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A Conceptual Framework for Blended Learning: A Systematic Reviews

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ABSTRACT

Blended learning has gained prominence in higher education, yet its effective implementation depends on the interplay of learner, teacher, instructional, and institutional factors. This study aimed to develop a comprehensive framework for blended learning by systematically reviewing recent literature and synthesizing key factors, processes, and outcomes. A systematic review of 37 empirical and theoretical studies published between 2010 and 2025 was conducted following PRISMA guidelines. Studies were screened for relevance, quality, and focus on blended learning in higher education contexts. Data were extracted and thematically analyzed to identify learner-related, teacher-related, instructional design, technological, and institutional factors influencing blended learning adoption and effectiveness. The review revealed that learner engagement, motivation, self-regulation, and digital readiness significantly influence learning outcomes. Teacher-related factors, including pedagogical competence, professional development, and technological confidence, were critical for successful implementation. Instructional design and technological components, such as active learning strategies, collaborative tasks, formative assessment, and multimodal resources, enhanced learning experiences. Institutional and contextual enablers included strategic leadership, governance, infrastructure, and ongoing support, whereas gaps in any dimension constrained adoption. Integrating these factors facilitated a holistic conceptual framework for blended learning, highlighting interdependencies across learners, teachers, instructional design, and institutional contexts. Successful blended learning requires alignment of learner readiness, teacher capacity, effective instructional design, and institutional support. The synthesized framework provides a practical guide for designing, implementing, and sustaining blended learning in higher education.

INTRODUCTIONS

Background

Blended learning (BL) has emerged as a transformative approach in higher education, integrating traditional face-to-face instruction with online learning to create flexible, interactive, and student-centered educational experiences (Alebaikan & Troudi, 2010; Ali & Georgiou, 2025). Over the past decade, advances in digital technologies, learning management systems (LMS), and virtual laboratories have facilitated the adoption of blended learning across diverse educational contexts, enabling educators to personalize learning, enhance engagement, and improve academic outcomes (Chen *et al.*, 2025; Allameh *et al.*, 2025).

The global shift toward blended learning was accelerated by the COVID-19 pandemic, which forced educational institutions to rapidly adopt online and hybrid instructional modalities to ensure continuity of learning (Mudenda *et al.*, 2023; Allameh *et al.*, 2025). This sudden transition highlighted both the potential and the challenges of blended learning, revealing issues such as digital inequities, teacher preparedness, learner engagement, and the need for robust institutional support (Bervell & Umar, 2020; Hill & Smith, 2023; Saboowala & Mishra, 2021).

Research has identified several critical components for effective blended learning, including learner factors such as motivation, self-regulated learning, and digital literacy (Ballouk *et al.*, 2022; Chen *et al.*, 2026); teacher factors such as pedagogical knowledge, technological competency, and attitudes toward innovation (Minhas *et al.*, 2021; McCarthy *et al.*, 2025); and instructional design elements such as the integration of active learning strategies, formative assessment, and AI-supported personalization (Mizza *et al.*, 2025; Tang *et al.*, 2025). In addition, technological infrastructure and institutional policies play a pivotal role in supporting or constraining the adoption of blended learning (Ngoasong, 2022; Pei *et al.*, 2025; Price & Winchester, 2025).

Despite the growing body of research, there remains a lack of comprehensive, systematic frameworks that synthesize these factors into an integrated model of blended learning. Many studies focus narrowly on single dimensions, such as learner engagement or technological tools, without accounting for the complex interactions between learners, teachers, instructional design, technology, and institutional contexts (Ali, 2025; Daniel *et al.*, 2024; Ramirez-Arellano *et al.*, 2018). This gap limits the ability of educators, instructional designers, and policymakers to develop evidence-based strategies that optimize blended learning experiences and outcomes.

A systematic review of current literature is therefore essential to consolidate knowledge, identify key enablers and barriers, and propose a conceptual framework that

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guides effective blended learning implementation. Such a framework can provide a theoretical and practical foundation for improving teaching and learning, informing professional development, and guiding institutional strategies for educational innovation (Li, 2024; Chen *et al.*, 2025; McCarthy *et al.*, 2025). In this context, the present study aims to develop a comprehensive framework for blended learning through a systematic review of recent literature, addressing the multidimensional interactions between learners, teachers, instructional design, technology, and institutional support to enhance learning outcomes and educational equity.

Problem Statement

The rapid integration of technology into education, particularly during and after the COVID-19 pandemic, has significantly transformed teaching and learning practices across all levels of education. Blended learning, flipped classrooms, and mobile-assisted instruction have emerged as effective strategies for enhancing student engagement, flexibility, and academic performance (Binoy, 2024; Lawsin & Prudente, 2023; Mphunyane & Ntšohi, 2025). These approaches allow students to access learning materials beyond the traditional classroom, promote learner autonomy, and provide opportunities for interactive and student-centred learning.

Blended learning (BL) has increasingly become a central instructional approach in higher education, promising flexibility, engagement, and enhanced learning outcomes (Alebaikan & Troudi, 2010; Ali & Georgiou, 2025). The COVID-19 pandemic further accelerated the adoption of BL, compelling institutions to integrate online and face-to-face teaching rapidly (Mudenda *et al.*, 2023; Allameh *et al.*, 2025). Despite its widespread adoption, the effectiveness of blended learning remains inconsistent across contexts. Many learners report low engagement, limited digital competence, and uneven access to resources, while educators face challenges in instructional design, technology integration, and pedagogical readiness (Bervell & Umar, 2020; Chen *et al.*, 2025; Minhas *et al.*, 2021).

Furthermore, research evidence suggests that institutional policies, technological infrastructure, and professional development significantly influence BL adoption and outcomes (Hill & Smith, 2023; Pei *et al.*, 2025; Price & Winchester, 2025). However, most studies focus narrowly on single dimensions, such as student engagement or technology use, without examining the complex interactions among learners, educators, instructional design, technology, and institutional support (Daniel *et al.*, 2024; Ramirez-Arellano *et al.*, 2018). Consequently, there is no comprehensive framework that synthesizes these interrelated factors to guide effective BL implementation in diverse educational contexts.

This gap limits the ability of educators, instructional designers, and policymakers to strategically plan, implement, and evaluate blended learning programs. Without a clear framework, institutions risk suboptimal learning outcomes, inequitable access, and inefficient use of resources, undermining the potential benefits of blended learning in higher education. The rationale for this study is grounded in the need to consolidate existing knowledge on blended learning into an integrated, systematic framework that addresses the multidimensional factors influencing its effectiveness. This study will produce a robust, evidence-based framework that supports the effective planning, implementation, and evaluation of blended learning programs, ensuring both pedagogical quality and educational equity in contemporary higher education.

Research Objectives

The main aim of this study is to develop a comprehensive framework for blended learning by systematically reviewing recent literature and synthesizing key factors, processes, and outcomes. The specific objectives are to:

1. Identify learner-related factors that influence the effectiveness of blended learning.
2. Examine teacher-related factors that affect blended learning implementation.
3. Analyze instructional design and technological components of blended learning.
4. Investigate institutional and contextual factors that enable or constrain blended learning adoption.
5. Synthesize these factors into a comprehensive conceptual framework for blended learning.

Theoretical Framework

Community of Inquiry (CoI)

The Community of Inquiry (CoI) framework provides a comprehensive theoretical lens for understanding how meaningful learning occurs in online, blended, and technology-enhanced learning environments. Rooted in social constructivism and collaborative inquiry, the framework conceptualises learning as a socially mediated process in which knowledge is co-constructed through sustained interaction, discourse, and reflection (Fiock, 2020; Garrison, 2019). According to the CoI framework, effective educational experiences emerge from the intentional integration of three interdependent presences, cognitive, social, and teaching, that function synergistically rather than independently to shape learners' engagement, motivation, and learning outcomes (Adam *et al.*, 2025; Richardson *et al.*, 2025; Van Dorresteijn *et al.*, 2024).

Over the past two decades, the CoI framework has evolved from a descriptive model of online discussion to a robust, empirically supported theory applicable across disciplines, learning modalities, and cultural contexts (Rawal, 2025; Guo *et al.*, 2025). Recent scholarship further extends the framework by integrating learner-centred and motivational constructs, enhancing its explanatory power in contemporary higher education settings (ElSayad, 2023, 2024; Maré & Mutezo, 2025; Adam *et al.*, 2025).

Cognitive Presence

Cognitive presence represents the extent to which

learners construct and confirm meaning through sustained reflection and discourse. It is grounded in the practical inquiry model, which conceptualises learning as a cyclical process comprising four phases: triggering event, exploration, integration, and resolution (Garrison, 2019; Fiock, 2020). These phases reflect progressively sophisticated levels of cognitive engagement, moving from problem identification to the application of new knowledge.

Within the CoI framework, cognitive presence serves as the core mechanism of deep learning and conceptual understanding. Empirical evidence demonstrates that higher cognitive presence is associated with improved academic performance, conceptual clarity, and epistemic development across online and blended learning contexts (Guo *et al*., 2021; Oshima *et al*., 2025; Ariati *et al*., 2025). Process-oriented studies show that cognitive presence develops dynamically through collaborative interaction, discourse patterns, and instructional scaffolding (Elmoazen *et al*., 2025; ElSayad, 2023). In discipline-specific contexts, cognitive presence has been shown to support knowledge creation and adaptive problem-solving. For example, Reyes *et al*. (2024) found that chemistry academics fostered cognitive presence during emergency remote teaching through adaptive discourse strategies and concern-driven pedagogy. Validation studies further indicate that cognitive presence remains a stable and measurable construct across both online and face-to-face learning environments (Ariati *et al*., 2025; Guo, 2025).

Social Presence

Social presence refers to learners' ability to project themselves as real, socially and emotionally engaged participants within a learning community. It encompasses affective expression, open communication, and group cohesion, contributing to a supportive and trusting learning environment (Garrison, 2019; Fiock, 2020). Theoretically, social presence facilitates meaning-making by reducing psychological distance and enabling productive dialogue among learners (Burbage *et al*., 2023; Chatterjee & Parra, 2022).

Within the CoI framework, social presence is a critical enabling condition for cognitive presence. Empirical studies show that students who perceive higher social presence report greater motivation, engagement, and satisfaction, particularly in collaborative and discussion-based learning contexts (Asghar *et al*., 2024; Aljohani & Aljehani, 2024; Burbage *et al*., 2023). Social presence is also central in blended, synchronous, and social media-mediated learning environments, where interaction extends beyond traditional learning management systems (Chatterjee & Parra, 2022; Teng *et al*., 2024).

Cross-cultural research highlights that social presence is shaped by contextual and cultural norms, influencing perceptions of interaction, participation, and instructor immediacy. Guo (2025) found significant differences in CoI perceptions between UK and US students, while Limberg *et al*. (2025) reported perceptual mismatches between instructors and learners, indicating that alignment of expectations is crucial for effective engagement. In crisis-driven learning contexts, social presence maintains continuity and peer support, as shown in studies of social media-based CoI environments in Turkey and Pakistan (Asghar *et al*., 2024) and virtual internships for EFL students (Aljohani & Aljehani, 2024).

Teaching Presence

Teaching presence encompasses the design, facilitation, and direction of cognitive and social processes to achieve meaningful learning outcomes. It includes three core functions: instructional design and organisation, facilitation of discourse, and direct instruction (Richardson *et al*., 2025; Van Dorresteijn *et al*., 2024). Conceptually, teaching presence operationalises pedagogical intent by aligning learning objectives, activities, and assessments with opportunities for interaction and inquiry.

Among the three presences, teaching presence is often considered the most influential, as it structures and sustains a productive community of inquiry (Douglas *et al*., 2022; West *et al*., 2024). Empirical studies indicate that teaching presence directly enhances both social and cognitive presence by structuring tasks, modelling disciplinary thinking, and maintaining engagement (Richardson *et al*., 2025; Van Dorresteijn *et al*., 2024; Donlon *et al*., 2022). During emergency remote teaching, strong teaching presence has been shown to mitigate cognitive overload, reduce disengagement, and support continuity of learning (Douglas *et al*., 2022; West *et al*., 2024). In blended and flipped classrooms, teaching presence predicts students' behavioural intentions and positive attitudes toward online learning (Chang *et al*., 2023; Nguyen & Tran, 2025; Chang *et al*., 2023).

Extensions of the Community of Inquiry Framework

Recent theoretical developments extend the CoI framework to incorporate learner agency and self-regulation. The introduction of learning presence emphasises learners' active roles in planning, monitoring, and regulating their learning processes (ElSayad, 2023, 2024). Learning presence draws on self-regulated learning and metacognitive theories, positioning learners as co-designers of their educational experiences. Empirical studies support learning presence as a distinct yet complementary construct within the CoI framework (ElSayad, 2023, 2024; Na *et al*., 2024).

Integrative models combining CoI with self-determination theory suggest that teaching and social presence support learners' psychological needs for autonomy, competence, and relatedness, thereby enhancing motivation and engagement (Adam *et al*., 2025). These studies collectively indicate that learner agency and motivation are critical to the effectiveness of CoI-informed learning environments (Maré & Mutezo, 2025; Adam *et al*., 2025; Na *et al*., 2024). Such extensions reflect a conceptual shift toward more learner-centred interpretations of community and inquiry

in digital learning contexts.

Blended Learning

Blended learning (BL), defined as the integration of face-to-face and online learning, has emerged as a transformative pedagogical approach in higher education (Alebaikan & Troudi, 2010; Ali, 2025). Its adoption has been accelerated by technological advances and global crises such as the COVID-19 pandemic, which necessitated rapid transitions to hybrid instructional models (Allameh *et al*., 2025; Mudenda *et al*., 2023). BL is associated with enhanced flexibility, engagement, and learning outcomes. Yet, its effectiveness is contingent on multiple interacting factors, including learner characteristics, teacher competence, instructional design, technology infrastructure, and institutional support (Chen *et al*., 2025; McCarthy *et al*., 2025).

Learner Factors in Blended Learning

Learner engagement and self-regulation are central to BL effectiveness. Studies indicate that students who are motivated, digitally literate, and capable of self-regulated learning demonstrate higher achievement and satisfaction in blended environments (Ballouk *et al*., 2022; Chen *et al*., 2026; Regmi *et al*., 2024). Daniel *et al*. (2024) highlighted that systematic support for goal-setting, progress monitoring, and self-assessment positively influences learning outcomes. Additionally, the psychological contract between students and educators impacts commitment to online components (Fenech, 2021).

Equitable access to BL remains a challenge in both high- and low-resource contexts. Price and Winchester (2025) emphasized that socioeconomic disparities, gender, and digital infrastructure significantly affect participation and learning outcomes. Similarly, Song and Lai (2025) argued that engagement strategies must be inclusive and culturally sensitive to bridge these gaps. Mudenda *et al*. (2023) also noted that in African higher education, resource constraints influenced both learner access and perceived learning quality.

Teacher Factors in Blended Learning

Teacher readiness is a key determinant of BL success. Ali and Georgiou (2025) found that educators who are pedagogically and technologically competent can more effectively integrate online and face-to-face components. Minhas *et al*. (2021) and McCarthy *et al*. (2025) emphasized the role of professional development programs and digital literacy training in fostering confidence and motivation among teachers. Studies indicate that teacher attitudes, including perceptions of usefulness, ease of implementation, and workload concerns, affect BL adoption (Bervell & Umar, 2020; Hill & Smith, 2023). Pei *et al*. (2025) highlighted the importance of building communities of practice, where educators share strategies, resources, and experiences to enhance BL adoption.

Instructional Design and Technology

Instructional design is crucial for effective BL. Active learning strategies, including flipped classrooms, cooperative learning, and formative assessment, have been shown to increase engagement and learning outcomes (Mizza *et al*., 2025; Tang *et al*., 2025; Pan *et al*., 2024). Chen *et al*. (2025) demonstrated that structured laboratory simulations in biochemistry courses enhanced student understanding and skill acquisition.

Technology infrastructure supports BL delivery, monitoring, and personalization. Bervell and Umar (2020) noted that LMS adoption may be hindered by teacher anxiety or lack of training, while McCarthy *et al*. (2025) found that AI-based systems could provide personalized learning paths and automated feedback. Allameh *et al*. (2025) and Chen *et al*. (2026) emphasized the importance of integrating virtual labs, multimedia, and analytics to enhance learning experiences.

Institutional And Contextual Factors

Institutional support is essential for BL sustainability. Hill and Smith (2023) observed that clear policies, resource allocation, and administrative support are critical for successful BL programs. Ali (2025) and Ngoasong (2022) highlighted the need for strategic planning, teacher training, and equity-focused interventions in low-resource contexts. Furthermore, Pei *et al*. (2025) argued that fostering a sense of community among students and staff enhances participation and learning outcomes.

MATERIALS AND METHODS

Identification Of Studies

A comprehensive literature search was performed across multiple electronic databases, including Taylor & Francis Online, SAGE Publications, SpringerLink, Wiley Online Library, Google Scholar, ERIC, and ScienceDirect. The search targeted peer-reviewed studies published between 2010 and 2025, using keywords and Boolean operators such as "blended learning" OR "hybrid learning," "framework" OR "model" OR "conceptual framework," "higher education" OR "university" OR "teacher education," and "student engagement" OR "learning outcomes."

Screening

Duplicate records were removed using Zotero reference management software, leaving unique studies for review. The remaining articles underwent a two-stage screening process. In the first stage, titles and abstracts were reviewed to assess relevance to blended learning frameworks, inclusion of learner, teacher, instructional design, technological, or institutional factors, and applicability to higher education contexts. In the second stage, full-text articles were reviewed to confirm eligibility based on predefined inclusion and exclusion criteria. Studies were included if they were peer-reviewed empirical or theoretical investigations on blended learning frameworks, focused on higher education or teacher

education contexts, published in English between 2010 and 2025, and reported on learner, teacher, instructional design, technological, or institutional factors. Studies were excluded if they were conference abstracts, editorials, or commentaries without full empirical or theoretical content, focused solely on fully online or fully face-to-face learning without blended learning elements, or published in languages other than English.

Eligibility

Eligible studies were further assessed for quality and relevance to ensure that only methodologically sound studies contributed to the synthesis.

Study Selection

The study selection process followed the PRISMA 2020 guidelines (Page *et al*., 2021). A total of 65 records were identified through database searches and other sources. Five duplicate records were removed, leaving 60 unique studies for screening. During title and abstract screening, 15 records were excluded because they were not focused on blended learning frameworks or were not situated in higher education or teacher education contexts. This resulted in 45 full-text articles assessed for eligibility. Following full-text review, eight articles were excluded due to failure to meet the inclusion criteria. Consequently, 37 studies were included in the final qualitative synthesis.

Data Extraction

A structured data extraction form was used to collect key information from each study, including authorship, year, country of study, abstract, study design and methodology, findings, conclusion, and recommendations.

Data Synthesis

Extracted data were synthesized qualitatively to identify recurring themes, factors, and relationships across the studies. The synthesis focused on learner-related factors influencing blended learning effectiveness, teacher-related factors affecting implementation, instructional design and technological components, and institutional and contextual factors that enable or constrain adoption. These insights informed the development of a comprehensive conceptual framework for blended learning, illustrating the interactions among learner, teacher, instructional design, technological, and institutional dimensions.

RESULTS AND DISCUSSIONS

Learner-Related Factors

The review highlighted that learner engagement, motivation, and self-regulation are critical determinants of blended learning success. Students who actively participated, exhibited intrinsic motivation, and demonstrated interest in the subject achieved higher learning outcomes (Bekele *et al*., 2025; Daniel *et al*., 2024; Ghani & Taylor, 2021; Song & Lai, 2025). Self-regulated learners, who could plan, monitor, and evaluate their own learning, performed better across blended learning environments (Ballouk *et al*., 2022; Tempelaar, 2020; Xiuguo, 2025). Digital literacy and access to technology also influenced participation and knowledge construction, with learners who had reliable access and prior digital skills engaging more effectively (Mudenda *et al*., 2023; Ali, 2025). Additionally, students' perceptions of online components and their sense of cognitive and social presence significantly impacted engagement and performance (ElSayad, 2024; Oshima *et al*., 2025).

Teacher-Related Factors

Teachers' competencies and attitudes were central to successful blended learning adoption. Professional development and targeted training improved educators' abilities to design and facilitate blended learning effectively (Pei *et al*., 2025; Minhas *et al*., 2021; Mohammadi *et al*., 2025). Technological competence, particularly familiarity with learning management systems and digital tools, correlated strongly with successful implementation (Bervell & Umar, 2020; McCarthy *et al*., 2025). Effective pedagogical strategies, including collaborative learning, student-centered approaches, and interactive engagement, further supported positive learning outcomes (Bidarra & Rusman, 2017; Khalil *et al*., 2018). Conversely, teacher anxiety, reluctance to adopt technology, or limited motivation constrained effective implementation (Ali, 2025; Alebaikan & Troudi, 2010), while willingness to innovate and positive attitudes facilitated adoption (Ashraf *et al*., 2021; Saboowala & Manghirmalani Mishra, 2021).

Instructional Design and Technological Components

Instructional design emerged as a critical factor in learning effectiveness. Courses incorporating active and collaborative learning activities, such as group projects, discussions, and peer feedback, fostered cognitive engagement and knowledge construction (Chen *et al*., 2025; Mizza *et al*., 2025; Ma *et al*., 2025). The use of multimodal content, including videos, readings, simulations, and synchronous or asynchronous sessions, addressed diverse learning preferences and enhanced accessibility (Allameh *et al*., 2025; Ramirez-Arellano *et al*., 2018). Formative assessments and timely feedback were consistently reported to improve learning outcomes and promote self-regulation (Pan *et al*., 2024; Tempelaar, 2020). Technological infrastructure, including reliable learning management systems, virtual labs, and communication platforms, facilitated seamless integration of online and face-to-face components, supporting learning processes (Mohammadi *et al*., 2025; Li, 2025; McCarthy *et al*., 2025).

Institutional And Contextual Factors

Institutional strategies and contextual factors were also found to be pivotal. Institutions with clear strategic visions, structured policies, and strong leadership support demonstrated greater success in implementing blended learning (Ali & Georgiou, 2025; Hill & Smith, 2023). Adequate technical and pedagogical support for teachers

and students, coupled with efforts to ensure equity and accessibility, were crucial for effective adoption, particularly in resource-constrained contexts (Ngoasong, 2022; Price & Winchester, 2025; Sisimayi *et al.*, 2025). Local culture, prior experiences, and existing teaching practices influenced how blended learning initiatives were perceived and implemented (Zakariya *et al.*, 2024; Alebaikan & Troudi, 2010).

Table 1: Summary synthesis of the studies

S/N	Authors & Year	Country/ Context	Study Focus	Methodology	Key Findings
1	Alebaikan & Troudi (2010)	Saudi Arabia	Challenges and perspectives of blended learning	Qualitative case study	Identified institutional, technological, and pedagogical challenges; highlighted the need for faculty training and support.
2	Ali (2025)	Multiple	Barriers for teachers in implementing blended learning	Qualitative interviews	Teachers face workload, lack of technical skills, and resistance to change; institutional support is critical.
3	Ali & Georgiou (2025)	Australia	Institutional adoption and diffusion of blended learning	Mixed methods	Proposed a structured adoption process; emphasizes leadership, training, and policy alignment.
4	Allameh et al. (2025)	Iran	Virtual learning framework in medical education	Case study	COVID-19 lessons informed framework design; integration of technology enhances engagement.
5	Ashraf, Tsegay & Meijia (2021)	China & Ethiopia	Blended learning for diverse classrooms	Experimental qualitative	Blended approaches improve inclusivity and accommodate diverse learning needs.
6	Ballouk et al. (2022)	Various	Self-regulation in blended medical education	Systematic scoping review	Students' self-regulation strategies are crucial for blended learning success.
7	Bekele, Melese & Sime (2025)	Ethiopia	Effect on student engagement	Quasi-experimental	Blended learning increased engagement, participation, and interaction among students.
8	Bervell & Umar (2020)	Ghana	Tutor anxiety and LMS adoption	Qualitative	Tutor anxiety hinders adoption; training and support mitigate barriers.
9	Bidarra & Rusman (2017)	Netherlands	Pedagogical model for science education	Conceptual study	Proposed blended learning model bridging theory and practice.
10	Chen et al. (2025)	China	Biochemistry lab courses	Controlled study	The blended approach enhanced practical skills and theoretical understanding.

11	Daniel et al. (2024)	Various	Blended innovative teaching and academic motivation	Systematic review	Blended teaching improves motivation and academic achievement.
12	ElSayad (2024)	Egypt	Students' perception in blended learning community	Survey	Positive perceptions are linked to engagement and perceived learning effectiveness.
13	Fenech (2021)	Malta	Psychological contract in blended learning	Qualitative	Students value autonomy, flexibility, and clear expectations in blended settings.
14	Ghani & Taylor (2021)	UK	Student engagement	Literature review	Blended learning enhances engagement through interactive and active learning strategies.
15	Hill & Smith (2023)	UK	Institutional challenges and opportunities	Case study	Organizational culture and leadership shape the adoption and sustainability of blended learning.
16	Khalil, Abdel Meguid & Elkhider (2018)	USA	Teaching anatomical sciences	Mixed methods	Blended learning improved student performance and retention in anatomy courses.
17	Li (2025)	China	Academic emotions and online presence	Quantitative	Positive online emotions mediate the effect of presence on learning performance.
18	Ma et al. (2025)	China	PERIO-Blended Learning framework in dental education	Experimental	Integration of theory and practice enhanced competency development.
19	McCarthy, Palmer & Falkner (2025)	Australia	AI and personalization in blended learning	Mixed methods	Educator characteristics influence the effectiveness of AI-supported blended learning.
20	Minhas et al. (2021)	UAE	Teacher perceptions of the blended learning model	Survey	Teachers see value in blended learning but require institutional support and training.
21	Mizza, Reese & Malouche (2025)	USA	Flipped classroom and blended learning	Case study	Engagement and inclusion are improved through blended and flipped approaches.
22	Mohammadi, Paasivara & Kasurinen (2025)	Finland	Platforms and teacher support	Review	Good practices in platforms and teacher support enhance student motivation.
23	Mudenda et al. (2023)	Zambia	Student experiences during COVID-19	Mixed methods	Students report satisfaction and challenges; hybrid approaches are valued.

24	Ngoasong (2022)	Cameroon	Curriculum adaptation in resource-scarce contexts	Case study	Context-sensitive curriculum design improves blended learning feasibility.
25	Oshima, Oshima & Kayagi (2025)	Japan	Knowledge creation and epistemic views	Mixed methods	Hybrid learning fosters critical thinking, collaboration, and knowledge creation.
26	Pan, Wang & Zhu (2024)	China	Formative assessment in TEFL	Mixed methods	Strategic questioning in blended environments enhances learning outcomes.
27	Pei et al. (2025)	Netherlands	Professional development for blended learning	Review	Sense of community improves through targeted professional development.
28	Price & Winchester (2025)	Australia	Equity in blended learning	Scoping review	Inclusive design and accessibility are key to equitable blended learning.
29	Ramirez-Arellano et al. (2018)	Mexico	Factors affecting learning performance	Quantitative	Motivation, engagement, and learning design influence performance.
30	Regmi et al. (2024)	Nepal	Self-efficacy in medical nutrition	Mixed methods	Self-efficacy and perceived competence influence blended learning success.
31	Saboowala & Mishra (2021)	India	Teacher readiness post-COVID-19	Survey	In-service teachers need training and confidence-building for effective implementation.
32	Shah et al. (2024)	Pakistan	Challenges in postgraduate blended learning	Qualitative	Faculty face workload, technological, and pedagogical challenges.
33	Sisimayi, Muperi & Vuyiswa (2025)	Zimbabwe	ICT-enhanced blended learning	Conceptual	Framework proposed to integrate ICT for effective secondary education blended learning.
34	Song & Lai (2025)	China	Vocational education and engagement	Survey	Blended learning enhances engagement but requires careful design and scaffolding.

A Conceptual Framework on Blended Learning

This review indicates that the effectiveness of blended learning arises from the complex interplay among learners, teachers, instructional design, technology, and institutional support. Learner engagement, motivation, and self-regulation are maximized when instructional strategies are learner-centered, adaptive, and responsive to individual needs (Bekele *et al.*, 2025; Ashraf *et al.*, 2021). Teachers play a pivotal role in this framework, not only through pedagogical expertise but also through their knowledge and skill in using online tools, adaptive application of AI, and innovative integration of technology to enhance learning. Professional development and targeted training enable teachers to leverage these tools effectively, design meaningful learning activities, and implement formative assessments that provide timely, actionable feedback to learners (Pei *et al.*, 2025; Hill & Smith, 2023).

Instructional design and technological components must be flexible and aligned with learning objectives, supporting both synchronous and asynchronous learning. The adaptive use of AI, such as personalized learning pathways and predictive analytics, can enhance

formative assessment and enable differentiated feedback that promotes learner self-regulation and continuous improvement (Li, 2025; Xiuguo, 2025). Similarly, innovative applications of AI and online tools foster active engagement, collaborative knowledge construction, and deeper conceptual understanding (McCarthy *et al.*, 2025; Mizza *et al.*, 2025).

Institutional factors, including governance, infrastructure, policies, and a culture that values innovation, provide the foundation for sustainable blended learning. Strategic planning, investment in technology, and ongoing institutional support ensure that both teachers and learners can engage effectively with blended learning initiatives (Ali & Georgiou, 2025; Mohammadi *et al.*, 2025). Ultimately, the framework illustrates that blended learning effectiveness is not determined by any single factor but emerges from the interdependent relationships among learner engagement, teacher knowledge and innovation, instructional design, technological affordances, and institutional support.

Table 2: Roles and responsibilities of stakeholders, and their contribution to blended learning.

Stakeholder	Roles & Responsibilities	Contribution to Blended Learning
Teachers	• Design learner-centered, integrated activities • Teach through synchronous platforms (e.g., Zoom, Google Meet, etc.) and asynchronous platforms (e.g., Google Classroom, LMS) • Integrate and innovate with online tools and AI • Conduct formative assessment and provide timely feedback • Engage in professional development and share knowledge	• Facilitate learner engagement and self-regulation • Adapt AI and digital tools to support individual learner needs • Collaborate with institutions to access infrastructure and training
Learners	• Actively engage in both online and face-to-face learning • Self-regulate, manage time, and plan learning • Use digital tools and AI-enabled platforms effectively • Demonstrate internet efficacy and digital literacy • Make presentations and interact collaboratively with peers • Act on feedback to improve performance • Collaborate and build a learning community	• Respond to teacher guidance and feedback • Co-create knowledge with peers • Provide feedback to teachers and institutions on learning needs and challenges
Institutions	• Provide technological infrastructure and access to LMS/AI tools • Establish policies promoting quality, inclusion, and innovation • Offer professional development and incentives for teachers • Support learner orientation, digital literacy, and academic success • Evaluate and refine blended learning programs	• Enable teachers to innovate with pedagogy and technology • Empower learners to engage effectively • Monitor and ensure quality, inclusivity, and sustainability of blended learning

Discussion

The findings of this systematic review underscore the multifaceted nature of blended learning in higher education. Learner-related factors such as engagement, motivation, and self-regulation emerged as critical determinants of success. Consistent with prior research, students who actively managed their learning and demonstrated intrinsic motivation achieved higher academic outcomes (Bekele *et al.*, 2025; Ballouk *et al.*, 2022; Tempelaar, 2020). These findings reinforce the importance of designing blended learning experiences that promote self-directed learning and foster cognitive and social presence (ElSayad, 2024; Oshima *et al.*, 2025). Moreover, digital literacy and equitable access to technology were essential for meaningful participation, highlighting that student readiness cannot be assumed even in digitally familiar cohorts (Mudenda *et al.*, 2023; Ali, 2025).

Teacher-related factors were equally influential in shaping blended learning effectiveness. Professional development programs, pedagogical training, and technological competence were necessary to empower educators to design and facilitate learner-centered blended environments (Pei *et al.*, 2025; Minhas *et al.*, 2021; Mohammadi *et al.*, 2025). Conversely, teacher anxiety or lack of confidence with technology emerged as a barrier

to adoption (Ali, 2025; Bervell & Umar, 2020). These findings support earlier studies emphasizing that effective blended learning requires not only access to technology but also educator readiness, motivation, and innovation in pedagogical practice (Ashraf *et al*., 2021; Saboowala & Manghirmalani Mishra, 2021).

Instructional design and technological components were central to fostering engagement and learning outcomes. Courses integrating active, collaborative, and interactive approaches, including simulations, group work, and peer feedback, were particularly effective (Chen *et al*., 2025; Mizza *et al*., 2025; Ma *et al*., 2025). The inclusion of multimodal content and flexible delivery modes accommodated diverse learner preferences and improved accessibility, consistent with prior research demonstrating that blended learning supports differentiated instruction (Allameh *et al*., 2025; Ramirez-Arellano *et al*., 2018). Furthermore, formative assessment and timely feedback were consistently associated with higher levels of self-regulation and learning achievement (Pan *et al*., 2024; Tempelaar, 2020). These findings highlight that instructional design and technological infrastructure must be aligned and intentionally integrated to enhance learning outcomes.

Institutional and contextual factors further influenced blended learning adoption. Clear strategic vision, leadership support, and structured policies were found to facilitate large-scale implementation (Ali & Georgiou, 2025; Hill & Smith, 2023). Conversely, limited resources, insufficient technical support, or inconsistent policies constrained the effectiveness and sustainability of blended initiatives, particularly in resource-limited contexts (Ngoasong, 2022; Price & Winchester, 2025; Sisimayi *et al*., 2025). This aligns with prior research showing that institutional culture, governance, and infrastructure play a critical role in enabling or constraining educational innovation (Zakariya *et al*., 2024; Alebaikan & Troudi, 2010).

Synthesizing these findings, it is evident that blended learning effectiveness is not determined by a single factor but arises from the interaction of learners, educators, instructional design, technology, and institutional support. Learners' engagement and motivation are maximized when instructional designs are interactive and adaptive, and when teachers are trained and supported to leverage technology effectively (Bekele *et al*., 2025; Ashraf *et al*., 2021; Mohammadi *et al*., 2025). Institutional policies and governance frameworks provide the structural foundation necessary to sustain and scale blended learning practices (Ali & Georgiou, 2025; Hill & Smith, 2023). Therefore, successful implementation requires a systemic approach that integrates these factors rather than treating them in isolation.

The conceptual framework for blended learning developed in this review underscores the dynamic interplay between learners, teachers, instructional design, technology, and institutional support. This framework reflects a multi-dimensional understanding of blended learning, emphasizing that its effectiveness is not determined by a single factor but rather by the synergy among various elements. Learner engagement, self-regulation, and active participation emerge as central to successful blended learning, and these outcomes are strongly influenced by teacher competence, instructional strategies, and institutional support (Bekele *et al*., 2025; Ashraf *et al*., 2021).

Teacher roles are pivotal within this framework. Teachers are not only content deliverers but also facilitators and designers of learning experiences. Their ability to operate effectively across synchronous platforms such as Zoom and Google Meet, as well as asynchronous platforms such as Google Classroom and Learning Management Systems (LMS), is essential for maintaining continuity and flexibility in learning. Furthermore, teachers' knowledge and innovative use of AI and online tools can enhance personalization and adaptivity, allowing them to monitor learner progress, provide timely formative feedback, and scaffold learning according to individual needs (McCarthy *et al*., 2025; Mohammadi *et al*., 2025). Teachers' planning, assessment design, and feedback mechanisms ensure that learning objectives are achieved while promoting engagement and motivation. Professional development and institutional support are therefore critical to enable teachers to fulfill these multifaceted responsibilities (Pei *et al*., 2025; Hill & Smith, 2023).

Learners' roles within the framework highlight their active engagement, self-regulation, and digital competence. Successful learners demonstrate internet efficacy, digital literacy, and the ability to navigate both synchronous and asynchronous platforms effectively. Additionally, they participate in presentations, collaborate with peers, and leverage AI and online tools to enhance understanding and performance (Li, 2025; Mizza *et al*., 2025). Feedback from teachers enables learners to adjust strategies, improve comprehension, and develop autonomous learning skills. Thus, learners are co-creators of knowledge rather than passive recipients, interacting dynamically with teachers and technological systems.

Institutions provide the structural and strategic support that underpins blended learning. Adequate infrastructure, access to digital platforms, clear policies promoting quality, equity, and inclusion, and professional development opportunities are all essential for fostering a conducive learning environment (Ali & Georgiou, 2025; Mohammadi *et al*., 2025). Institutions also play a central role in monitoring program effectiveness, ensuring sustainability, and facilitating collaboration among teachers and learners. Without institutional commitment, the integration of technology, pedagogy, and assessment may be fragmented, limiting the potential of blended learning to improve engagement and learning outcomes.

The interdependence among teachers, learners, and institutions within the framework demonstrates that blended learning is a collaborative, ecosystem-like process. Teachers' instructional expertise and innovative use of technology interact with learners' digital

competence and engagement, while institutional policies and infrastructure sustain these processes. Formative assessment and feedback serve as critical connectors, reinforcing learning, guiding instructional adjustments, and promoting continuous improvement. Moreover, the integration of AI and online tools offers opportunities for adaptive learning and personalized support, highlighting the evolving nature of the blended learning landscape (Xiuguo, 2025; McCarthy *et al.*, 2025). The proposed framework extends existing blended learning models by explicitly incorporating the roles and responsibilities of each stakeholder, emphasizing interaction, innovation, and continuous feedback. This systemic approach provides a practical guide for higher education institutions aiming to implement blended learning effectively.

CONCLUSION

This systematic review synthesized recent research on blended learning in higher education and highlighted the complex interplay of learner, teacher, instructional, technological, and institutional factors that shape its effectiveness. Learner-related factors, including engagement, motivation, self-regulation, and digital literacy, were critical for achieving meaningful learning outcomes. Teacher preparedness, professional development, and pedagogical innovation were equally influential, with technological competence and confidence emerging as key enablers of effective blended instruction. Instructional design that incorporates active learning, collaboration, formative assessment, and flexible, multimodal delivery enhanced both engagement and performance. Institutional and contextual factors, including strategic leadership, governance, infrastructure, and consistent support mechanisms, were essential for the adoption, sustainability, and scaling of blended learning practices.

The evidence indicates that blended learning success is not determined by any single component but rather by the dynamic interaction of learners, educators, instructional design, technology, and institutional structures. When these factors are harmonized, blended learning can improve engagement, foster self-directed learning, and enhance academic outcomes. Conversely, gaps in support, infrastructure, or teacher readiness can significantly constrain effectiveness, particularly in resource-limited or underdeveloped contexts. This review underscores the importance of adopting a systemic and integrated approach to blended learning in higher education.

Based on the findings, several recommendations are proposed to enhance the effectiveness and sustainability of blended learning. First, institutions should prioritize learner readiness by providing orientation programs that build digital literacy, self-regulation skills, and familiarity with blended learning environments. Ensuring equitable access to technology and resources is critical to enable all students to participate fully.

Second, teacher development must be central to blended learning initiatives. Institutions should offer targeted professional development, mentoring, and training programs to enhance educators' pedagogical and technological competencies. Opportunities for teachers to experience blended learning as learners themselves can foster reflective practice and innovation in instructional design.

Third, instructional design should emphasize active, collaborative, and inclusive learning strategies. Courses should integrate formative assessment, timely feedback, and multimodal content to support diverse learning preferences and enhance engagement. Flexibility in delivery modes can further accommodate student needs and improve participation.

Fourth, institutional policies and support structures must be aligned to enable sustainable adoption. Strategic vision, leadership commitment, and governance frameworks are essential to embed blended learning across programs. Adequate technological and pedagogical infrastructure, ongoing support, and recognition or incentives for educators should be provided to foster engagement and innovation.

Finally, the development of a comprehensive, evidence-based blended learning framework, which integrates learner, teacher, instructional, technological, and institutional dimensions, can guide implementation, monitoring, and continuous improvement. Future research should evaluate the framework in diverse contexts, including under-resourced institutions and across multiple disciplines, to refine strategies that maximize the benefits of blended learning in higher education.

Limitations of the Review

Although this review followed PRISMA 2020 guidelines, several limitations should be noted. The search was limited to English-language, peer-reviewed journal articles, which may have excluded relevant studies in other languages or grey literature and introduced language and publication bias. Methodological heterogeneity across the included studies, including differences in design, context, and outcome measures, precluded quantitative meta-analysis and necessitated qualitative synthesis. Additionally, the quality of the synthesis depended on the reporting standards of the original studies. Most studies were conducted in specific higher education contexts, which may restrict the generalizability of the proposed blended learning framework across diverse institutional and cultural settings.

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