely adopted as a result of a well-developed ICT and a high level of digital literacy. However, studies in developing countries like Sub-Saharan Africa and Southern Asia have identified substantial challenges of poor internet quality and lack of training (Naresh & Reddy, 2015; Ansong *et al.*, 2017). These differences reinforce the significance of situational factors for explaining e-learning adoption. Furthermore, a review of literature shows similarities and differences among the studies. For instance, as academics such as Venkatesh *et al.* (2003) and Salloum *et al.* (2019) all find perceived usefulness and perceived ease of use as important drivers of e-learning adoption; however, the weight of importance of these attributes are different across scenarios. For advanced economies, acceptance of e-learning is driven by perceived usefulness as users emphasize on efficiency and convenience of e-learning systems (Almaiah *et al.*, 2020).

¹ Department of Computer Science, Koforidua Technical University, Ghana

² School of Management, Jiangsu University, China

* Corresponding author's e-mail: samuel.tawiah@ktu.edu.gh

On the contrary, in emerging economies, perceived ease of use is more important since, due to low level of skills of the digital users, the systems mandates to have user-friendly, intuitive systems (Kanwal & Rehman, 2017).

Our findings imply that although theories such as TAM and UTAUT play an important role model, they are only valid by considering a specific context to regional variation.

Table 1: E-Learning definition by different scholars

Scholar	Definition
Abdekhoda <i>et al.</i> (2022)	E-learning adoption is defined as the process by which individuals or organizations accept and utilize e-learning technologies, influenced by their compatibility with tasks and the technological infrastructure available.
Salloum <i>et al.</i> (2019)	It refers to the acceptance and usage of e-learning platforms driven by user perceptions of ease of use, usefulness and facilitating conditions within a specific educational or cultural context.
Ansong <i>et al.</i> (2017)	Adoption in e-learning entails the decision-making process through which users engage with digital educational platforms, affected by technological readiness, organizational support and user motivation.
Kanwal & Rehman (2017)	E-learning adoption is conceptualized as the acceptance and implementation of digital learning tools in educational settings, determined by contextual factors such as institutional support and cultural dynamics.
Sarabadani <i>et al.</i> (2017)	The integration and sustained use of e-learning systems by employees within organizational environments, shaped by technological attributes and individual attitudes.
Uğur & Turan (2018)	Adoption is the utilization of e-learning technologies by educators and students, based on their alignment with user expectations and the technological ecosystem of the institution.
Venkatesh <i>et al.</i> (2003)	This study defines adoption as the process by which users accept and consistently use a new technology, underpinned by factors such as performance expectancy, effort expectancy and social influence.
Wu & Chen (2017)	Adoption is the extent to which learners continue to use e-learning platforms based on their alignment with individual learning needs and technological capabilities.
Chang <i>et al.</i> (2020)	The behavioral intention to accept and use digital learning systems, moderated by factors such as perceived ease of use, perceived usefulness and readiness for technology.
Chao (2019)	E-learning adoption is defined as the voluntary acceptance and sustained use of mobile and digital learning tools within educational environments, influenced by behavioral and attitudinal factors.

**Theoretical Models of E-Learning Adoption
Technology Acceptance Model (TAM)**

TAM, introduced by Davis (1989), suggests that PU and PEOU are the main antecedents of technology adoption. These factors have also been found reliable in high-resource context settings, wherein users appreciate e-learning systems for its economy and utility (Wu & Chen, 2017; Pal & Patra, 2021). Similarly, Wu and Chen (2017) employed TAM to analyse MOOCs and concluded that PEOU was a better predictor of adoption in technologically-developed environments, as students admire the idea of being able to access high-quality educational materials. However, in resource-constrained settings, perceived ease of use is an important priority due to low levels of digital literacy, demonstrating a need for straightforward, easy-to-use platforms (Ansong *et al.*, 2017; Kanwal and Rehman, 2017). This discrepancy draws attention to a limitation of TAM: it does not account for context factors like digital skill and infrastructural limitations that are vital in emerging regions. Also, TAM, as a model, has succeeded to explain adoption at the individual level, but tends to ignore the impact of institutional and cultural factors. Like-wise, in collectivist cultures, social norms and group behaviors are more important in determining user’s attitude, which are not considered explicitly in the original TAM model

(Khundrakpam *et al.*, 2022; Maisha & Shetu, 2023). To overcome this limitation, extended versions such as TAM2 and TAM3, including additional constructs such as social influence and facilitating condition (Pal & Patra, 2021), have been developed. Even these “extensions” do not account for all the nuances of e-learning adoption across different cultural and institutional settings, however.

Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT was proposed by Venkatesh *et al.* (2003), overcome some of TAM’s drawbacks by adding to it some concepts like social influence, enabling conditions and effort expectancy. These extensions specifically suit the case of e-learning adoption in various settings, where individual factors (perceived ease of use, perceived usefulness, and other elements) interact with societal and organizational factors. For example, UTAUT has been found to be useful to understand barriers to e-learning, which included deficiency in infrastructure and educators’ resistance to change in higher education settings (Sewandono *et al.*, 2022; Sarabadani *et al.*, 2017). Yet the model’s focus on quantifiable factors has a tendency to disregard qualitative details such as user experience and cultural dynamics that are essential to the adoption in a non-Western context. The regional variances add

the complexity to the generalization of UTAUT. In developed countries with a high technological readiness and digital literacy infrastructure, performance expectancy (the perceived potential of e-learning to bring positive effects on learning processes) becomes a key predictor for adoption (Almaiah *et al.*, 2020; Al-Adwan *et al.*, 2022). In contrast, when it comes to developing countries, facilitating conditions (e.g., access to secure internet and technical support) tend to be the most significant factor as most of the perceived barriers are purely infrastructural barriers (Naresh & Reddy, 2015; Ansong *et al.*, 2017). These results indicate that UTAUT is a general framework with constructs after weighting only according to the specific situation.

Extensions and Integrations of TAM and UTAUT

To overcome the shortcomings of TAM and UTAUT, a number of researchers have attempted to further develop these models by adding in extra constructs and frameworks. For instance, Wu, and Chen (2017) integrated TAM and the Task-Technology Fit (TTF) model, to assess the level of task-technology fit

e-learning platforms provide. Their results indicate that, while TAM is good for predicting adoption in resource rich environments, TTF gives a more refined view of technology adoption in resource scarce scenarios through focusing on matching technology with user tasks. Similarly, Al-Adwan *et al.* (2022) expanded UTAUT with cultural dimensions and found that collectivist nature of the society will lead to a greater level of social influence on e-learning adoption. Notwithstanding these progresses a number of lacunae also exist. Firstly, many extended models concentrate on specific scenarios or areas and therefore are not generalizable. For example, in studies from Sub-Saharan Africa enabling factors and cultural adaptability are emphasized (Ansong *et al.*, 2017; Khundrakpam *et al.*, 2022) but are less often reported in studies done in developed countries. Second, heavy use of quantitative approaches in UTAUT-driven research may overlook qualitative elements of adoption, such as user experiences and cultural factors. Lastly, the absence of longitudinal research has restricted our knowledge of the durability of e-learning over time.

Table 2: UTAUT Constructs from other Combination Models

Scholars	Combination from other models	UTAUT Construct
Abdekhoda <i>et al.</i> (2022); Wu & Chen (2017)	Integrated with the Task Technology Fit (TTF) Model	Performance Expectancy
Chang <i>et al.</i> (2020); Chao (2019)	Extended by Technology Readiness as a moderating factor	Effort Expectancy
Lim (2022); Tarhini <i>et al.</i> (2017)	Extended with theories of Social Influence (SI) and subjective norms	Social Influence
Ain <i>et al.</i> (2016); Al-Adwan <i>et al.</i> (2022)	Combined with learning value and perceived usefulness	Facilitating Conditions
Wu & Chen (2017); Kanwal & Rehman (2017)	Integrated with the Technology Acceptance Model (TAM)	Behavioral Intention
Al-Qirim <i>et al.</i> (2018); Ambarwati <i>et al.</i> (2020)	Enhanced with perceived behavioural control and habit	Use Behavior
Abdekhoda <i>et al.</i> (2022); Pal & Patra (2021)	Combined with Task Technology Fit (TTF) to assess alignment between technology and user tasks	Task Fit
Sarabadani <i>et al.</i> (2017); Wu <i>et al.</i> (2020)	Combined with TAM and modified to include the impact of hybrid models in blended learning	Perceived Ease of Use
Pal & Patra (2021); Wu & Chen (2017)	Merged with TAM constructs to evaluate the impact of video-based learning and MOOCs	Perceived Usefulness
Amin <i>et al.</i> (2014); Ali (2018)	Added to UTAUT with constructs from Information Systems Success Models (ISSM)	User Satisfaction
Amin <i>et al.</i> (2014); Alalwan (2020)	Combined with trust-enhanced models for user acceptance of mobile learning systems	Trust in Technology
Wu & Chen (2017); Kanwal & Rehman (2017)	Integrated into UTAUT with Bandura's theory to explain continuance intention in MOOCs	Self-efficacy
Ain <i>et al.</i> (2016); Al-Adwan <i>et al.</i> (2022)	Combined with UTAUT to assess the educational value derived from e-learning systems	Learning Value
Ansong <i>et al.</i> (2017); Khundrakpam <i>et al.</i> (2022)	Integrated into UTAUT with context-specific factors like infrastructure limitations in developing regions	Cost and Accessibility

Trends in E-Learning Adoption in Education

E-learning implementation has been unequal across the world between developed and developing areas. In the developed world, the diffusion of high-speed internet and the implementation of state-of-art ICT infrastructure have enabled the growing embrace, especially at higher education institutions (Almaiah *et al.*, 2020; Okojie *et al.*, 2019). On the other hand, in developing countries there are continuous issues including low internet penetration, lack of funding, and low digital literacy (Naresh & Reddy, 2015; Ansong *et al.*, 2017; Gonzalo, 2025). Even though e-learning has been incorporated in the curricula in universities in the industrialized world, colleges of education in the developing world are frequently challenged by obsolete equipment along with unreliable internet connection (Kamau & Nyerere, 2016; Pal & Patra, 2021). Once more, the COVID-19 epidemic amplified these discrepancies, institutions in developed countries took to online learning, and those in developing nations experienced substantial challenges (Almaiah *et al.*, 2020; Akbar, 2021). This disparity emphasises the requirement for resource-specific interventions to overcome infrastructure and capacity-building issues in limited-resource settings. Furthermore, the pandemic reminded us of e-learning as a backup plan and the success/failure of e-learning in maintaining continuation of learning of students.

Influential Factors in E-Learning Adoption

Technological infrastructure is an important factor in determining e-learning acceptance but it is not readily available in all areas. Research from developed countries point out to high-speed internet and sophisticated e-learning platforms as enabling factors for acceptance (Almaiah *et al.*, 2020; Wu & Chen, 2017). On the other hand, studies in developing countries exposed the digital divide as one of the major barriers, showing that human

beings did not have access to internet and/or use very old devices (Kanwal & Rehman, 2017; Ansong *et al.*, 2017). These factors imply that the technological influences on forecast quality are universal, but are also affected by area differences in infrastructure and resources.

Organizational support is also critical to the adoption of e-learning. Research from developed countries showed that strategic leadership and funding influenced adoption (Tarhini *et al.*, 2017; Al-Adwan *et al.*, 2022). However, the adoption of E-banking in developing economies does not enjoy the same level of support from institutions with the absence of well developed policies and low levels of funding (Naresh & Reddy, 2015; Aguti *et al.*, 2015). These differences emphasize the importance of institution commitment to e-learning programmes, especially in the resource-limited world.

Human-related issues, such as literacy as well as users' attitudes, are central in e-learning adoption. In developed countries, studies have indicated the need for user training and support (Alshahrani *et al.*, 2017; Nguyen *et al.*, 2020), while in developing countries capacity building interventions are necessary to overcome problems of low digital literacy and resistance to change (Kanwal & Rehman, 2017; Ansong *et al.*, 2017). These results indicate that human factors are context-specific, necessitating intervention to face individual challenges.

Cultural factors including resistance to change and socio-cultural perception have a big impact on the adoption of e-learning. It also highlights, once again, the importance of social networks to affect user attitudes in collectivist cultures (Tarhini *et al.*, 2017; Lim, 2022). On the other hand, individualist societies link interdependence to personal likes and interests and perceived advantage (Abbasi *et al.*, 2015; Al-Gahtani, 2016). These distinctions emphasize the requirement of building culturally sensitive eLearning plan in line with regional cultures and values.

Table 3: Key barriers to e-learning adoption

Scholars	Key Barriers	Theme
Abdekhoda <i>et al.</i> (2022); Ansong <i>et al.</i> (2017); Kanwal & Rehman (2017); Naresh & Reddy (2015); Maisha & Shetu (2023)	Lack of adequate technological infrastructure, poor internet connectivity and limited access to devices.	Technological Infrastructure
Abubakar <i>et al.</i> (2017); Ain <i>et al.</i> (2016); Uğur & Turan (2018); Lakshmi <i>et al.</i> (2020); Abbad (2021)	Insufficient digital literacy, lack of training on e-learning systems and unfamiliarity with technology tools.	User Skills and Literacy
Abbasi <i>et al.</i> (2015); Al-Adwan <i>et al.</i> (2022); Singh & Singh (2020); Tarhini <i>et al.</i> (2017); Khundrakpam <i>et al.</i> (2022)	Resistance to change, cultural biases against online education and low acceptance of e-learning platforms in traditional education settings.	Cultural and Social Factors
Singh & Thurman (2019); Ryan <i>et al.</i> (2016); Kafyulilo (2015); Pal & Patra (2021); Wu <i>et al.</i> (2020)	Poorly designed course materials, lack of engaging content and inadequate adaptation of pedagogy for online learning.	Pedagogical and Content Quality
Wu & Chen (2017); Venkatesh <i>et al.</i> (2003); Al-Qeisi <i>et al.</i> (2015); Al-Gahtani (2016); Akbar (2021)	Complex system interfaces, lack of user-friendly platforms and difficulties in navigation.	System Usability and Design

Aguti <i>et al.</i> (2015); Alharthi <i>et al.</i> (2019); Karmakar (2020); Sewandono <i>et al.</i> (2022); Alenezi (2020)	Inadequate institutional policies, lack of administrative support and absence of clear implementation strategies.	Institutional Support
Al-Qirim <i>et al.</i> (2018); Almaiah <i>et al.</i> (2020); Ambarwati <i>et al.</i> (2020); Chao (2019); Abdekhoda & Salih (2017)	High costs of implementing e-learning systems, affordability issues for students and insufficient funding for technological investments.	Financial Constraints
Lim (2022); Chao (2019); Ali (2018); Abbad (2021); Alharthi <i>et al.</i> (2019)	Concerns over data privacy, lack of trust in the security of online platforms and fear of misuse of personal information.	Privacy and Security Concerns
Venkatesh <i>et al.</i> (2003); Sarabadani <i>et al.</i> (2017); Tarhini <i>et al.</i> (2017); Abdekhoda <i>et al.</i> (2016); Parlakkilic (2015)	Low motivation to adopt new systems, fear of technology and psychological barriers to embracing online education.	Behavioral and Psychological
Karmakar (2020); Alenezi (2020); Singh <i>et al.</i> (2020); Maisha & Shetu (2023); Kutluca (2020)	Disruptions due to external factors such as power outages, unavailability of conducive learning environments and disparities in geographic accessibility to resources.	Environmental Factors

Relationships and Patterns among the Influential Factors of E-Learning Adoption

The interaction between the factors identified forms a tangled web of relationships. The technological aspects are also underlying factors on which other factors are developed upon. For instance, strong facilities powers the efficacy of both institutional arrangements and human management as observed in successfully documented cases in Kenya and Ghana (Kamau & Nyerere, 2016; Ansong & Boateng, 2021). On the other hand, insufficient technology tends to increase institutional and human challenges and forming a vicious cycle which retard the adoption (Kira & Darsono, 2018). Institutional attributes including administrative endorsement and policies shape distribution of resources, training programs, and the development of culturally appropriate content. As opined by Okojie *et al.* (2019) that Nigerian colleges of education used policy-induced investments to upgrade the digital literacy of both faculty and the student body. But its performance is diminished without institutional support; although advanced technology alone cannot sufficiently produce desired outputs, there still exists the necessity for synergy between institutional and technological interventions (Pal & Patra, 2021). Second, human factors (digitalliteracy in particular) appear to have a mutually reinforcing impact on technological and institutional factors. On one hand, the high level of digital literacy increases the level of user engagement in e-learning system. However, a poorly designed platform or unfavourable training can discourage user, reiterating negative attitude to the technology (Mtebe & Raisamo, 2014). Furthermore, a mutual effect between teachers' attitudes and students' acceptance also forms a loop that more favorable experience with e-learning leads to wider acceptance and use. In addition, socio-cultural resistance comes mainly from a lack of knowledge in the use of digital tools and the psychological inclination to traditional teaching methods. Nonetheless, culturally related methods, such as employment of local languages

or relevant culture information, encourage acceptance (Al-Gahtani, 2016}). In addition, value orientations towards technology have an impact on institutional priorities and whether or not e-learning is considered as a supplement to, or a substitute for, traditional education.

Comparing E-Learning Adoption in Colleges of Education with the Universities

Higher institutions tend to be better equipped as the sector enjoys better provision of technology infrastructure, high-speed internet, sophisticated e-learning system and well-established technical support (Almaiah *et al.*, 2020; Okojie *et al.*, 2019). Colleges of education, however, operate on tighter budgets, so the institutions are not in a position to invest in the same physical infrastructure (Kamau & Nyerere, 2016). The former is associated with higher use of e-learning in universities in Ghana and South Africa resulting from institutional collaboration with tech companies, while colleges of education grapple with obsolete machines and on-and-off internet availability (Ansong & Boateng, 2021; Pal & Patra, 2021). Pedagogically, university e-learning is frequently designed in order to assist independent study, research-oriented work, and high level academic discussion. However, colleges of education focus on pedagogical training of pre-service teachers which may need a hands-on approach (Mtebe & Raisamo, 2014; Lim, 2022). This variation in emphasis indicates that e-learning in colleges of education has to provide features such as simulated classrooms and interactive teaching aids to cater the specific needs (Al-Gahtani, 2016). In addition, university faculty often have greater digital literacy and learning opportunities compared to their counterparts in colleges of education (Kian, 2016; Nusir *et al.*, 2014). University students may also have more access to personal device and digital resources, while pre-service teachers in colleges of education may rely more on institutional resources (Okojie *et al.*, 2019; Almaiah *et al.*, 2020).

Table 4: Factors of e-learning from selected previous studies

Author(s)	Factors	Method	Theory/Model
Abdekhoda <i>et al.</i> (2022)	Performance expectancy, effort expectancy, social influence, facilitating conditions, task-technology fit	Quantitative survey	UTAUT & TTF
Salloum <i>et al.</i> (2019)	Perceived usefulness, ease of use, social influence, attitude towards use, trust	Case study	TAM & UTAUT
Ansong <i>et al.</i> (2017)	Institutional support, infrastructure readiness, cost-effectiveness, user competence	Mixed methods	TOE Framework
Kanwal & Rehman (2017)	Access to technology, digital literacy, organizational support, perceived utility	Quantitative study	TAM
Sarabadani <i>et al.</i> (2017)	Social influence, organizational support, performance expectancy, effort expectancy	Survey	UTAUT
Uğur & Turan (2018)	User experience, perceived usefulness, perceived ease of use, trust	Quantitative analysis	Extended TAM
Wu & Chen (2017)	Continuance intention, perceived task fit, perceived ease of use, perceived usefulness	Survey	TAM & TTF
Chao (2019)	Behavioral intention, facilitating conditions, technology readiness	Quantitative survey	Extended UTAUT
Pal & Patra (2021)	Perception of usefulness, content quality, accessibility, technological infrastructure	Case study	TAM & TTF
Lim (2022)	Social influence, network readiness, resource availability, adaptability	Qualitative	Social Influence Theory
Al-Adwan <i>et al.</i> (2022)	Learning tradition, perceived ease of use, perceived usefulness	Quantitative survey	Extended UTAUT
Abbasi <i>et al.</i> (2015)	Cultural dimensions (individualism vs collectivism), technology acceptance	Cross-country survey	TAM & Cultural Analysis
Tarhini <i>et al.</i> (2017)	Students' attitude, teaching methodologies, infrastructure, perceived ease of use	Structural Equation Modeling	TAM & UTAUT
Al-Qeisi <i>et al.</i> (2015)	Perceived system quality, user satisfaction, perceived usefulness	Quantitative	Extended TAM
Alharthi <i>et al.</i> (2019)	Sustainability requirements, e-learning system design factors	Literature review	System Design Theory
Almaiah <i>et al.</i> (2020)	Usability, system quality, user engagement	Mixed methods	IS Success Model

MATERIALS AND METHODS

Research Design

This study uses the method of SLR to consolidate the previous works concerning the adoption of e-learning technologies in Colleges of Education. In general, systematic review is a rigorous way to approach a review in order to identify, select and critically evaluate the relevant research with respect to a predefined issue (Abdekhoda *et al.*, 2022). The method allows and guards against lack of coverage and selectivity (bias) by following a priori rules and protocols. Systematic reviews are characterised by focus on transparency, reproducibility and strict literature appraisal (Venkatesh *et al.*, 2003; Singh & Thurman, 2019). The systematic review is a preferred method for aggregating studies on factors that influence the adoption of e-learning in educational context to reach a comprehensive view on the determining factors of e-learning adoption. In addition, the choice was made to focus on articles

from 2015 to 2023 and corresponds to key trends in e-learning deployment. This era signals a transformative stage in the history of educational technology running through where there is rapid growth of digital tools, wide spread access to the internet and broad approbation of mobile learning platform. The latter half of this period, in particular from 2020 onwards, has experienced an exceptional growth in e-learning adoption as mandated by the outbreak of COVID-19 that had led educational institutions worldwide to shift towards online learning (Almaiah *et al.*, 2020; Pal & Patra, 2021). By concentrating on this period, the analysis is able to capture how both pre-covid and covid-caused trends in e-learning adoption have affected these dynamics, which is critical to being able to understand the evolving nature of the factors that influenced this transition. Moreover, the year 2015 can be considered a landmark year, as the year also marked the beginning of the global impetus for digital transformation in education through initiatives such as

the United Nations Sustainable Development Goal 4 (Quality Education) and the growing worldwide ICT in education related policies (UNESCO, 2015). This period of time would have allowed the research to account for newer technologies in e-learning, such as growth in Learning Management Systems (LMS), Massive Open Online Courses (MOOCs) and adaptive learning software, as well as the challenges and learning experiences of the pandemic.

Data Sources

A search of the literature was performed in various information databases: Scopus, PubMed, IEEE Xplore, ScienceDirect, SpringerLink and Taylor & Francis Online. These databases were selected because they are well circulated with quality peer reviewed articles and interdisciplinary research on e-learning. Searches were conducted using keywords and Boolean operators. Terms such as “e-learning adoption,” “factors influencing e-learning,” “educational technology acceptance,” “UTAUT model” and “colleges of education” were used in conjunction with Boolean operators (e.g, AND, OR) to narrow down searches. Additional keywords including “developing countries”, “UTAUT extension”, and “blended learning” were incorporated to include more literature especially from different geographical and cultural backgrounds. Results The search results were screened with the structured search filters (e.g. publication dates 2015–2023, peer-reviewed material and related to the research topic). This series of iterations also guaranteed the involvement of landmark publications as well as recent contributions in the field. Also, in an effort to reduce selection bias, the performing of the present study was based on rigid inclusion and exclusion criterions. Only non-editorial publications in English language in peer-reviewed journals were selected for the credibility and validity of the sources. We prioritized studies that concentrated on e-learning adoption in higher education level machineries, especially colleges of education. However, articles that did not directly examine factors affecting the adoption of e-learning, or presented inappropriate methodic validity, were removed. The research also incorporated studies from a wide range of geographical locations to encompass the difference of e-learning adoption in developed and developing countries. This method reduces the potential for over-representing information from particular geographic or situational sources.

Data Analysis Methods

The reviewed literature was thematically synthesized in order to find recurrent patterns, themes and relationships across the selected studies. Thematic synthesis is a qualitative method by which the data is coded, inclusive of descriptive themes, and analytical themes generated (Ryan *et al.*, 2016; Tarhini *et al.*, 2017). First, pertinent content was extracted from each study such as research objectives, methods, results and

context. Open coding was initially used on the data to extract recurring themes like perceived ease of use, performance expectancy and facilitating conditions. Categories of codes were associated to higher-level issues such as technology, readiness to use and institutional support. Analytical themes were generated on an analysis of the interaction among these factors and how they affect e-learning adoption with due consideration of variations between the contexts (developing vs developed countries). Meta-synthesis methods were also applied to synthesize results of quantitative and qualitative studies, resulting in the integration of divergent views. This approach helped stipulate gaps in the literature and future research directions. Bias was further reduced by the use of clear and transparent selection criteria (as well as systematics) that embraced a wide range of proposal experiences and methodologies.

RESULTS AND DISCUSSION

The study identifies poor technological infrastructure as a challenge to e-learning penetration in Colleges of Education is emphasized. For example, inadequate internet connectivity, unreliable electricity and lack of devices were often mentioned as barriers. These results are consistent with previous studies, for instance, Adarkwah (2021) who emphasized the role of infrastructural complexity as a barrier to the smooth implementation of e-learning. To address these, investments in infrastructure are necessary. In Kenya, the state-government worked together with private sector players to ensure affordability of internet access and devices to colleges in the rural areas, and this increased the level of e-learning adoption (Kamau & Nyerere, 2016). Likewise, the National Digital Literacy Mission, in India, has helped narrow the digital gap through the provision of subsidized devices and internet access to educational institutions (Karmakar, 2020). These cases show that both PPP and government interventions can play a role in breaking through infrastructure barriers. Moreover, knowledge level and the degree of use of e-learning programs are the two important factors for predicting faculty members’ successful adoption. A number of those in colleges of education are not adequately trained, resistant to and under-utilise digital platforms. This result is consistent with Nguyen *et al.* (2020) who highlight that faculty preparedness is a condition for intuitive e-learning adoption. To cope with this, organizations need to consider such professional development programs that meet the needs of the faculty. Also in Ghana, the Ministry of Education conducted a country-wide training of teachers on digital literacy and e-learning tools which enhanced the use of the facility (Ansong & Boateng, 2021). In Finland, peer-led workshops and mentoring have also succeeded in creating a learning culture that encourages staff to work with e-learning tools (Mtebe & Raisamo, 2014). These experiences underscore the need for developing programs to prepare faculty. The research shows that digital literacy, perceived ease

of use and perceived usefulness have had an impact on students' acceptance of e-learning technologies. These results also correspond to TAM, where user acceptance is influenced by perceived usefulness and ease of use (Davis, 1989). There are the other factors too that contribute in getting students prepared for e-learning, such as students' capability of manage the electronic tools, the families level of income in order to subscribe with the internet, which is another share of getting themselves prepared for e-learning by overcoming financial obstacles. Institutions should consider subsidizing the cost of the internet or low-cost devices to be more inclusive. Consequently, in South Africa, the government collaborated with the telcos to subsidize data plans for students, which increased the students' access to e-learning platforms (Pal & Patra, 2021). In the same way, digital literacy programmes have been set-up in universities in Australia to help students develop the capabilities to effectively use e-learning systems (Alalwan *et al.*, 2018). These projects are examples to show that focused interventions may increase student's involvement and acceptance in e-learning technologies. The study also sheds light on the significance of the role of institutional leadership in stimulating e-learning implementation. And at the end of the day, good leadership is about establishing strategic priorities, apportioning resources and creating an environment where innovation is nurtured. Yet the superstructure of institutional policies is not always in sync with national priorities. National strategies, e.g. Ghana's ICT in Education Policy, demonstrate that potential to fast-track e-learning uptake if appropriately implemented (Ministry of Education, Ghana, 2015). Institutional leaders in Norway have effectively restructured the e-learning in their teacher education program by dovetailing their approach with national digitalization objectives (Lim, 2022).

Resistance to e-learning influenced by culture, largely underpinned by conventional teaching models, constitutes a major challenge for e-learning in numerous environments. The study highlights the need to reconcile e-learning strategies with local cultural values in order to make them acceptable and relevant. Culturally relevant strategies such as use of local languages and content have been effective in improving acceptability. Colleges of Education in Nigeria have included local languages in e-learning platforms and that increased student participation and engagement (Okojie *et al.*, 2019). E-learning programs in Japan have also been customized to adhere to cultural norms such as collectivism and respect for authority which have been reflected in successful acceptance (Al-Gahtani, 2016). Again, inadequate funding is one of the hurdles in adopting e-learning. Cost considerations limit the resources that institutions can put into the infrastructure, training programs, and e-learning platforms. The E-learning initiatives need sustainable financing system. In Brazil, government has set up the special fund for educational

technology, which enables the colleges to invest in to the infrastructure and to the training of e-learning technology (Bailey & Lee, 2020). Similarly, in Canada, there has been funding support for e-learning project, through public private-partners hearings, to sustain these projects in the long period (Almaiah *et al.*, 2020).

CONCLUSION

The integration of e-learning technology in the Colleges of Education is an intricate and multifaceted process that is influenced by technological, organisational, cultural and financial factors. The present study shows that poor technological infrastructure, which is evidenced by a lack of reliable internet, poor electricity supply and difficulty of access to devices, poses an impediment to e-learning adoption. Tackling the infrastructure gaps will, however, require intentionality of investment under PPPs and stable government support. In addition, the effectiveness of e-learning rests on the digital literacy and preparedness of lecturers and learners. A significant proportion of the faculty are neither ready nor willing to adopt technology, and this highlights the necessity for strategic capacity-building interventions, professional development, and peer-to-peer mentoring activities.

Student adoption is also influenced by digital literacy, perceived usefulness, and ease of use, based on the Technology Acceptance Model (TAM). Yet there are socio-economic variables - such as who can afford to both get online and own a device - that need to be addressed to be inclusive. Commitment from national leaders is key to connecting local strategies with national ICT policies in a cohesive manner for sustainable implementation. In addition, cultural resistance stemming from traditional pedagogies can prevent adoption unless culturally sound and situated pedagogy is used. The inclusion of local languages and culturally relevant content has been identified as an effective strategy to engage users.

Finally, sustainable financing is essential. In the absence of adequate finance instruments, the infrastructure and supportive systems cannot flourish at the institutional level. This offers practical solutions by building on such best international practices as the ESGF and dedicated educational technology funds and jointly financed models. In the end, proper integration of e-learning is a wholeistic, collaborative and context-sensitive undertaking that involves everyone in a meaningful manner.

REFERENCES

- Abbad, M. M. (2021). Using the UTAUT model to understand students' usage of e-learning systems in developing countries. *Education and Information Technologies, 26*(6), 7205–7224.
- Abbasi, M. S., Elyas, T., & Shah, F. (2015). Impact of individualism and collectivism over the individual's technology acceptance behavior: A multi-group analysis between Pakistan and Turkey. *Journal of Enterprise Information Management, 28*(6), 747–768.
- Abdekhoda, M., & Salih, K. M. (2017). Determinant factors

- in applying picture archiving and communication systems (PACS) in healthcare. *Perspectives in Health Information Management*, 14, 1.
- Abdekhoda, M., Dehnad, A., & Zarei, J. (2022). Factors influencing adoption of e-learning in healthcare: Integration of UTAUT and TTF model. *BMC Medical Informatics and Decision Making*, 22, 327. <https://doi.org/10.1186/s12911-022-02060-9>
- Abubakar, M., Kumar, S., Bashir, M., & Aishatu, S. (2017). E-learning: A tool for enhancing teaching and learning in educational institutes. *International Journal of Computer Science and Information Technologies*, 8, 217–221.
- Aduloju, O. D., & Adodo, S. O. (2025). Effects of Flipped Learning Instructional Strategy on Secondary School Students Achievement in Mathematics in Ondo State. *Journal of Educational Technology and E-Learning Innovations*, 1(1), 32–40. <https://doi.org/10.54536/jeteli.v1i1.5125>
- Aguti, B., Wills, G. B., & Walters, R. J. (2015). An evaluation of the factors that impact on the effectiveness of blended e-learning within universities. In *International Conference on Information Society, i-Society 2014* (pp. 117–121). <https://doi.org/10.1109/i-Society.2014.7009023>
- Ain, N., Kaur, K., & Waheed, M. (2016). The influence of learning value on learning management system use: An extension of UTAUT2. *Information Development*, 32(5), 1306–1321. <https://doi.org/10.1177/0266666915597546>
- Akbar, M. (2021). Investigating the intentions to adopt e-learning using UTAUT-3 model: A perspective of COVID-19. In *Proceedings of the AUBH e-Learning Conference*.
- Alalwan, A. A. (2020). Mobile food ordering apps: An empirical study of the factors affecting customer e-satisfaction and continued intention to reuse. *International Journal of Information Management*, 50, 28–44.
- Alenezi, A. (2020). The role of e-learning materials in enhancing teaching and learning behaviors. *International Journal of Information and Education Technology*, 10(1), 48–56.
- Al-Gahtani, S. S. (2016). Empirical investigation of e-learning acceptance and assimilation: A structural equation model. *Applied Computing and Informatics*, 12(1), 27–50.
- Alharthi, A. D., Spichkova, M., & Hamilton, M. (2019). Sustainability requirements for eLearning systems: A systematic literature review and analysis. *Requirements Engineering*, 24, 523–543. <https://doi.org/10.1007/s00766-018-0299-9>
- Ali, M. (2018). Assessing e-learning system in higher education institutes. *Interactive Technology and Smart Education*, 15(1), 59–78. <https://doi.org/10.1108/ITSE-02-2017-0012>
- Almaiah, M. A., Al-Khasawneh, A., & Althunibat, A. (2020). Exploring the critical challenges and factors influencing the e-learning system usage during COVID-19 pandemic. *Education and Information Technologies*, 25, 5261–5280.
- Al-Queisi, K., Dennis, C., & Abbad, M. (2015). How viable is the UTAUT model in a non-Western context? *International Business Research*, 8(2), 204–219. <https://doi.org/10.5539/ibr.v8n2p204>
- Al-Qirim, N., Rouibah, K., Tarhini, A., Serhani, M. A., Yammahi, A. R., & Yammahi, M. A. (2018). Towards a personality understanding of information technology students and their IT learning in UAE university. *Education and Information Technologies*, 23(1), 29–40.
- Ansong, E., Lovia Boateng, S., & Boateng, R. (2017). Determinants of e-learning adoption in universities: Evidence from a developing country. *Journal of Educational Technology Systems*, 46(1), 30–60.
- Chang, Y. Z., Yu, C.-W., Chao, C.-M., & Lin, F.-C. (2020). Influences on medical app adoption by patients: The unified theory of acceptance and use of technology model and the moderating effects of technology readiness. *Social Science Journal*, 2020, 1–14.
- Chao, C. M. (2019). Factors determining the behavioral intention to use mobile learning: An application and extension of the UTAUT model. *Frontiers in Psychology*, 10, 1652.
- Gonzalo, J. (2025). Generative AI as a Learning Tool in Aviation: A Review of Pedagogical Approaches and Outcomes. *Journal of Educational Technology and E-Learning Innovations*, 1(2), 1–7. <https://doi.org/10.54536/jeteli.v1i2.5496>
- Kafyulilo, C. (2015). Challenges and opportunities for e-learning in education: A case study. In Keengwe, J. (Ed.), *Handbook of Research on Educational Technology Integration and Active Learning* (pp. 317–328). IGI Global.
- Kanwal, F., & Rehman, M. (2017). Factors affecting e-learning adoption in developing countries: Empirical evidence from Pakistan's higher education sector. *IEEE Access*, 5, 10968–10978. <https://doi.org/10.1109/ACCESS.2017.2708910>
- Karmakar, R. (2020, June). In the time of online classes, Northeast waits for a faint signal from a distant tower.
- Khundrakpam, P., Singh, K. D., & Singh, S. N. (2022). Factors influencing the adoption of e-learning technologies: An Indian perspective. *International Journal of Information and Education Technology*, 12(8), 675–682.
- Kutluca, T. (2020). Investigation of teachers' computer usage profiles and attitudes toward computers. *International Online Journal of Science*, 2(1), 81–97.
- Lakshmi, Y. V., Das, J., & Majid, I. (2020). Assessment of e-learning readiness of academic staff and students of higher education institutions in Gujarat, India. *Indian Journal of Educational Technology*, 2(1), 31–45.
- Lam, W. S., Hoe, L. W., Liew, K. F., Mohd, A. B., & Sim, J. X. (2021). Analysis of the e-learning method in Malaysia with AHP-VIKOR model. *International Journal of Information and Education Technology*, 11(2), 52–58.
- Lee, K. (2017). Rethinking the accessibility of online higher education: A historical review. *The Internet and Higher Education*, 33, 15–23. <https://doi.org/10.1016/j.chaos.2017.04.001>

- org/10.1016/j.iheduc.2017.01.001
- Lim, W. M. (2022). *Toward a theory of social influence in the new normal*. Taylor & Francis, 1–8. <https://doi.org/10.1080/23311983.2022.2087208>
- Maisha, K., & Shetu, S. N. (2023). Influencing factors of e-learning adoption amongst students in a developing country: The post-pandemic scenario in Bangladesh. *Future Business Journal*, 9, 37. <https://doi.org/10.1186/s43093-023-00214-3>
- Ministry of Education (2015). ICT in Education Reform. <https://moe.gov.gh/ict-in-education-reform/>
- Naresh, B., & Reddy, B. S. (2015). Challenges and opportunities of e-learning in developed and developing countries: A review. *International Journal of Emerging Research in Management and Technology*, 4(6), 259–262.
- Pal, D., & Patra, S. (2021). University students' perception of video-based learning in times of COVID-19: A TAM/TTF perspective. *International Journal of Human-Computer Interaction*, 37(10), 903–921. <https://doi.org/10.1080/10447318.2020.1842754>
- Parlakilic, F. (2015). E-learning readiness in medicine: Turkish family medicine (FM) physicians' case. *Turkish Online Journal of Educational Technology*, 14(2), 59–62.
- Ryan, S., Kaufman, J., Greenhouse, J., Ruicong, S., & Shi, J. (2016). Effectiveness of blended online learning courses at the community college level. *The Community College Journal of Research and Practice*, 40(4), 285–298. <https://doi.org/10.1080/10668926.2015.1040723>
- Salloum, S. A., Al-Emran, M., Shaalan, K., & Tarhini, A. (2019). Factors affecting the e-learning acceptance: A case study from UAE. *Education and Information Technologies*, 24(1), 509–530. <https://doi.org/10.1007/s10639-018-9786-3>
- Sarabadani, J., Jafarzadeh, H., & ShamiZanjani, M. (2017). Towards understanding the determinants of employees' e-learning adoption in the workplace: A unified theory of acceptance and use of technology (UTAUT) view. *International Journal of Enterprise Information Systems*, 13(1), 38–49. <https://doi.org/10.4018/IJEIS.2017010103>
- Sewandono, R. E., Thoyib, A., Hadiwidjojo, D., & Rofiq, A. (2022). Performance expectancy of e-learning on higher institutions of education under uncertain conditions: Indonesia context. *Education and Information Technologies*, 27, 45–62. <https://doi.org/10.1007/s10639-022-10981-6>
- Singh, V., & Thurman, A. (2019). How many ways can we define online learning? A systematic literature review of definitions of online learning (1988–2018). *American Journal of Distance Education*, 33(4), 289–306. <https://doi.org/10.1080/08923647.2019.1663082>
- Tarhini, A., Masa'deh, R., Al-Busaidi, K. A., Mohammed, A. B., & Maqableh, M. (2017). Factors influencing students' adoption of e-learning: A structural equation modeling approach. *Journal of International Education in Business*, 10(2), 164–182. <https://doi.org/10.1108/JIEB-09-2016-0032>
- UNESCO. (2015). *Wide Education Inequalities*.
- Uğur, N. G., & Turan, A. H. (2018). E-learning adoption of academicians: A proposal for an extended model. *Behaviour & Information Technology*, 37(4), 393–405. <https://doi.org/10.1080/0144929X.2018.1432753>
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425–478. <https://doi.org/10.2307/30036540>
- Wu, B., & Chen, X. (2017). Continuance intention to use MOOCs: Integrating the technology acceptance model (TAM) and task-technology fit (TTF) model. *Computers in Human Behavior*, 67, 221–232. <https://doi.org/10.1016/j.chb.2016.10.028>
- Wu, E. H. K., Lin, C. H., Ou, Y. Y., Liu, C. Z., Wang, W. K., & Chao, C. Y. (2020). Advantages and constraints of a hybrid model K–12 e-learning assistant chatbot. *IEEE Access*, 8, 77788–77801. <https://doi.org/10.1109/ACCESS.2020.2990406>