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METHODOLOGICAL AND THEORETICAL APPROACHES IN STUDIES ON ACCEPTANCE AND ADOPTION OF E-LEARNING TECHNOLOGIES: A SYSTEMATIC REVIEW (2008-2024)

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Abstract

Previous Information Systems (IS) research have examined methodological and theoretical approaches in technology acceptance in different contexts. However, there is scant literature on the methodological and theoretical approaches in studies on acceptance of e-learning technologies. This study therefore examined the dominant research designs, methods and theoretical frameworks employed in e-learning acceptance and adoption research. A systematic literature review employing content analysis was conducted on 162 peer-reviewed studies published between 2008 and 2024. Studies were identified through searches of Google Scholar, ScienceDirect, ERIC and Scopus. Articles were included if they examined the acceptance or adoption, of e-learning technologies in higher education, while conference papers, review articles, theses, and non-empirical studies were excluded. The findings reveal a strong dominance of quantitative research designs (91%, n=148), while qualitative and mixed method designs each accounted for only 4% (n=7) of the reviewed studies. Surveys were the principal data collection method in quantitative studies, whereas in-depth interviews were the most frequently employed quantitative method. The review demonstrates that e-learning acceptance and adoption research remains methodologically dominated by quantitative survey-based studies and theoretically centred on UTAUT and TAM. The findings provide a comprehensive methodological and theoretical profile of the field and suggest that greater use of qualitative and mixed-methods approaches could enrich future research by providing deeper insights into the contextual and behavioural factors influencing e-learning acceptance and adoption.

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Keywords: E-learning acceptance, adoption, digital technologies, higher education, systematic literature review

Introduction

Developments in information and communication technologies (ICTs) have fundamentally transformed the Information Systems (IS) landscape and accelerated the integration of digital technologies across different sectors, including education. In higher education, e-learning technologies such as Learning Management Systems (LMS), video conferencing platforms, and artificial intelligence applications have become integral to teaching and learning. These technologies have contributed significantly to improving the quality, accessibility and cost-efficiency of educational delivery (Ghavifekr and Rosdy, 2015). However,

their successful implementation depends on users` willingness to accept and use them (Venkatesh et al., 2003; Granić, 2022). This has made the concept of "technology acceptance" a central theme in IS research. As academic institutions increasingly adopt e-learning platforms and digital learning technologies, understanding the factors that influence users` acceptance and adoption has become an important area of research. Researchers have therefore sought to identify the factors that encourage or hinder the acceptance and adoption of these technologies in order to inform strategies for their successful implementation. While technology acceptance refers to users` positive attitude toward using a system (Taherdoost, 2018), technology adoption refers to the decision to fully use the technology (Granić, 2022). Both decisions are considered indicators of successful implementation of e-learning technologies in higher education.

Given the importance of user acceptance, researchers have studied the acceptance and adoption of educational technologies in Higher Educational Institutions (HEIs) from the perspectives of students and teachers. This growing research emphasises the role of users as crucial stakeholders in the technology implementation process, and seeks to understand their behavioural intentions to use educational technologies (Usoro et al., 2014; Adedoja & Morakinyo, 2016; Song & Kong, 2017; Colchester et al., 2017; Olafare et al., 2018; Chao, 2019; Ziraba et al., 2020; Karthega, 2023). Researchers have the liberty to choose from qualitative, quantitative or mixed-method approaches to examine e-learning acceptance and adoption. The choice of methodology is crucial to the type, depth and interpretation of evidence generated on e-learning acceptance and adoption (Chen and Hirschheim, 2004). Although quantitative methods have historically dominated IS research, several scholars have expressed concern that this methodological imbalance limits understanding of the complex social and organisational contexts surrounding technology acceptance and adoption, therefore, advocating greater adoption of qualitative and mixed-method approaches (Mingers, 2003; Monteiro et al., 2022).

In addition to methodological considerations, theoretical frameworks play a crucial role in advancing e-learning acceptance and adoption research. Within IS research, theories are used to explain and predict the factors that influence users` acceptance and adoption of technology. Because IS research is interdisciplinary in nature, attracting scholars from different disciplines including, psychology, sociology, engineering, communication, and education (Mingers, 2001, Halawi & McCarthy, 2006), several theories have been developed to explain technology acceptance and adoption. These theories propose different determinants of users` behavioural intentions and technology use. However, Venkatesh et al. (2003) argue that selecting the most appropriate theoretical framework remains challenging because these models originate from different disciplines and emphasise different explanatory constructs. Therefore, the choice of theories often depends on the research contexts and phenomenon under study. Given the importance of methodological and theoretical choices in shaping evidence on technology acceptance and adoption, it is important to examine the research designs, research methods, and theoretical frameworks employed in empirical studies on e-learning acceptance and adoption.

Previous studies

Several reviews and meta-analyses have examined methodological and theoretical approaches in technology acceptance and adoption research. Within the broader IS domain, Choudrie and Dwivedi (2005) analysed research methods used in technology adoption studies and found that survey methods dominated at the individual level, while case study methods were more common in organisational contexts. From the findings, 63% of the articles employed

surveys, 25% mixed-methods, while ethnography studies and secondary data analysis each accounted for 6%. Similarly, Williams et al. (2009) reviewed 345 papers on innovation adoption, acceptance and diffusion, published between 1985 and 2007, and reported a strong dominance of quantitative research methods, and the Technology Acceptance Model (and its associated constructs). Specifically, 64.8% of the reviewed studies employed quantitative approaches. Also, Mingers (2003) reviewed IS research and found that empirical studies dominated, with surveys, interviews, experiment and case studies being the most frequently used methods. Qualitative approaches accounted for only 22.6% of the studies, while conceptual and theoretical papers represented just and 8.6%. Together, these reviews suggest that technology acceptance research is characterised by a strong preference for quantitative methodologies.

Reviews focusing specifically on e-learning acceptance have similarly highlighted the predominance of established technology acceptance theories. For instance, Šumak et al. (2011) conducted a systematic review and meta-analysis of 42 journal papers and identified Technology Acceptance Model (TAM) as the most used theoretical framework for explaining e-learning acceptance research, while the Unified Theory of Acceptance and Use of Technology (UTAUT) appeared in relatively few studies. Imtiaz & Maarop (2019) likewise, found that most studies used TAM and extended it with constructs from other acceptance models and cognitive studies. More recently, Ziraba et al. (2020) in their review of 58 empirical studies on Moodle Learning Management System (LMS) adoption published between 2010 and 2019, reported that quantitative approaches accounted for 45.7% of the studies, while qualitative and mixed-method approaches received comparatively fewer. Their review further showed that TAM and its extensions remained the dominant theoretical framework.

More recent reviews have adopted different synthesis approaches. Mustafa and Garcia (2021) examined theories integrated with TAM and found that the Theory of Planned Behaviour (TPB) and Task–Technology Fit (TTF) were the most frequently combined frameworks. Similarly, Xue et al. (2024) systematically reviewed 162 studies that applied UTAUT in higher education and found that surveys are the top data collection method. Collectively these reviews have advanced understanding of technology acceptance research but remain limited in scope. Some have concentrated on specific technologies (e.g., Learning Management Systems), and individual theoretical models such as TAM or UTAUT. Furthermore, many of these reviews synthesised relatively small numbers of studies over comparatively short publication periods. Consequently, there is limited evidence regarding the methodological characteristics of empirical e-learning acceptance and adoption research, across diverse e-learning technologies, particularly with respect to research designs, specific research methods and theoretical frameworks employed across different e-learning technologies.

To address this gap, the present study systematically reviews empirical journal articles on e-learning acceptance and adoption published between 2008 and 2024. Specifically, the study examines the research designs, specific research methods and theoretical frameworks employed in the reviewed studies, with a view to offering practical guidance for researchers in selecting appropriate methodological and theoretical approaches for future studies on technology acceptance and adoption of digital technologies in educational contexts.

Purpose of the Study

This paper systematically reviews empirical studies on e-learning acceptance and adoption, published between 2008 and 2024, to examine the research designs, methods, and theoretical frameworks employed in investigating the acceptance and adoption of e-learning technologies. The questions this study seeks to answer are:

1. What research designs are most commonly adopted in e-learning acceptance and adoption studies?
2. Which specific research methods are most frequently employed in e-learning acceptance and adoption studies?
3. What theoretical frameworks have been employed in e-learning acceptance and adoption studies?

Methodology

This study employed a systematic literature review (SLR), using systematic content analysis to examine the methodological and theoretical approaches of published studies on e-learning acceptance and adoption. Systematic content analysis combines the rigorous and transparent procedures of a systematic literature review with the systematic coding and quantitative analysis of document content (Khirfan et al., 2020). This approach was appropriate because the study sought to classify and analyse published articles according to their methodological and theoretical characteristics rather than synthesise empirical findings or estimate effect sizes. Accordingly, the review focused on identifying patterns in research designs, research methods, and theoretical frameworks employed in e-learning acceptance studies published between 2008 and 2024.

Article Selection/Search Strategy

The article search was conducted using four major databases: Google Scholar, Semantic Scholar**,** ERIC, and Scopus. These databases were selected because they provide broad coverage of peer-reviewed literature in educational technology in higher education. The search was conducted using the following key words: “e-learning acceptance”, “technology acceptance in education”, "technology adoption in education”, “digital technologies acceptance”, “digital technologies adoption”, “online learning acceptance”, and “online learning adoption”. The initial search generated 186 publications.

Inclusion and Exclusion criteria

Articles published from 2008-2024 were included because this period coincides with the rapid expansion of web-based learning environments, adoption of LMS, mobile learning, MOOCS (massive open online courses), and more recently, artificial intelligence (AI) in higher education (Oulamine et al., 2025). Restricting the review to this period enabled the study to capture contemporary methodological and theoretical developments in e-learning acceptance and adoption research.

The inclusion criteria were as follows: (i) peer-reviewed journal articles; (ii) publications between 2008 and 2024; (iii) empirical studies examining the acceptance or adoption of e-learning technologies for teaching and learning; (iv) studies conducted in higher education settings; (v) articles published in English; and (vi) full-text articles available for review.

Studies were excluded if they: (i) were conference papers and theses; (ii) were available only as abstracts; (iii) were published in languages other than English; (iv) examined technology adoption outside educational contexts; or (v) focused on educational levels other than higher education.

Following the removal of duplicate records, the remaining articles were screened against the eligibility criteria. Twenty-four articles were excluded because they did not meet the inclusion criteria, resulting in a final sample of 162 studies for analysis. Figure 1 illustrates the process of identifying and selecting suitable articles.

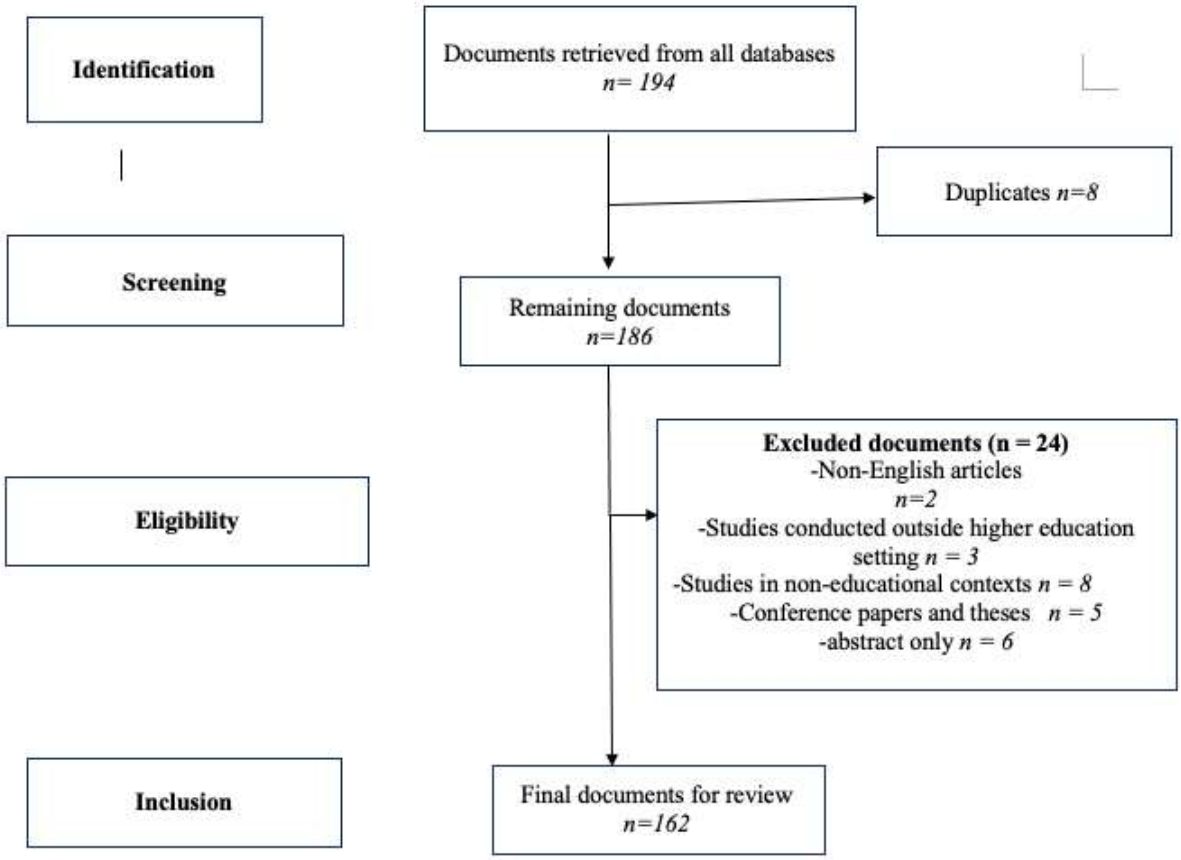


Figure 1: *Flow Diagram of the Selection process*

Coding Framework and Categorisation

Each reviewed publication was coding using a structured coding framework, comprising three categories: (i) research design, (ii) research method, and (iii) theoretical framework. These categories formed the basis of the systematic content analysis.

Research Design

Research design referred to the overall methodological orientation adopted by each study. the reviewed studies were classified into three broad categories: (i) Quantitative design (ii) qualitative design (iii) mixed-methods design, based on the approach explicitly reported by the

authors. Studies were classified as quantitative where they employed numerical data and statistical analysis. Studies relying on textual or narrative data were classified as qualitative, while studies that integrated both approaches were classified as mixed methods.

Specific research methods

Within each research design category, the specific data collection method(s) employed by the authors were identified and coded. Quantitative studies were classified according to the method employed (e.g., survey or experiment). Qualitative studies were coded based on methods including interviews, focus group discussions (FGDs), ethnography and qualitative content analysis. Studies combining two or more quantitative and qualitative methods were classified as mixed methods and coded according to the combination of methods employed.

Theoretical Frameworks

Theoretical frameworks were coded according to the theories and models adopted by each study. The coding framework included theories such as TAM, UTAUT, Extended TAM, Extended UTAUT, TPB, TRA, Uses and Gratifications Theory. Where studies integrated multiple theories, these were coded as combined theoretical models. Studies that did not report an explicit theoretical framework were coded separately.

Coding Procedure

To promote coding consistency, a structured coding protocol was developed prior to data extraction. Definitions for each category were established and applied consistently throughout the review. All studies were coded by the author using the same protocol. Although the review employed a single-coder approach and inter-coder reliability was therefore not assessed, the use of predefined coding categories and a consistent coding protocol helped promote consistency throughout the analysis.

Data Analysis

The coded data were entered into Microsoft Excel (2022 version), where frequency counts and percentages were generated to describe the distribution of these methodological and theoretical approaches across the reviewed studies. The findings are presented using tables and figures to facilitate comparison and interpretation.

Results

Research Designs

Table 1 shows the distribution of research designs across the 162 studies included in the review. The table provides an overview of the methodological approaches adopted by researchers in investigating e-learning acceptance and adoption.

Table 1: Distribution of research designs adopted by the sampled publications on E-learning acceptance and adoption

Research Design	Frequency	Percentage
Quantitative	148	91.4
Qualitative	7	4.3
Mixed Methods	7	4.3
Total	162	100

Out of the 162 sampled publications, 91.4% (n=145) employed quantitative designs; whereas only 4.3% (n=7) adopted qualitative designs, and another 4.3% (n=7) employed mixed design. The findings indicate a strong preference for quantitative research designs in studies investigating the acceptance and adoption of e-learning technologies.

Specific research methods

Beyond identifying the predominant research designs, this review also examined the specific research methods employed by the sampled studies. Table 2 summarises the methods used within each research design category, thereby providing further insight into the methodological approaches adopted by researchers investigating e-learning acceptance and adoption.

Table 2: Specific research methods adopted by researchers of E-learning acceptance and adoption

Research Design	Research methods	Frequency	% within design
Qualitative (n=7)	Interview	5	71.4
	Open-ended questionnaire	1	14.3
	Interview + FGD	1	14.3
Quantitative (n=148)	Survey	148	100.0
Mixed Methods (n=7)	Survey + Interview	1	14.3
	Survey + Interview + FGDs	2	28.6
	Survey + Pedagogy Usability Testing	1	14.3
	Survey + Semi-structured Interview + Engagement reports	1	14.3
	Survey + Interviews + Structured meeting	1	14.3
	Survey + FGDs	1	14.3

As shown in Table 2, surveys were the dominant research method in quantitative research, accounting for all quantitative studies included in the review. Among qualitative studies, in-depth interviews were the most frequently used method, while open-ended questionnaires and combinations of interviews and FGDs were used less frequently. Mixed methods studies were comparatively rare and generally combined surveys with qualitative techniques, particularly FGDs and interviews.

Table 3: Classification of Theories and Models Adopted in E-learning Acceptance and Adoption Studies

Theory /Models	Frequency	Percentage
UTAUT	56	34.6
TAM	45	27.8
Extended TAM	35	21.6
No theory	10	6.2
TAM + other theories	8	4.9
Extended UTAUT	3	1.9
GETAMEL	2	1.2
MSAM	1	0.6
TPB	1	0.6
U&G	1	0.6

Table 2 presents the distribution of theoretical frameworks employed in the 162 empirical studies reviewed. The Unified Theory of Acceptance and Use of Technology (UTAUT) was the most frequently applied theoretical framework, accounting for 56 studies (35%). This was followed by the Technology Acceptance Model (TAM) with 45 studies (28%) and Extended TAM with 35 studies (22%). Together, these three frameworks were adopted in 136 studies, representing approximately 84% of the reviewed studies. Apart from the three dominant theories, a small number of studies employed GETAMEL (1.2%), Extended UTAUT (1.9%), TPB (0.6%), Uses and Gratifications (0.6%), and Mobile Service Acceptance Model (0.6%). In addition, 4.9% of the studies employed theoretical models integrating TAM with other theories (e.g., TAM+TTF+TRA; TAM+TTF; TAM+TRA+TPB), while 6.2% did not report the use of an explicit theoretical framework.

Discussion of findings

The findings of this systematic review reveal clear methodological and theoretical patterns in e-learning acceptance and adoption research. Quantitative research designs, overwhelmingly dominates the reviewed studies, with surveys serving as the principal data collection method. Among qualitative studies, in-depth interviews were the most frequently employed method, while the relatively few mixed methods studies typically combined surveys with qualitative techniques, particularly interviews and focus group discussions (FGDs). Although qualitative and mixed methods approaches are represented in the literature, their application remains limited. These findings are consistent with earlier reviews of technology acceptance research which similarly reported the predominance of quantitative research designs and survey methods (Orlikowski and Baroudi, 1991; Mingers, 2003; Choudrie and Dwivedi, 2005; and Williams et al., 2009; Ziraba et al., 2020; Monteiro, 2022). The predominance of quantitative methods may reflect the objectives of technology acceptance research, which are largely centred on testing theoretical models and examining relationships among factors influencing users` acceptance and adoption of technology. Chen and Hirschheim (2004) observed that Information Systems research has traditionally emphasised the empirical testing of hypotheses, causal relationships among constructs, and the objective interpretation of findings. Because most e-learning acceptance studies are guided by theories, quantitative methods provide an appropriate means of measuring theoretical constructs and testing hypothesised relationships. However, scholars like Orlikowski and Baroudi (1991) and Chen and Hirschheim (2004) have long advocated greater methodological diversity in IS research to provide richer and more comprehensive understanding of phenomena. The present review suggests that despite these longstanding calls, e-learning acceptance studies continue to rely predominantly on quantitative approaches. Such continued reliance may limit understanding of the contextual, organisational, and socio-cultural factors influencing e-learning acceptance and adoption.

The review also identified clear patterns in the theoretical frameworks underpinning e-learning acceptance research. UTAUT emerged as the most frequently adopted theoretical framework, followed by TAM and Extended TAM, while relatively few studies were conducted without an explicit theoretical foundation. Unlike earlier reviews that consistently identified TAM as the dominant theoretical framework (Williams et al., 2009; Šumak et al., 2011; and Ziraba et al., 2020), this review found that UTAUT has become the most frequently adopted in recent e-learning acceptance and adoption studies. This shift from TAM to UTAUT may reflect researchers` preference for more comprehensive explanatory models that incorporate constructs from several earlier theories of technology acceptance, and are applicable across diverse educational contexts. In essence, UTAUT provides a broader framework for explaining users` behavioural intentions than the original TAM. Nevertheless, TAM continues to be widely used due to its conceptual simplicity and strong empirical support. Many studies extend TAM by incorporating additional variables that reflect contextual factors relevant to the technology being studied. Such extensions enhance the explanatory power of the model, while maintaining its theoretical simplicity, thereby ensuring its continued relevance in e-learning acceptance and adoption research. In summary, the findings suggest that although e-learning acceptance and adoption research has matured through the widespread application of established frameworks, greater methodological diversity and theoretical integration remain important directions for advancing the field.

Conclusion

This systematic review examined the methodological and theoretical approaches of empirical studies published from 2008 to 2024. By synthesising 162 studies, this review provides an overview of research designs, methods and theoretical frameworks that have shaped e-learning acceptance and adoption research in higher education. The findings show that the field remains heavily dominated by quantitative designs, with surveys serving as the principal method of data collection. Qualitative and mixed methods approaches although present, remain comparatively underutilised. The review also demonstrates that UTAUT has emerged as the most frequently adopted theoretical framework, surpassing TAM, while extended versions of TAM continue to receive considerable attention.

These insights provide theoretical enrichment and methodological guidance for advancing the field of e-learning acceptance and adoption. The continued dominance of survey-based quantitative studies suggests that opportunities remain for researchers to employ qualitative and mixed-methods approaches to generate richer insights into users` experiences and the contextual factors influencing technology acceptance. Similarly, while UTAUT and TAM continue to provide robust explanatory frameworks, future studies may benefit from integrating alternative theoretical perspectives or developing context-specific models capable of capturing the evolving nature of digital learning technologies. As e-learning technologies continue to expand in higher education, greater methodological diversity and theoretical innovation will be essential for advancing understanding of technology acceptance or adoption, and informing the effective design and implementation of digital learning environments.

Limitations

This review has several limitations that should be considered when interpreting the findings. First, the review included only peer-reviewed journal articles published in English between 2008 and 2024. Consequently, relevant studies published in other languages or in conference proceedings, books, dissertations and other forms of grey literature were excluded. Second, the review focused exclusively on studies conducted within higher education, limiting the applicability of the findings to other educational contexts. Third, although a structured coding framework was employed throughout the review, the coding process was undertaken by a single reviewer and formal inter-coder reliability was not assessed. Future reviews involving multiple independent coders could further strengthen the reliability of the coding process.

Suggestions for Future Study

The findings of this review highlight several opportunities for future research. First, given the overwhelming dominance of quantitative studies, future researchers should employ more qualitative and mixed-methods designs to provide richer insights into learners' and instructors' experiences of e-learning technologies. Second, future studies should consider longitudinal research designs to examine how technology acceptance evolves over time rather than relying predominantly on cross-sectional surveys. Third, while UTAUT and TAM continue to dominate the literature, future research should explore alternative or integrated theoretical perspectives capable of explaining users' acceptance of emerging technologies such as artificial intelligence, adaptive learning systems, learning analytics and immersive learning environments. Finally, as higher education continues to evolve following the COVID-19 pandemic, future studies should

investigate technology acceptance within hybrid and flexible learning environments to determine whether the determinants of acceptance have changed in post-pandemic educational contexts.

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