Original Research

Evolution and Impact of Blended Learning in Higher Education: A Brief Systematic Review From 2010 to 2022

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Abstract

As education has moved towards the digital reality, one of the greatest challenges has been to provide students with an engaging learning environment. This era of technological advancement has yielded various teaching and learning tools and strategies. Among these, blended learning has emerged as a practical solution, seamlessly merging traditional in-person instruction with digital resources. This extensive review, encompassing 161 articles from reputable databases such as Scopus, Web of Science, and ERIC, spanning 2010 to 2022, is guided by the PRISMA model for article selection. The primary goal was to assess the effectiveness of blended learning strategies across multidisciplinary courses in higher education. Following meticulous examination, which involved eliminating duplicate records, excluding articles that were not relevant (totaling 37 exclusions), and filtering out non-English articles (9 in total), a refined set of 39 relevant articles remained for thorough analysis. Exploring these 39 preceding studies consistently validates the effectiveness of blended learning as the favored pedagogical approach in higher education. It not only engages students but also cultivates critical thinking skills, thereby fostering a conducive learning environment. This learning strategy creates a conducive learning environment for the students by engaging them and

improving their critical thinking skills. A literature review found that since 2011, the same models have been repeated and practiced in various settings.

Keywords: blended learning, systematic review, higher education

Introduction

The quest for strategies that enhance teaching and learning experiences has been persistent in the dynamically evolving context of education. Recent developments have prominently highlighted blended learning (BL) as a strategy that skillfully melds traditional in-person and innovative online learning approaches, thereby emerging as a pivotal element in modern education (Park, 2009). Blended learning underscores the mere amalgamation of different learning modes and strategically leverages them to curate a rich, flexible, and accessible learning environment.

The inception of blended learning is particularly noted for its dual focus: maintaining pivotal face-to-face educational interactions while concurrently integrating technology-enhanced learning experiences online. It provides a structure that aspires to judiciously reduce costs for participants and facilitators in the educational process without compromising the essential benefits of in-person interactions (Haleem et al., 2022). Significantly, it affords learners considerable autonomy over their learning trajectory, allowing them to influence their learning pace, engage with instructional material, and select their learning milieu.

Concurrently, the rapid advancements in Information and Communication Technologies (ICT) have indubitably propelled the development and application of blended learning strategies. An array of innovative and efficacious learning strategies has emerged against the backdrop of these technological advancements, all directed toward enhancing student academic achievement and meeting the multifaceted demands of the education sector (Bakhsh et al., 2022; Saira et al., 2020). Furthermore, the blended learning approach, especially in its adept incorporation of ICT, has been empirically substantiated as effective across numerous studies and diverse contexts, solidifying its repute in contemporary educational discourse (Anthony, 2022; Hafeez & Akhter, 2021).

However, several challenges have surfaced amidst the proliferation and adoption of blended learning. One notable concern revolves around the transition of academic

material into new digital arenas, which, while proffering numerous advantages, also bears the potential to heighten the complexity of subjects, thereby risking a diminution of student engagement and a possible erosion of confidence levels (Yun, 2023). This dichotomy of potentials and pitfalls underscores the need for a meticulous exploration and understanding of blended learning strategies within varied educational settings.

The pedagogical landscape has transformed from traditional, teacher-centered frameworks to more inclusive, learner-centered models (Castro, 2019). This shift, which has been significantly catalyzed by technological infusion, has profoundly impacted instructional delivery and learner engagement dynamics. Therefore, this research seeks to delve comprehensively into blended learning, unpacking its theoretical frameworks, evaluating empirical evidence, and exploring its pragmatic implications in contemporary education while maintaining a critical lens toward its applicability and effectiveness in diverse educational contexts.

The characteristics of BL, as indicated by Carman (2005), are highlighted in this paper. The table in this section lists the five crucial requirements to create a blended learning model, as in Table 1.

Table 1: Elements of Blended Learning Model

Elements	Explanation
I. Real Events	Synchronous or on-site, teacher-led interactive learning. In the classroom, but they may also be present in other settings, all participants interact man-to-man at the same time and place. On-site instruction can create a rewarding and insightful learning environment that meets learning goals.
II. Learner's Autonomy through Online Material	Online tools make it possible to engage in self-study at any time and location (asynchronously). Text-based or multi-time-based instructional materials can impart knowledge, such as audio, video, animation, images, simulation, or a combination. These resources are available online, i.e., via the web or a mobile application, and include audio streaming, video streaming, and e-books that may be downloaded to a CD for offline reading and printing. Students can use these resources at any time and from any location.
III. Collaborative Effort	Teachers can foster student collaboration when designing blended learning for activities like problem-solving or project

	tasks by using communication tools like chat rooms, discussion forums, email, online chat, websites, and social media. Because it incorporates numerous parties and various learning tools, it is anticipated that students' scientific ideas will be expanded due to this partnership.
IV. Assessment	In order to improve blended learning, a teacher can mix several assessment kinds, such as tests, non-tests, or the transformation of authentic examinations into activities or products that can be offered both online and offline, providing students with more options for responding to the assessment. The review is necessary for evaluating students' knowledge. Pre- and post-assessment may be administered prior to in-person training and independent study to evaluate prior knowledge and knowledge retention, respectively.
V. Materials for Enhancing Learners' Competence	In blended learning approaches, reference materials are essential for improving learning retention and outcomes. To promote the ability of learners to absorb the content. It is necessary to create digital teaching resources and make them available to research participants offline and online.

Traditional learning environments struggle to engage digital natives fully, with students born in the twenty-first century surrounded by digital technologies and seeking learning experiences that align with their technological fluency (Ibrahim & Nat, 2019). To address this challenge, educational institutions must integrate advanced digital learning tools and methodologies (Heilporn et al., 2021). This study aims to evaluate the effectiveness of blended learning in higher education for digital natives, drawing upon previous research to provide empirical evidence and inform decision-making (Akgunduz & Akinoglu, 2016; Kwak et al., 2015; Olympiou & Zacharia, 2012). The findings will contribute to the discourse on educational methodologies and assist in adopting blended learning practices in higher education.

Blended learning offers a more accommodating schedule and supports instructors in building vital skills during in-person sessions. It is an effective technique to suit the needs and preferences of academic staff members regarding instruction. It also allows professors to evaluate their pedagogy (Alamri et al., 2021). As a teaching approach, lecturers adopt BL because it promotes flexibility, course content accessibility, and cost-effectiveness. Blended learning reduces the time students and teachers spend in the

class, reducing personnel expenses. BL can improve education by allowing institutions to utilize technology, fostering a community of researchers, and allowing meaningful and active learning. Due to the ever-increasing demand for information and communication-based strategies in learning and teaching, the aims of this paper were: a) to identify and analyze the commonly used models of blended learning in higher education and b) to evaluate the methods and criteria employed to measure the efficacy of blended learning strategies in higher education.

Blended Learning Strategy

Institutions currently deliver the content of course syllabi via information and communications technologies, such as the BL method. This method combines conventional in-person instruction with the use of online learning materials. Due to its benefits over traditional and online teaching methods, BL is being increasingly used in universities. The adoption of a BL approach, according to research findings, enhances learners' engagement and experiences while also having a positive effect on how they perceive the learning environment and pedagogical approach (Bakeer, 2018; Lee & Hung, 2015; Rianto, 2020; Sahni, 2019; Yusoff et al., 2017). Blended Learning shifts the emphasis from the process of teaching to the learning, enabling learners to be engaged and motivated in the academic process and bolstering their perseverance and dedication (Kundu et al., 2021). The concept of BL is presented in Figure 1.

Figure 1: Concept of Blended Learning
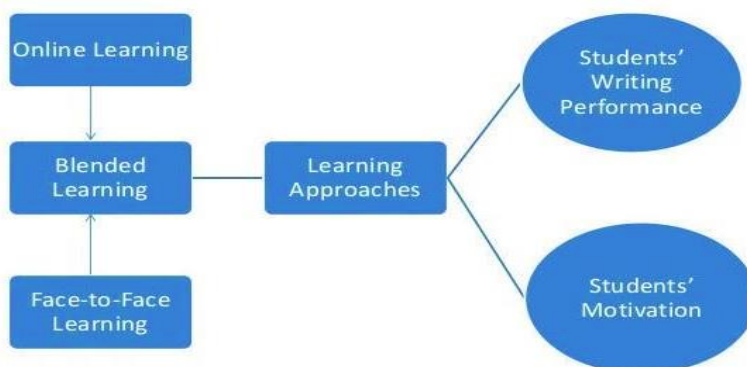
Learners can access it at their own pace and by their own schedules in group settings by participating in online and in-person learning experiences through BL. In a typical

BL approach, students engage in synchronous instructor-led face-to-face sessions while employing innovative web-based learning resources, such as a learning management system (LMS), to create a hybrid learning environment. Utilizing these tools improves student achievement and academic involvement while facilitating learning (Dakduk et al., 2018). The use of BL is currently expanding at academic institutions worldwide. In addition, researchers anticipate that BL will emerge as the predominant instructional method in educational institutions.

Previous Studies on Blended Learning Strategy in Higher Education

Studies have been conducted over the past year to examine the variables affecting lecturers' acceptance of blended learning (BL). In this regard, Anthony et al. (2019) examined how BL influences the success of learning and teaching in institutions. The authors created a model based on an innovation adoption framework and course redesign result framework to aid institutions in decision-making regarding student learning and lecturer teaching evaluations. The model's primary constructs included university administration, students, faculty, BL initiatives, practice, and the efficiency of teaching and learning. The data was gathered by a survey questionnaire, and it was assessed through structural equation modeling. The study results indicated that a blended learning approach effectively speeds up teaching and learning.

Further, to study the adoption of BL and its influence on teachers' activities in a virtual classroom, Radovan and Kristl (2017) created a model. The authors want to learn more about LMS usage among professors and how it affects instruction. They concluded that LMS adoption among teachers enhances their skills in digital competency. In the same spirit, Gawande (2016) conducted another study where the researchers investigated instructors' perspectives on BL usage at higher education institutions. The study's objective was to identify the factors that influence BL adoption. The researchers identified expectations for behavior, effort, a supportive environment, social influence, performance, and instructional trends as the factors that predispose individuals to adopt BL.

Lastly, a range of issues influences learning outcomes for students. Fririksdóttir (2019) commented that most online and blended classrooms indicated that having a set curriculum, one-on-one time with the tutor, and overall support from the tutor were motivating factors. Some participants in Zou's (2020) study thought student-teacher

interaction was critical for an effective online course, while others thought connections between students were important for online teaching. According to these statistics, most course participants prefer frequent interactions with either tutors or coworkers. According to the discussion before, the problem of online course participant retention is significant and crucial to their success.

Articles Selection Procedure

Articles included in this review study were selected by searching Scopus, the Web of Science, and the ERIC databases. Initially, 497 studies were identified. After removing the duplicate records of 167 studies, the first and second authors revised all the studies regarding titles and abstracts based on inclusion and exclusion criteria. After removing the duplicate studies, the remaining studies were 330 for screening. Records excluded based on the abstract review were n=69, not relevant n=37, and not in English n=9. The total full-text articles assessed for eligibility obtained were n=215. The full-text articles with no link to blended learning and Higher Education were also excluded n=54. So, the final studies included in the review were obtained as n=161. The article selection process is inspired by the Prisma diagram shown in Figure 3.

Figure 3: Article Selection Procedure
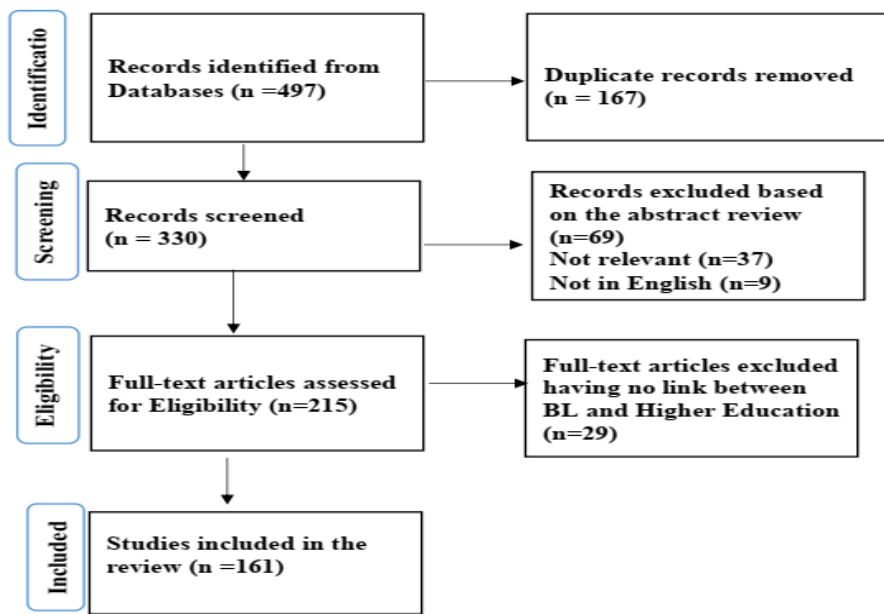
The existing body of literature on blended learning has demonstrated that, since 2010, no new models have emerged (Graham, 2009; Bryan & Volchenkova, 2016). Figure 4 illustrates the various types of blended learning models employed in educational institutions, drawing upon the work of Horn and Staker (2011). This framework is a basis for comparing whether any novel models have been introduced in recent years.

Figure 4: Types of Blended Learning Models
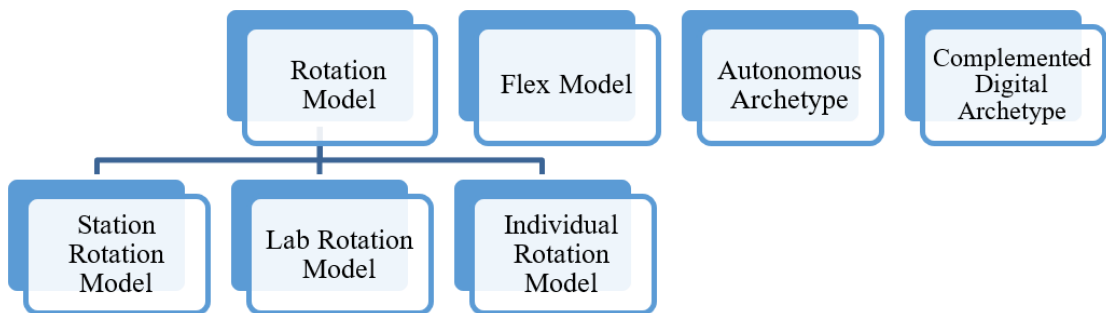
In 2023, amid the changing scenario of education and the lessons learned from the post-corona pandemic shift to online learning, a reassessment of Powell et al.'s 2015 study on Rotation Models is both relevant and crucial. Against the backdrop of the evolving educational landscape and the lessons gleaned from the post-corona pandemic shift to online learning, a reevaluation of Powell et al.'s 2015 study on Rotation Models becomes pertinent and indispensable. Powell's research extensively explored the delicate balance required when integrating online and in-person learning, emphasizing the critical role of maintaining a meticulously organized schedule overseen by substitute instructors. Within Powell's comprehensive study, four distinct sub-models emerged, each characterized by distinctive features and strategies for effectively amalgamating online and in-person learning experiences. Upon revisiting Powell's work, I found these valuable insights to be a cornerstone for comprehending rotation models within the ever-evolving realm of blended learning strategies. In light of the transformative changes experienced in education, Powell et al.'s findings retain their original significance and have also gained heightened relevance in the present educational context.

Rotation Models

Rotation Models are a compelling approach to blended learning that seamlessly integrates online and in-person study, all while maintaining a carefully structured timetable under the supervision of substitute instructors (Kömür et al., 2023; Powell et al., 2015). This methodology offers a dynamic educational experience, where students transition between online and in-person activities based on a well-defined schedule. In a study by Powell et al. (2015), the Rotation Model was dissected into four distinct sub-models, each with its unique characteristics and strategies for enhancing the blending of online and in-person learning experiences. These sub-models provide a versatile framework for educators, allowing them to adapt the Rotation Model to suit their educational contexts' specific needs and objectives.

Furthermore, research by Fitri et al. (2019) underscores the effectiveness of a blended learning rotation model, particularly in the context of mathematics education in high schools. Their study demonstrates how the cognitive conflict strategy, integrated into the Rotation Model, enhances mathematical resilience among high school students.

By combining insights from Powell et al. (2015), Kömür et al. (2023), and Fitri et al. (2019), educators can gain a comprehensive understanding of Rotation Models and how they can be applied to create engaging and effective blended learning experiences for students. These models offer the flexibility and structure necessary to adapt to the ever-evolving education landscape.
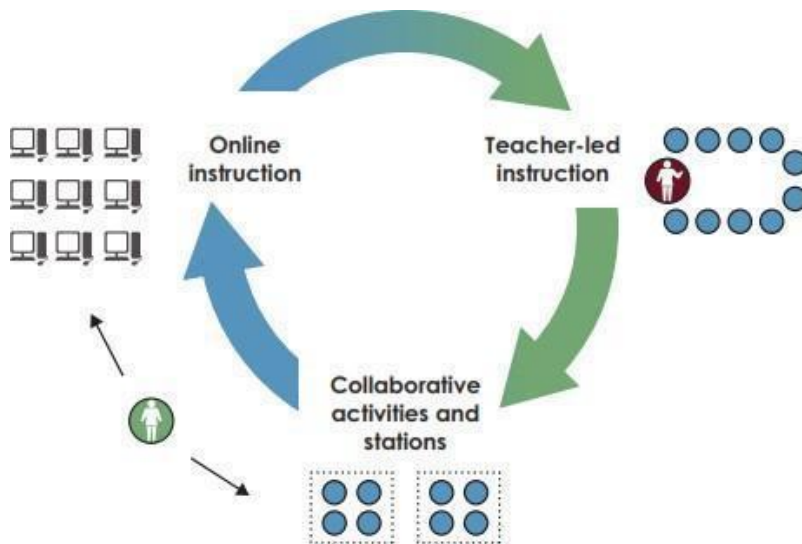
Station Rotation Model

In the Station Rotation Model, students physically move between classroom stations, including at least one with online digital learning elements (Nurkamto et al., 2019). These stations blend traditional teaching methods like lectures, projects, group work, debates, and assessments with digital resources, offering a comprehensive learning experience (Nurkamto et al., 2019).

The teacher's timetable guides students through each station, fostering active participation and diverse learning experiences (Nurkamto et al., 2019). This model aligns with the principles of blended learning, emphasizing integrating online and in-person elements to enhance education (Pardede, 2013). Blended learning, as highlighted by Pardede (2013), offers personalized learning, flexibility, and increased

engagement, ultimately improving learning outcomes. The Station Rotation Model provides educators with a versatile framework to create effective blended learning environments (Pardede, 2013). It is shown in Figure 5.

Figure 5: Station Rotation Model

Lab Rotation Model

Like the Station Rotation Model, the Lab Rotation Model combines traditional classroom teaching with specialized online learning labs (Cai et al., 2018). Students seamlessly shift between in-class instruction and virtual learning experiences, such as computational thinking activities, enhancing their overall learning (Cai et al., 2018). It has also proven adaptable and effective in enhancing various skills, including English writing for junior high school students (Syarif, 2020). The Lab Rotation Model aligns with blended learning principles, offering educators a versatile framework to enhance the learning experience and meet specific educational goals (Syarif, 2020). In continuing the virtual learning they did in the prior session, students in vital computer learning do two hours of online learning in addition to their classroom work. It is shown in Figure 6.

Figure 6: Lab Rotation Model
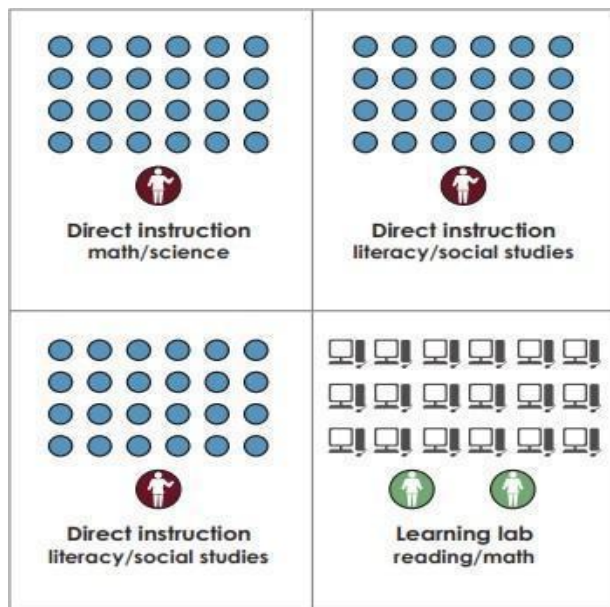
Individual Rotation Model

In the Individual Rotation Model, students have the flexibility to choose between in-person and online education alternatives, setting it apart from other rotation models. Unlike traditional rotation models where students are required to move to specific stations, this model allows students to opt for the learning mode that suits their needs best. This adaptability is particularly valuable when addressing diverse student needs, such as providing individual attention to students with higher needs or reducing class sizes for enhanced focus (Faries, 2023).

Additionally, the Individual Rotation Model can be effectively applied in various educational contexts. For instance, it can serve as an excellent rotation option for elementary school computer students, particularly when implementing intensive online reading programs (Fitri et al., 2019). As educational practices continue to evolve, the Individual Rotation Model aligns with the principles of blended learning and differentiated instruction, offering a versatile framework to tailor instruction to meet specific student requirements (Faries, 2023; Walne, 2012). It is shown in Figure 7.

Figure 7: Individual Rotation Model
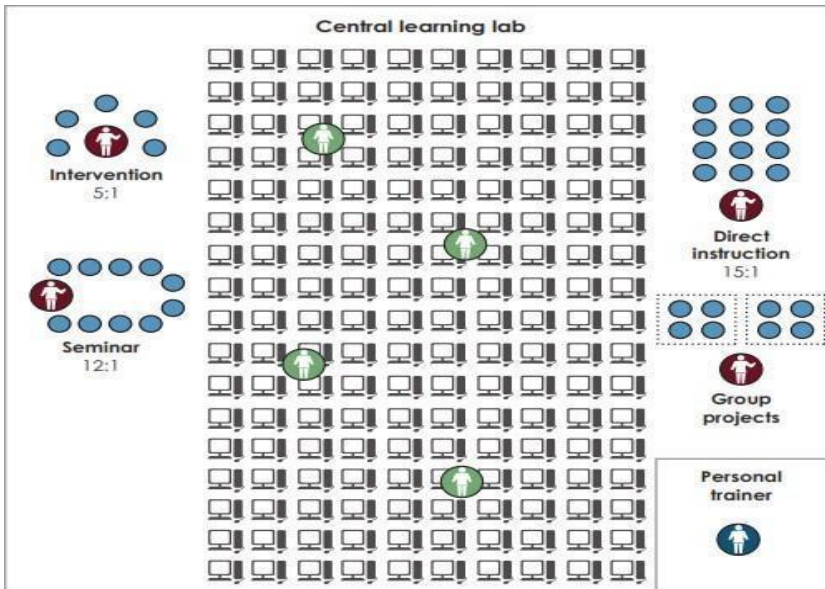
Flex Models

This method involves delivering the content online. Learning is mostly self-guided as students independently research and apply new ideas in a digital setting, even when teachers can aid if needed. Flex Models of blended learning are characterized by their emphasis on online content delivery and self-guided learning, affording students the autonomy to navigate their educational journey independently (Davis, 2019). In this approach, students research and apply new concepts in a digital environment, with teachers available for support when needed. Flex Models encompass diverse learning spaces, including study areas, learning labs, small group collaboration zones, and common spaces, allowing students to work at their own pace and access a wide variety of resources. This approach shares similarities with the Individual Rotation Models, providing students with the flexibility to tailor their learning experiences to suit their unique preferences (Eleni et al., 2016).

Recent research has underscored the effectiveness and versatility of Flex Models in different educational contexts. For instance, Kang et al. (2022) validated using Flex Models in Objective Structured Clinical Examination (OSCE) evaluations within

medical education.Similarly, Abdurahman and Ahmad (2022) examined the challenges and opportunities pre-service English teachers encounter in Flex Model Blended Learning environments. These studies affirm the adaptability and potential impact of Flex Models across diverse educational fields. In summary, Flex Models represent a contemporary and flexible approach to blended learning, empowering students to take ownership of their education while benefiting from teacher support and many resources in various learning environments. (Eleni et al., 2016). It is shown in Figure 8.

Figure 8: Flex Models
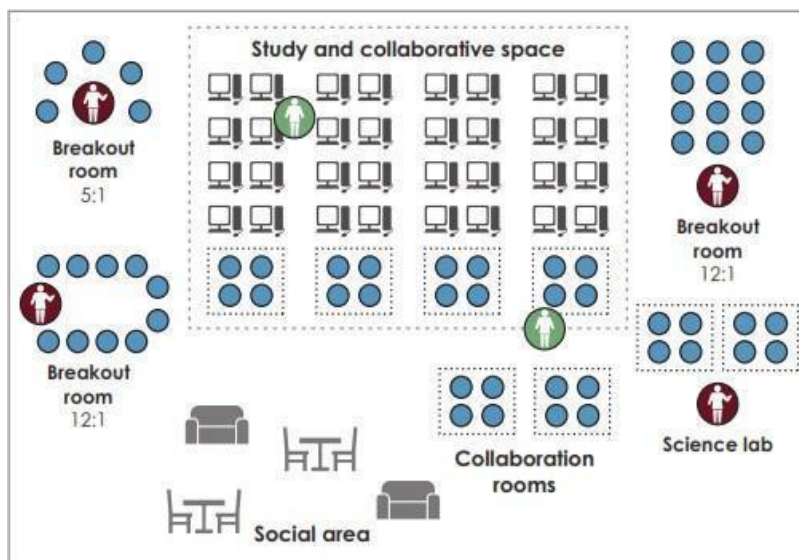
Autonomous Archetype

The Self-Blend model of blended learning embodies the concept of autonomous archetypes, seamlessly integrating in-person instruction with online education, providing students with the flexibility to enhance their educational experience (Eleni et al., 2016). This concept, commonly found in high school settings, is particularly valuable for students seeking courses that may not be offered within their institution. Students who opt for self-blend courses can complement their traditional classroom education with online courses, even if they are physically attending school. However, the success of this hybrid learning approach hinges on students' high levels of motivation and their ability to embody autonomous archetypes of self-directed learning (Arispe & Blake, 2012).

Self-Blend courses cater to students who aspire to take additional classes and extend their learning horizons beyond the conventional curriculum, allowing them to embrace autonomous archetypes in their educational journey (Eleni et al., 2016). The concept aligns with the notion that students are increasingly seeking opportunities to tailor their education to their unique interests and needs. Viebig's (2022) systematic literature review on blended learning in entrepreneurship education highlights the significance of autonomous archetypes in the context of student-driven learning experiences. Scopes' (2009) exploration of learning archetypes as tools of Cybergogy for a 3D educational landscape further underscores the potential for students to embrace autonomous archetypes and take control of their learning. In essence, the Self-Blend model empowers students to embody autonomous archetypes, enabling them to autonomously navigate their education, pursue additional coursework, and access a wider array of learning opportunities, making it a valuable choice for motivated learners. It is shown in Figure 9.

Figure 9: Autonomous Archetype
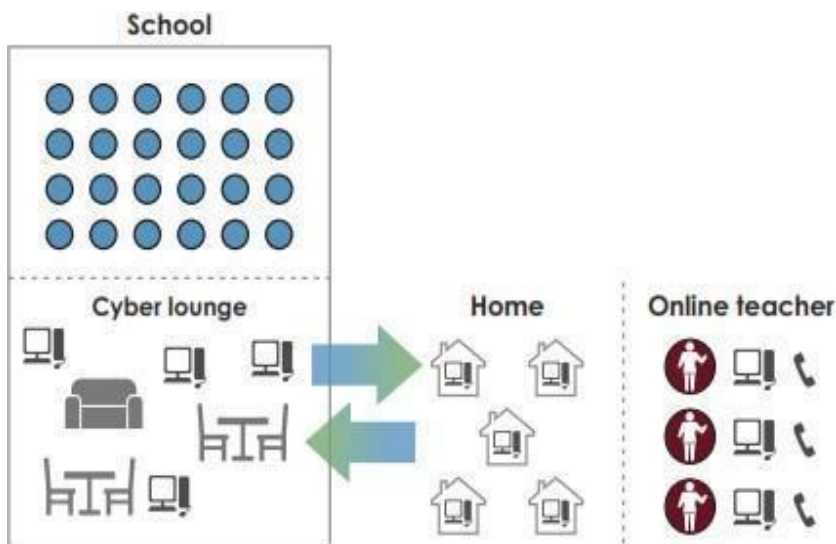
Complementary Digital Archetype

The Digital Archetype model of blended learning blends in-person and online education to give students more flexibility in their learning (Eleni et al., 2016). It's designed for students who like traditional classroom teaching but want to do some

assignments on their own (Fischer et al., 2020). By embracing the idea of autonomous archetypes, students take an active role in their learning and navigate their education independently. In today's education, many online programs and hybrid approaches support regular classroom teaching (Benson et al., 2011). This shift reflects the recognition that students have different learning preferences. Adventure learning, described by Doering (2006), is one example that aligns with blended learning principles. It focuses on engaging and interactive online experiences, showing how hybrid models like the Digital Archetype can enhance traditional classroom learning.

The Digital Archetype model empowers students to be self-reliant learners and offers a mix of in-person and online instruction. It's a flexible approach that adapts to students' needs, catering to our diverse learning landscape. It is shown in Figure 10.

Figure 10: Complementary Digital Archetype
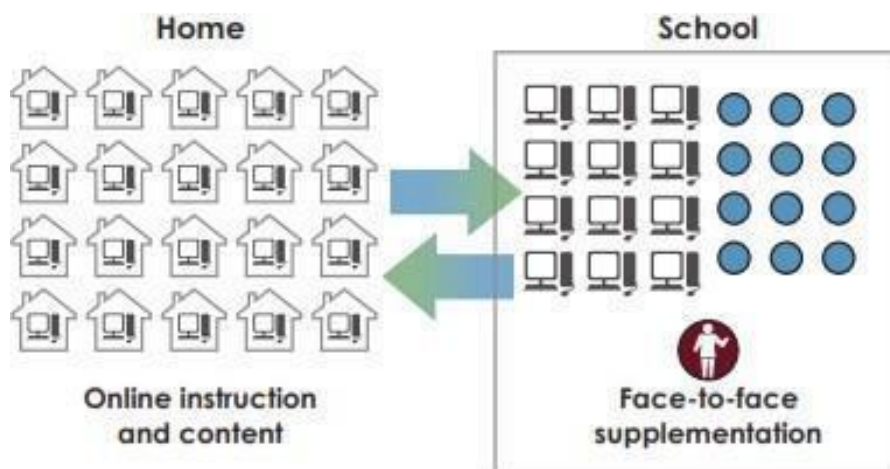
Transformative Potential of Blended Learning

Several perceptions and notions about blended learning) are built on widely accepted definitions of the term. According to Tuomainen (2016), blended learning is an essential component of our contemporary environment, where people learn partially digitally and partially physically. Rahman (2017), for instance, claimed that BL offers the chance to employ both synchronous and asynchronous technologies. The importance of BL in improving students' perspectives of the learning process cannot be overstated. The importance of BL in changing students' attitudes toward learning

cannot be emphasized. Blended learning is a productive style of training that combines the most successful onsite and online learning approaches (Indra et al., 2022). According to Prifti (2022), blended learning provides the possibility to achieve 21st-century standards by combining the best online and in-person learning environments.

Effectiveness of Blended Learning Strategy at Higher Educational Level

The effectiveness of the blended learning method at the higher educational level has been supported by numerous studies. The results of prior research on the effectiveness of blended learning strategies at the higher educational level (from 2010 to 2022) are shown in Table 2:

Table 2: Summary of Research

Reference	Level	Course	Outcomes
Caner (2010)	Pre-Service Teachers	English Language	The blended learning strategy creates a productive learning environment for the pre-service teachers.
López-Pérez et al. (2011)	Undergraduate	Different courses	Blended learning is an effective strategy for lowering dropout rates and raising exam scores.
So and Lee (2013)	Undergraduate	English as a foreign language	It was noted that the study's participants thought the blended learning approach would benefit their development as writers.
Dewi (2014)	Undergraduate	English	The findings indicated that students had a favorable opinion of Edmodo and felt at ease interacting with friends and teachers online.
Lee and Hung (2015)	Undergraduate	Income Tax Law course	The blended learning group, which combines online instruction with traditional testing methods, had the highest learning achievement.
Albhnsawy and Aliweh (2016)	Undergraduate	Microteaching course	According to data analysis, participants' teaching abilities are significantly impacted by blended learning.
Tuomainen (2016)	Undergraduate	English for Academic	The findings showed that non-native university students valued blended

		Purposes (EAP) course	learning for the EAP course and that they benefited from its flexibility and ease for their EAP learning.
Yusoff et al. (2017)	Undergraduate	Introduction to Statistics	The results revealed a clear distinction between the exam scores attained by the various student groups.
Rahman (2017)	Undergraduate	fluid mechanics	The Blended Learning Strategy enhanced the fluid mechanics students' learning experience.
Bakeer (2018)	Undergraduate	English Language course	According to the study's findings, students' views regarding the use of blended learning improved their language abilities and their capacity for independent study and motivation to learn.
Shang and Liu (2018)	Undergraduate	Medical Physiology	According to student polls, 68% of respondents favored blended learning over regular classroom instruction.
Sahni (2019)	Teachers	Business course	In the test group, when blended learning was used, the results indicated improved student learning.
Rianto (2020)	Undergraduate	EFL courses	The findings revealed that most students had good perceptions of the online and in-person learning environments employed in their blended EFL courses.
Syakur et al. (2020)	Undergraduate	English language	The findings revealed that 81.99% of respondents supported using blended learning to teach English reading.
Alsalhi et al. (2021)	Undergraduate	Statistics course	The experimental group learned by the blended learning model achieved better academic results.
Bidari (2021)	High School	English Language classroom	The findings reported that employing non-textbook resources, including visual aids, music, and intriguing topic talk relating to courses, helped engage learners.
Shrestha et	Undergraduate	English	The findings reported that retention

al. (2022)		language course	issues include, instructors' delayed response time, poor activity design, improper online tool selection, and the requirement for extra time
Hosseini and Shokrpour (2022)	Undergraduate	ESP Language learners	The results demonstrated that students had a more favorable opinion of mixed learning.
Anwar et al. (2022)	Undergraduate	Electronics Engineering	The learners' critical thinking abilities were enhanced by blended learning model.

The research summarized in Table 2 shows that blended learning is successful in higher education.

Discussion

The effectiveness of the Blended Learning approach at the higher educational level is well-supported by the substantial research conducted between 2010 and 2022, as summarized in Table 2. These studies consistently demonstrate the positive impact of blended learning across various educational contexts, courses, and outcomes.

An overarching theme emerging from these studies is creating a productive and engaging learning environment through blended learning. For instance, Caner (2010) noted the benefits for pre-service teachers, and multiple studies highlighted improvements in language skills, writing abilities, and overall learning experiences (Bakeer, 2018; Dewi, 2014; Lee & Hung, 2015; Rahman, 2017). Additionally, blended learning is a valuable tool for addressing common challenges in higher education, such as reducing dropout rates and improving exam scores (López-Pérez et al., 2011).

Furthermore, the research consistently highlights the positive impact of blended learning on student motivation and the development of independent study skills (Bakeer, 2018; Dewi, 2014). The flexible nature of blended learning, as reflected in student perceptions (Tuomainen, 2016; Yusoff et al., 2017), contributes to its preference among learners and positive influence on learning outcomes.

Importantly, these findings emphasize the versatility of blended learning across diverse subject areas, including language courses, science, engineering, and teacher training (Bidari, 2021; Bakeer, 2018; Sahni, 2019). Even at the high school level, as

demonstrated by Shrestha et al. (2022), blended learning is explored as a valuable strategy to address issues related to student retention.

While these studies collectively provide evidence of the efficacy of the Blended Learning Strategy, it is crucial to acknowledge and address potential challenges. One significant concern is the digital divide, which may hinder equitable access to technology and the Internet (Afzal et al., 2023). As we advocate for the benefits of blended learning, we must remain mindful of the disparities it could inadvertently exacerbate. Instructors and educational institutions must take proactive steps to ensure that all students, regardless of their socioeconomic backgrounds, have access to the digital resources necessary for meaningful participation in blended learning. This may involve addressing issues related to the quality of online materials and technical difficulties students face and providing additional training for educators to implement blended learning effectively. Additionally, considering the formidable challenge of sustaining student engagement and motivation, particularly in extended blended courses (Khan, 2020). Educators can devise strategies that perpetuate students' enthusiasm for online components, preventing attrition and passive involvement. Achieving the delicate equilibrium between the advantages of online flexibility and the imperative of active engagement represents a multifaceted pedagogical puzzle demanding educators' adept solutions.

Hattie (2018) argues that the method with the quality of instruction students get is the single most influential factor in their learning. Technology in education has changed due to advancements in information and communication technology (ICT). In today's educational systems, blended classroom learning has shown to be a successful learning approach. A pile of research has demonstrated the usefulness of the blended learning technique (Suryanti et al., 2020). According to research by Aristovnik et al. (2017), blended learning is more productive than traditional classroom settings. This education style also uses digital media like computers and mobile devices. The blended learning approach uses ICT. Harandi (2015) stated that the blended learning strategy approach is a fusion of conventional learning. The advocates of the blended learning strategy contend that combining traditional classroom instruction with online learning may create an effective teaching strategy. It was created as a teaching aid for pupils with various academic aptitudes. Khan (2020) discovered that maintaining students' interest

throughout a lengthier course required much labor, but this issue was solved when courses were shorter. The key points are explained below:

Better Communication, Social Interaction, and Collaboration

As a dynamic teaching method, blended learning seamlessly integrates learners, activities, and events by harnessing various modern technological tools and resources. It is pivotal for imparting knowledge and cultivating and disseminating cross-cultural understanding globally. Through its innovative approach, blended learning transcends geographical boundaries, enabling individuals from diverse backgrounds to engage in a shared educational journey.

Moreover, meaningful interaction among students and their educators, as well as among fellow learners, flourishes. This interaction catalyzes the formation of vibrant online learning communities and collaborative practices. In these digital spaces, knowledge is not confined but liberated, where concepts are explored collectively, experiences are exchanged, and learning products are shared and celebrated. Such online learning communities enrich the educational experience and prepare students for a digitally interconnected world, where effective communication, social interaction, and collaboration are valuable skills and essential life competencies (Anderson & Dron, 2011).

Improved Efficiency and Flexibility

BL's main goal may be to supplement or replace traditional in-person training. It incorporates offline and online learning, with the distinction being made that digital learning refers to using web resources for educational reasons. Offline learning takes place in the more traditional classroom environment. Learning and teaching are both made more adaptable and efficient because of the proliferation of online resources (Dahal, 2023). Students can attend the class online, with the instructor conducting the teaching and learning portion through video or teleconference. It is not difficult to track out study materials and resources for research on the internet. Students and teachers are allowed to explore the digital world through the use of applications that are made available online. Some examples of these applications are electronic books, resources, and libraries. Blending consequently provides the ability to enhance the learning content while simultaneously increasing the experiences of both the instructor and the students.

Increases Range and Flexibility

As a result of the advancement of information and communication technologies, the educational process has revolutionized. Thanks to improvements in wireless and mobile technologies, education can now occur whenever and wherever students desire, regardless of where they are physically located. Combining delivery methods, instructional strategies, technological advancements, and learning environments will support learning that is personalized while also being collaborative and interactive, timely and targeted toward a specific need while also being a part of a lifelong learning journey, and complex while also being pervasive and seamlessly incorporated into the learning landscape. This makes it possible that using these technologies could increase education's accessibility to a larger public and encourage engaging collaborative learning.

Minimized Time and Cost of Development

As suggested in the study by Luitel et al. (2021), blended learning (BL) underscores the significance of achieving higher learning outcomes in resource classrooms. Blended learning incorporates a variety of delivery modes to strike a better balance and make the most of the time and resources invested in creating and executing learning programs. The Internet is a low-cost tool for delivering online education that has the potential to meet the needs of learners with diverse backgrounds and learning styles. The creation of this digital hub was inspired by a desire to encourage the expansion of a network of experts in a given field. This also shows that the concept can be used in low-income countries with minimum governmental funding support to give world-class exposure, leaving no child behind.

Resource Constraints

Blended learning emerges as a potent solution for tackling the challenge of minimizing the time and cost of development, particularly in resource-constrained environments (Luitel et al., 2021). It achieves this by incorporating a variety of delivery modes and harnessing the low-cost potential of internet-based education. This approach is crucial in providing quality education to learners with diverse backgrounds and learning styles. In low-income countries with limited government funding, it presents an opportunity to bridge educational gaps and offer world-class exposure (Anthony, 2022).

However, it's essential to acknowledge that while stable Wi-Fi connectivity can provide an ocean of online resources, poor Wi-Fi can disrupt the smoothness of the lesson, highlighting the need for reliable internet access to fully harness the benefits of blended learning.

Digital Equity and Inclusivity

It is also important to remember that blended learning may not be a one-size-fits-all solution. It is also worth noting that not all students may thrive in a blended learning environment. Some learners may require more structured face-to-face interactions and benefit from the traditional classroom setting. Recognizing these individual differences and providing flexibility in course delivery can contribute to a more inclusive educational experience. With these potential limitations and offering pragmatic strategies to mitigate them, we aim to present a more balanced and nuanced perspective on blended learning. This approach fosters a holistic understanding for educators, institutions, and policymakers as they navigate the dynamic terrain of higher education. Some educators and students may encounter challenges in adapting to this approach. For instance, the complete transition to online components may not be feasible in courses that require hands-on laboratory work or physical presence. Moreover, there can be concerns about the quality of online resources and the need for rigorous content design to ensure that online materials are as effective as in-person instruction. To ensure equitable access to digital education, we could address socioeconomic disparities and infrastructure limitations (Ahuja, 2023; Alphones, 2019).

Teacher Preparedness and Professional Development in Blended Learning

Educators learning to teach in blended learning environments often face challenges related to limited and impractical professional development opportunities (Dhakal & Bhandari, 2019; Dhakal & Pant, 2016). Many blended learning teachers struggle to find suitable resources and adapt them effectively to their programs. Collaboration among online teacher training departments in different educational institutions can help address these challenges. Blended learning educators must acquire skills to fulfill various roles, including teacher, administrator, trouble-shooter, and co-learner in a blended learning context (Buluma & Walimbwa, 2021). To support educators in navigating these complexities, a preparatory course like "Teaching Online" can offer

valuable assistance to newly appointed teachers as they confront challenges in this domain

To delve deeper into blended learning, critically examining digital equity, inclusivity, and technological adaptability in hybrid educational models is imperative. Research by Zadeh (2013) highlights the effectiveness of electronic learning courses but suggests a need to explore factors influencing digital engagement, such as socio-economic and cultural aspects. While informative about educator perspectives, Anthony's (2022) work does not fully address the systemic and infrastructural frameworks that impact blended learning implementation. Therefore, a comprehensive analysis that encompasses both logistical and socio-pedagogical dimensions of technological incorporation is necessary to ensure that blended learning achieves its pedagogical objectives and firmly establishes principles of educational equity and inclusivity (Anthony, 2022; Zadeh, 2013).

A Closer Look at Inclusion and Technological Adaptability in Hybrid Educational Models

The paramount discourse around digital equity is conspicuously evident, with a multi-dimensional challenge involving accessibility, usability, and empowerment within technology-embedded learning environments. While blended learning is often considered a promising educational approach, it is important to recognize that its effectiveness can be influenced by various contextual factors. For instance, Zadeh's (2013) research delved into the effectiveness of electronic learning courses, particularly focusing on the mental impact on high school students. While providing comprehensive insights, Zadeh's approach highlights the need to explore further variable factors shaping digital engagement, including socio-economic and cultural influences. In contrast, Anthony (2022) explored academic staff perceptions towards blended learning, shedding light on faculty members' pragmatic and attitudinal aspects in adopting this approach. Although this perspective from educators is valuable, it does not fully address the systemic and infrastructural frameworks that either support or inhibit implementing blended learning. This underscores the complexity of the blended learning landscape, where logistical and socio-pedagogical dimensions intersect. Thus, the literature emphasizes the imperative for a comprehensive analysis that marries these dimensions of technological incorporation, ensuring that blended learning achieves its

pedagogical outcomes and firmly anchors educational equity and inclusivity principles within the diverse contexts of higher education.

Limitation

This study has some limitations to note. Firstly, it primarily focuses on education and related fields, potentially limiting its relevance to other academic areas. Secondly, the review only covers studies from 2010 to 2022, potentially missing out on relevant research published outside this period. Thirdly, it includes only English-language articles, potentially excluding important studies in other languages. There is also a possibility of publication bias, as the research is based on specific databases. The included studies use various assessment methods, making direct comparisons challenging. The study does not comprehensively address contextual differences and instructor perspectives. Finally, variations in research quality could impact the overall findings. Despite these limitations, this study aims to provide insights into blended learning in higher education and guide further research and practice.

Conclusion

Combining traditional classroom instruction with the self-paced online study is known as blended learning. The purpose of this review study was to report on the efficiency of using a blended learning method at higher educational levels. According to the study's findings, a blended learning method can be a successful learning strategy for students in higher education. It creates a conducive and flexible learning environment that deeply affects engagement, critical thinking skills, self-efficacy, and self-directed learning. Further, the study recommends that a blended learning strategy be included in the curriculum to make it a more practical learning strategy.

Additional research may be carried out by observing classes in which students actively participate to determine whether or not the BL model has progressed over the past decade. By combining various teaching methods and materials, BL transforms face-to-face learning and provides university faculties with diverse strategies to deliver content effectively. Faculties select a mode that best suits their teaching and learning styles to ensure students receive a quality education. However, as pointed out by the study above., infrastructure and systemic issues pose significant challenges to implementing BL. To overcome these obstacles, the authors suggest restructuring the educational system and process, envisioning education as a means of transformation,

and using online education as a complementary system to foster BL to ensure higher learning outcomes. These recommendations from the above articles have far-reaching implications for educators, policymakers, and administrators in promoting quality education and enhancing learning outcomes. To address these concerns, institutions can invest in faculty development programs that empower educators with the skills to design engaging online content and leverage technology effectively. Furthermore, a thoughtful and well-planned approach to blended learning, considering course objectives and student needs, can help balance online and in-person components.

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