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A SYSTEMATIC REVIEW OF HYBRID LEARNING IN HIGHER EDUCATION: IMPLEMENTATION STATUS, ADVANTAGES, CHALLENGES, AND FUTURE DIRECTIONS

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Abstract:

In the digital era, traditional higher education models face significant challenges in terms of flexibility and accessibility. Hybrid learning (HL) emerged as a transformative approach to address theses challenges, which involves onsite (i.e., in the classroom) and online (e.g., in different locations) students simultaneously under the instruction of the same teacher, has gained widespread global attention and application. Despite its benefits for teaching effectiveness and resource optimization, HL implementation faces significant obstacles. To gain an in-depth understanding of HL's current implementation status and promote its effective application, this study adopted the PRISMA protocol (literature screened April‑June 2025; N = 115 articles) to conduct a systematic literature review on HL in higher education. We analyze HL's definitions, implementation status, advantages (e.g., flexibility, accessibility, efficiency), challenges (e.g., technological barriers, pedagogical adaptation), and future directions. Findings reveal that while HL enhances educational access, its adoption requires addressing institutional readiness, faculty training, and equitable resource distribution. The study further identifies opportunities (e.g., AI integration, global collaboration) and proposes actionable recommendations for stakeholders (institutions, policymakers, ed-tech firms) to optimize HL practices. By synthesizing HL's implementation landscape, this study aids educators and administrators in strategic decision-making and supports HL's sustainable development in higher education.

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Keywords:

Hybrid Learning, Higher Education, Implementation Status, Advantages, Challenges, Future Directions, Systematic Review

Introduction

The advent of the digital era has fundamentally transformed the educational landscape, with global society increasingly recognizing the importance of digital education in advancing educational equity, optimizing resource allocation, and fostering lifelong learning - all critical pillars for achieving sustainable educational development (Detyna et al., 2023). The COVID-19 pandemic accelerated educational technology adoption, making online education the norm since its outbreak in 2019, accompanied by numerous tools and platforms designed to facilitate remote learning (Daniel, 2020; Lockee, 2021). However, the limitations of purely online education have become increasingly apparent, particularly regarding the lack of face-to-face interaction, difficulties in effectively monitoring student engagement and learning outcomes, and challenges in adapting teaching methods to diverse student needs (Ahmad et al., 2023; Lorenzo-Lledó et al., 2021). As pandemic conditions gradually stabilized, some students returned to campus while others in heavily affected regions remained unable to resume in-person attendance. Consequently, educators faced the challenge of simultaneously teaching both online and on-site students, transitioning from purely online learning to hybrid learning models (Triyason et al., 2020).

Hybrid learning effectively integrates traditional classroom interactions (face-to-face) with the convenience of digital learning (online) (Cohen et al., 2020), creating rich yet complex technology-enhanced learning environments that unite previously opposing pedagogical approaches: formal and informal, online and physical, individual and collaborative, professional and academic (Gil et al., 2022). Gil et al. (2022) conceptualize these dualities coexisting within a single learning environment as "hybrid learning." Although the term emerged in the early 2000s, it experienced a prolonged period of limited attention until the COVID-19 pandemic revived interest, reaching peak adoption in 2020 (Ortega-Arranz et al., 2024). Our analysis reveals that from 2020 to the present, 2,668 journal articles have addressed hybrid learning, including over 600 high-quality publications (Q1/Q2 journals), demonstrating substantial scholarly attention to hybrid learning.

Eyal and Gil (2022) categorize hybrid learning through three perspectives: hybrid as blended, hybrid as a space of merging interactions, and hybrid as fluid. Nørgård (2021) similarly elaborates on various hybrid models, with particular attention to approaches combining online and on-site students within shared learning contexts (Raes et al., 2020). Scholars frequently designate this model as Blended Synchronous Learning (Bower et al., 2014; Huang et al., 2017; Zydney et al., 2019), Synchronous Hybrid Learning (Bülow, 2022; Raes et al., 2020), or Hybrid Classroom (Morgan et al., 2022). In this study, "hybrid learning" refers specifically to this type of mixed learning (i.e., Synchronous blended Learning). More specifically, in this study, hybrid learning refers to involving onsite (i.e., in the classroom) and online (e.g., in a different classroom, at home) students simultaneously under the instruction of the same teacher (Ortega-Arranz et al., 2024).

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Compared to other instructional models, hybrid learning offers distinct advantages (Gu et al., 2024). It enables remote participation for students constrained by work, family obligations, health concerns, or other barriers, providing more flexible learning opportunities than traditional campus-based education while avoiding the limitations of purely online formats (Ortega-Arranz et al., 2024). This approach enhances classroom engagement through increased questioning opportunities, strengthens students' sense of connection and community, and may generate economic efficiencies (Bower et al., 2014). Temiz (2024) further demonstrates that hybrid learning combines the benefits of traditional and online environments while promoting learners' knowledge acquisition and higher-order thinking skills, particularly metacognitive awareness and communication competencies.

However, hybrid learning imposes significant demands on instructors. Ensuring instructional quality requires comprehensive pedagogical redesign encompassing instructional design innovation, classroom organization, and assessment strategies (Bülow, 2022; Cohen et al., 2020; Raes et al., 2020). Teachers must simultaneously manage dual student cohorts, process multiple information streams, and troubleshoot technical issues, creating substantial additional workload and stress (Bower et al., 2014; Gu et al., 2024; Ortega-Arranz et al., 2024).

Despite these challenges, hybrid learning adoption continues expanding across educational contexts (Nørgård & Hilli, 2022; Raes, 2022). Scholarly investigations have proliferated regarding its impact on instructional design (Cohen et al., 2020), learning environment creation (Bülow, 2022; Nørgård & Hilli, 2022), academic achievement (Abbas, 2023; Prayogo, 2024), and learning outcomes (Shen & Shao, 2022). However, to our knowledge, no comprehensive synthesis exists examining hybrid learning's implementation status, advantages, challenges and future directions. A systematic literature review could elucidate these dimensions, address current research gaps, and provide theoretical foundations and practical guidance for effective hybrid learning implementation in higher education. This study not only advances understanding of hybrid learning models but also offers evidence-based strategies to support educators and policymakers navigating educational modernization challenges, ultimately fostering innovation and sustainable development in higher education teaching practices.

The Purpose Of The Study

This study aims to conduct a systematic literature review on the implementation status, advantages, challenges, and future directions of hybrid learning in higher education. Through this approach, we seek to provide guidance and reference for both future researchers in this field and educators implementing hybrid learning in their teaching practices. The significance of this study lies in the necessity to review existing research before conducting in-depth investigations, enabling stakeholders to anticipate potential issues and challenges while taking appropriate preventive measures. Furthermore, researchers require comprehensive literature support when selecting more original research topics and planning studies in this direction.

Our systematic review will make substantial contributions to the literature by not only revealing the developmental status of hybrid learning in higher education but also identifying similarities and differences among various studies. This will help educators develop a comprehensive understanding of hybrid learning's applicability in educational processes. Recognizing both the advantages and challenges of hybrid learning proves crucial for its successful integration into higher education classrooms. With awareness of these difficulties or barriers, educators can

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work to mitigate and overcome them; simultaneously, understanding these advantages enables them to better leverage hybrid learning to enhance teaching effectiveness.

Although existing studies have addressed hybrid learning (Ortega-Arranz et al., 2024; Sawada et al., 2024; Usher & Hershkovitz, 2024), our literature review reveals that these investigations are often limited to specific application scenarios (Ortega-Arranz et al., 2024), educational levels, or disciplines (Li et al., 2023; Pramila‐Savukoski et al., 2023; Prayogo, 2024). They either fail to comprehensively address our research questions or were published too early to reflect current educational technology developments. Therefore, this study aims to fill this research gap through a systematic literature review, providing an updated and comprehensive perspective.

Within the scope of this study, the following research questions are investigated:
RQ1: What is the current implementation status of hybrid learning in higher education?
RQ2: What are the advantages and challenges of hybrid learning in higher education?
RQ3: What are the future directions of hybrid learning in higher education?

By addressing these research questions, this study expects to provide scientific evidence and strategic recommendations for the further development and optimization of hybrid learning in higher education. To resolve these research questions, the authors have established the following research objectives:
RO1: To examine the current implementation status of hybrid learning in higher education.
RO2: To identify the advantages and challenges of hybrid learning in higher education.
RO3: To explore future directions of hybrid learning in higher education.

RESEARCH MRTHODOLOFY

This study employs a systematic literature review approach to comprehensively examine the application of hybrid learning in higher education. As an effective review method, systematic reviews enable researchers to identify and screen evidence relevant to specific research questions, subsequently evaluating and synthesizing findings for practical application in educational practice, policy-making, and further research (Harris et al., 2014; Xiao & Watson, 2019). Aromataris and Pearson (2014), Polanin et al. (2017), and Munn et al. (2018) emphasize that systematic reviews make significant contributions by: (1) uncovering potential evidence or patterns; (2) validating existing methods or procedures while resolving discrepancies and identifying novel practices; (3) determining directions for future research; (4) analyzing conflicting findings across studies; and (5) developing decision-making guidelines.

To conduct this systematic review, our article selection process strictly followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021). Adherence to this protocol ensures methodological consistency, transparency, and scientific rigor. As described in reviews by Haddaway et al. (2022), Regona et al. (2022), and Page et al. (2021), the PRISMA process consists of four key steps implemented in this study:

a. Database and Keyword Identification: Specification of databases and search terms used for initial literature retrieval and subsequent searches.
b. Search Strategy Development: Establishment of comprehensive search terms along with explicit inclusion/exclusion criteria. Preliminary article screening was conducted based on these parameters.

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c. Qualitative Screening: Evaluation of retrieved articles through examination of titles, keywords, and abstracts to identify those meeting predetermined eligibility criteria.
d. Full-text Review: Comprehensive analysis of remaining articles that passed initial screening.

Research Procedure

The systematic review procedure in this study consists of three distinct phases: Planning Phase, Evaluation Phase, and Classification Phase.

Planning Phase (Stage 1): This study utilized Web of Science (WoS) and Scopus as primary databases. Considering that hybrid learning gained widespread adoption post-pandemic, the review period was set from from January 2020 to June 5, 2025. The following search terms were employed in the literature retrieval process: ("Hybrid learning" OR "Blended Synchronous Learning" OR "Hybrid Classroom") AND ("Higher education" OR "University" OR "College") AND ("Development" OR "Evaluation" OR "Importance" OR "Advantage" OR "Benefit" OR "Challenge" OR "Barrier" OR "Obstacle"). These keywords were selected based on their frequent appearance in hybrid learning literature, ensuring comprehensive coverage of relevant studies. The initial screening involved two critical steps: Exclusion of document types other than research articles, proceedings papers, early access publications, review articles, or book chapters. Then removal of duplicate records and non-English publications (due to authors' language constraints). During this phase, the research strings (as detailed in Table 1) were finalized for the subsequent article search and retrieval process (Stage 2). Additionally, explicit inclusion and exclusion criteria (presented in Table 2) were developed to guide the subsequent screening and selection of literature.

Table 1: The Search String And The Results Of Article Filtering

Databases	Search String	Results
WoS	TS=(("Hybrid learning" OR "Blended Synchronous Learning" OR "Hybrid Classroom") AND ("Higher education" OR "University" OR "College") AND ("Development" OR "Evaluation" OR "Importance" OR "Advantage" OR "Benefit" OR "Challenge" OR "Barrier" OR "Obstacle"))	314
	Document Types: Article or Proceedings Paper or Review Article or Early access	311
	AND LANGUAGES: (ENGLISH)	303
Scopus	TITLE-ABS-KEY(("Hybrid learning" OR "Blended Synchronous Learning" OR "Hybrid Classroom") AND ("Higher education" OR "University" OR "College") AND ("Development" OR "Evaluation" OR "Importance" OR "Advantage" OR "Benefit" OR "Challenge" OR "Barrier" OR "Obstacle"))	527
	AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "cp") OR LIMIT-TO (DOCTYPE, "bc") OR LIMIT-TO (DOCTYPE, "cr") OR LIMIT-TO (DOCTYPE, "re") OR LIMIT-TO (DOCTYPE, "bk"))	525
	AND (LIMIT-TO (LANGUAGE, "English"))	513
Number of articles that passed the initial retrieval = 841		
Duplicated studies = 25		
After eliminating duplicated studies = 668		
After title and keyword screening = 483		
After abstract screening = 292		
After full-text review screening =115		
Total = 115		

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Table 2: Inclusion Criteria And Exclusion Criteria

Primary Criteria		Secondary Criteria	
Inclusionary	**Exclusionary**	**Inclusionary**	**Exclusionary**
Journal articles that are retrievable in Scopus or WoS	Duplicated studies	Articles containing contents that are related to the keywords	Articles containing contents that are not related to the keywords
Conference papers and proceeding papers that are retrievable in Scopus or WoS	Invalid articles (articles for which full-text content is not available online)	Studies that can assist the Authors in fulfilling the research objectives	Studies that cannot assist the Authors in fulfilling the research objectives
Review articles that that are retrievable in Scopus or WoS			
Books or book chapters that are retrievable in Scopus or WoS			
Written in English	Written in non-English languages		

Evaluation Phase (Stage 2): The initial literature search using the search strings in Table 1 yielded 841 articles (WoS: 314; Scopus: 527), with the final search conducted on June 5, 2025. First, we removed 25 papers that were not articles, proceedings papers, early access publications, review articles, book chapters, or books, or were non-English publications, leaving 816 articles. Next, 148 duplicates were excluded, resulting in 668 articles. We then qualitatively screened the remaining 668 articles by title and keywords based on the inclusion and exclusion criteria in Table 2. This step excluded 185 articles whose titles or keywords did not align with the research purpose and objectives, leaving 483 articles. Subsequently, we screened the abstracts of these 483 articles using the same criteria, removing 191 articles irrelevant to the research objectives or questions. Finally, we conducted full-text reviews of the remaining 292 articles according to the criteria in Table 2. During this process, 177 articles were excluded due to insufficient quality or mismatched content focus. Ultimately, 115 articles were included in this study.

Classification Phase (Stage 3): In this final phase, the remaining 115 articles were categorized based on their content. The classification revealed that these articles covered the following key aspects:
-Definitions of Hybrid Learning;
-Current implementation status of Hybrid Learning;
-Advantages of Hybrid Learning;
-Challenges of Hybrid Learning; and
-Future directions of Hybrid Learning.
-The detailed classification process is presented in Table 3.

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Table 3: Process Of Thematic Synthesis And Classification

Step	Activity	Method/Approach	Output/Outcome
1	Reading and Familiarization	Conducted in-depth, iterative reading of the full texts of all 115 included studies.	Gained a comprehensive understanding of the data and identified initial patterns and key statements related to hybrid learning.
2	Data Extraction	Systematically extracted all findings, quotes, and data points relevant to the research objectives (RO1: Definition; RO2: Advantages & Challenges; RO3: Implementation & Future).	Created a comprehensive database of textual evidence from the literature.
3	Initial Coding (Open Coding)	Applied inductive thematic analysis. Generated initial codes directly from the extracted data without forcing them into pre-existing categories (e.g., "technical glitches," "flexibility for working students," "dual presence challenge").	Produced a large pool of descriptive codes that captured the granularity of the findings.
4	Categorization (Axial Coding)	Grouped related initial codes into broader, more abstract categories based on their conceptual similarity (e.g., grouped "technical glitches," "internet instability," and "platform complexity" into the category "Technological Infrastructure Challenges").	Organized the data into a coherent structure of intermediate-level categories.
5	Theme Development (Selective Coding)	Aggregated the categories into the five final, overarching themes that directly answer the research questions. Themes were refined for internal coherence and distinctiveness from one another.	• Implementation Status • Advantages • Challenges • Future Directions

Through the aforementioned methodology, this study aims to comprehensively and systematically review the application and current development status of hybrid learning in higher education, identify its advantages, examine the challenges encountered during implementation, and pinpoint research gaps to provide valuable references and guidance for future studies. The article search and screening process employed in this research is illustrated in Figure 1.

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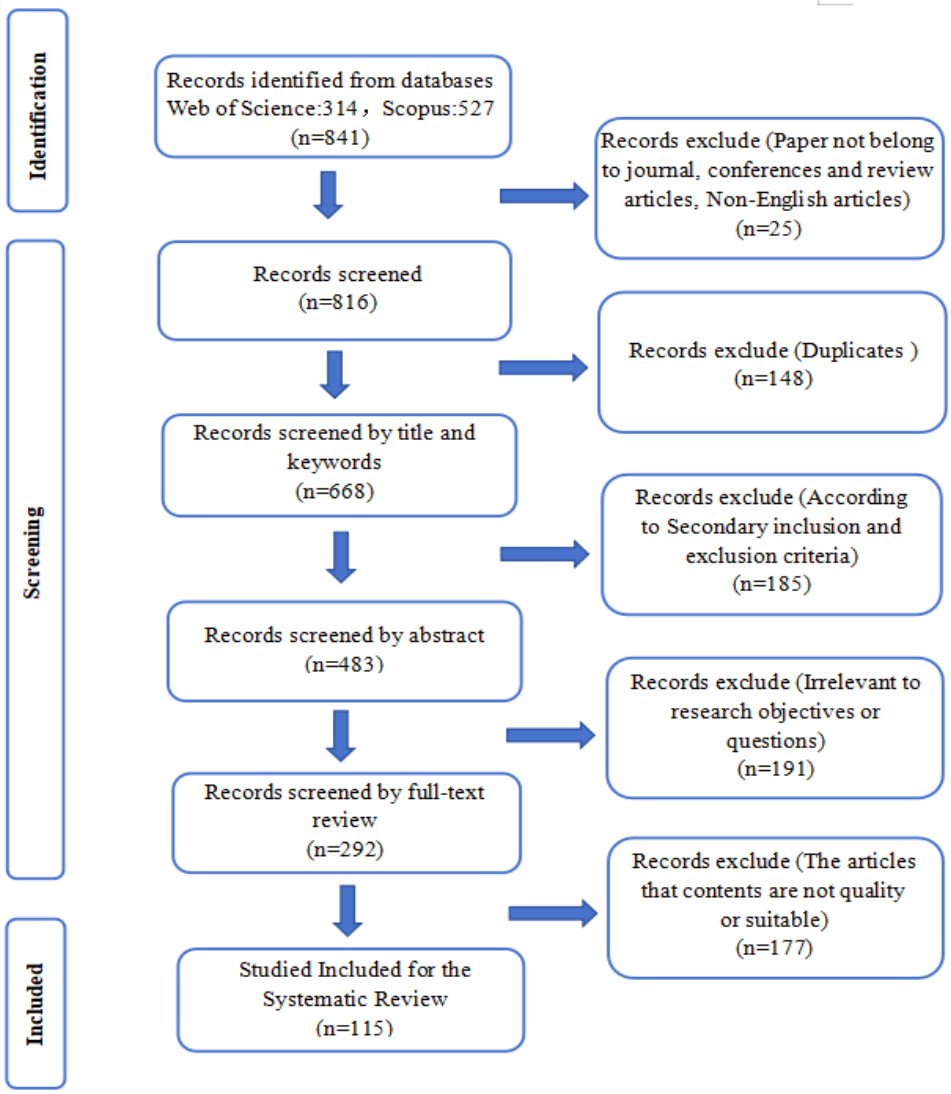

Figure 1: The Flow Chart Of Article Searching And Screening

Results

This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation, as well as the experimental conclusions that can be drawn.

Descriptive Analysis

Following the previously described literature search and screening process, this study ultimately included 115 articles for systematic review. After completing the retrieval and screening procedures, the selected studies were thoroughly examined through full-text reading. The annual distribution of published articles is presented in Figure 2.

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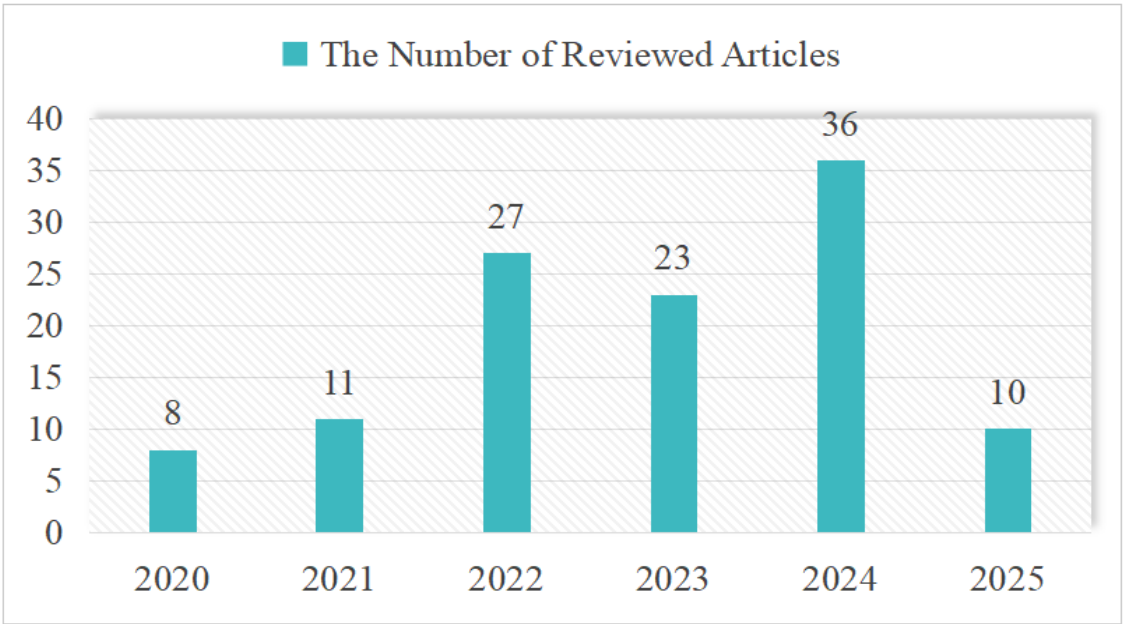

Figure 2: The Quantity Of Articles Published Per Year

Through systematic review of the included articles, it is evident that research on hybrid learning has gained global attention since 2020. As illustrated in Figure 2, the number of relevant publications reached 8 in 2020. Research activity increased in 2021, with 11 articles published that year. A significant growth emerged in 2022, yielding 27 publications. The output remained stable in 2023 (23 articles), while the upward trend continued in 2024 (36 articles). As of June 5, 2025 (the cutoff date for this study), 10 additional articles had been published. Collectively, these data demonstrate a consistent year-on-year increase in hybrid learning publications since 2020, reflecting sustained scholarly interest in this domain.

The literature search and screening process was conducted between May and June 2025, consequently excluding articles published after June 5, 2025. This temporal limitation resulted in incomplete coverage of 2025 publications. Thus, while only 10 articles from 2025 were included, this should not be interpreted as indicating declining research activity. Rather, the inclusion of 10 articles within the first half of 2025 alone suggests the continued relevance of hybrid learning research. Regarding publication sources, the reviewed studies were drawn from 55 journals, 31 conference proceedings, and 8 books. Figure 3 presents the ranked distribution of publication venues, though space constraints permit display of only the top 10 most frequent sources (by article count).

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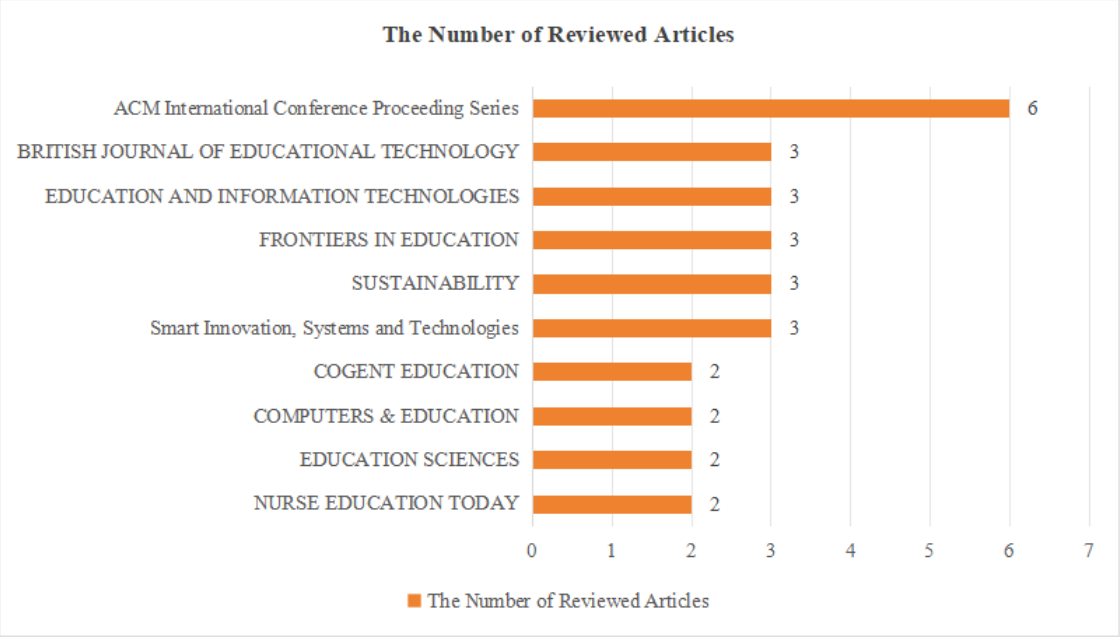

Figure 3: Number Of Papers Published Per Journal/Book/Conference

Results Analysis

Following the systematic review of the included articles, the content was categorized into five key themes, including definitions of hybrid learning; current implementation status of hybrid learning; advantages of hybrid learning; challenges of hybrid learning; future directions of hybrid learning.

Definition Of Hybrid Learning

The concept of hybrid learning has garnered significant attention in the field of education. Originating in the early 21st century, scholars have sought to define and refine its application across diverse learning environments.

Shi et al. (2020) conceptualize hybrid learning as an instructional model that utilizes synchronous multimedia technologies (e.g., audio and video) to integrate geographically dispersed students into a unified learning community. This approach provides equitable access to remote face-to-face classroom experiences for students in rural or underdeveloped regions while combining traditional in-person instruction with online learning to create more accessible educational environments.

Ortega-Arranz et al. (2024) define hybrid learning as involving "onsite (i.e., in the classroom) and online (e.g., in a different classroom, at home) students simultaneously under the instruction of the same teacher." Similarly, Thompson and Helal (2025) characterize hybrid learning as "instruction where remote students participate in face-to-face classes through rich media synchronization technologies such as video conferencing, web conferencing, or virtual worlds."

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Gudoniene et al. (2025) share this perspective, describing hybrid learning as the synchronous integration of traditional face-to-face teaching with online or distance education, offering a flexible and adaptive educational approach (Cronin, 2024; Hadizadeh & Kanık, 2023; Overton, 2021; Prihatmoko et al., 2022). This methodology enables educators to incorporate technological and digital resources while maintaining interpersonal interactions with students. Although subtle variations exist among these definitions, they collectively emphasize the fundamental requirement of learners' real-time synchronous participation in classroom activities.

Implementatation Status Of Hybrid Learning In Higher Education (RQ1)

Since its widespread adoption during the COVID-19 pandemic, the implementation of hybrid learning in higher education institutions has undergone significant transformations (Koort & Avall-Jaaskelainen, 2021; Pienaar, 2021; Zhao, 2022). Existing literature reveals several key operational models of this instructional approach across different contexts.

Geographically, hybrid learning has been implemented worldwide with distinct regional variations. North American and European institutions tend to emphasize technological sophistication, typically integrating advanced learning management systems with synchronous video conferencing tools (Fabian et al., 2024; Lin & Sun, 2024; Shu et al., 2024). While equally committed to hybrid learning, Asian universities focus more on solutions tailored for large-class teaching (Krishnamoorthy Srinivasan et al., 2024; Naeem & Bosman, 2023; Wolf et al., 2024). Australian institutions have demonstrated particular innovation in developing hybrid models for remote students, exemplified by Kee et al. (2025) who reconfigured the "architecture" of Synchronous Hybrid Learning (SHL) environments using the Pedagogy-Space-Technology (PST) framework to enhance technology-facilitated collaborative peer learning experiences.

The technological infrastructure supporting hybrid learning has improved substantially since 2020. Most institutions now employ integrated systems combining video conferencing platforms (Zoom, Microsoft Teams), learning management systems (Canvas, Moodle, Blackboard), and dedicated hybrid classroom technologies (Kehrer & Nieder-Steinheuer, 2021; Li et al., 2020; Mishra, 2023; Wadams & Schick-Makaroff, 2022). These typically include 360-degree cameras, multi-display systems, and advanced audio equipment designed to create equitable learning experiences for both onsite and online participants (Giannatelli, 2021). Recent implementations increasingly incorporate AI tools for automated transcription, real-time captioning, and learning analytics (Melcher et al., 2025; Pöysä-Tarhonen, 2025; Toprakli & Satir, 2025).

Pedagogically, hybrid learning has evolved beyond simple technology-mediated content delivery to more sophisticated instructional designs. Three predominant models have emerged: 1) Synchronous hybrid model where all students participate simultaneously regardless of location (Lakhal et al., 2021; Raes, 2022; Thompson & Helal, 2025; Vale et al., 2020); 2) Flexible hybrid model allowing students to choose participation mode per session (Samson, 2020); and 3) Rotating hybrid model where students alternate between onsite and online participation (Gallardo et al., 2023). The synchronous model remains most prevalent, particularly in discussion- and collaboration-intensive courses.

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Implementation varies significantly across disciplines. STEM fields typically combine theoretical instruction with virtual labs or simulation software (Koort & Avall-Jaaskelainen, 2021; Sivak, 2022; Vanhoolandt, 2024), while humanities and social sciences focus more on discussion-based hybrid seminars (Lakhal et al., 2020). Professional programs like business and education emphasize cross-modal case-based teaching (Stockert, 2024). Health sciences have developed particularly innovative models integrating virtual patient simulations with skills training (Gagnon et al., 2022).

Institutional support systems for hybrid learning have become more robust. Many universities now offer specialized hybrid learning certification programs for faculty and students, establish technical support teams, and provide instructional design consultants for course development (Stockert & Tidemann, 2022; Voicu-Dorobanțu, 2024). Some institutions have created physical "hybrid centers"—classroom spaces specifically optimized for simultaneous onsite and online instruction. Assessment methods in hybrid learning environments continue to evolve to address model-specific challenges (Patera, 2023). Common approaches include remotely proctored synchronous online exams, alternative assessments like e-portfolios, and multimodal project submissions (Auer, 2023; Elmehdi, 2022). Studies report increasing use of authentic assessments leveraging hybrid learning's unique advantages, such as collaborative projects between onsite and online student teams (Griffin et al., 2022).

Regarding infrastructure investment, leading institutions are redesigning physical learning spaces to better support hybrid learning. This includes installing ceiling microphones, multi-camera systems with auto-tracking capabilities, and interactive displays facilitating seamless integration of remote participants (Elmehdi, 2022; Stockert & Tidemann, 2022). Literature indicates that hybrid learning is transitioning from an emergency pandemic response to an established pedagogical approach in higher education (Kusumajati et al., 2023). However, implementation quality varies significantly across institutions, with the most successful cases typically featuring strong administrative support, dedicated resources, and ongoing faculty professional development. As hybrid learning matures, institutional focus is shifting from technological implementation to pedagogical optimization and quality assurance mechanisms (Wang & Guo, 2024).

Advantages Of Hybrid Learning In Higher Education (RQ2)

The application of hybrid learning in higher education has demonstrated significant multifaceted advantages that extend beyond enhancing teaching effectiveness to profoundly influence educational accessibility, flexibility, and resource utilization efficiency. Through systematic analysis of existing literature, these advantages can be categorized into several major aspects.

The enhancement of flexibility and accessibility stands as one of hybrid learning's most prominent advantages. Research indicates that by breaking temporal and spatial constraints (Leinonen, 2023; Seitl, 2024), hybrid learning creates unprecedented learning opportunities for various student populations (Monachesi, 2024; Pham & Pham, 2022). This flexibility manifests in multiple dimensions: it allows students to self-regulate their learning pace in terms of time arrangement (Barannikov et al., 2023; Dragicevic, 2020; Shi et al., 2020); enables students from remote areas (Margulis et al., 2020; Yu, 2022) and those unable to attend campus due to health reasons (Pham & Tran, 2022) to participate in quality education; and provides multiple participation options to accommodate different learning preferences (Meza-Fregoso et al.,

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2024). Practices at institutions like Tsinghua University demonstrate that this flexibility significantly promotes educational equity and accessibility (Qiao, 2022; Wang & Guo, 2024), particularly showing unique value in serving non-traditional student groups (De Caro-Barek & Støckert, 2024). Notably, this flexibility does not come at the expense of learning quality; on the contrary, most studies show that flexible learning arrangements actually improve student attendance and learning discipline (Munir, 2022).

The enhancement of teaching effectiveness represents the core advantage of hybrid learning. By integrating the strengths of online and offline teaching, hybrid learning creates richer learning experiences (Dragicevic, 2020; Shi et al., 2020). In practical disciplines like applied physics, the introduction of remote laboratory resources effectively addresses diverse student needs (Vanhoolandt, 2024); in foundational courses like programming, hybrid large-class teaching maintains instructional consistency (Krishnamoorthy Srinivasan et al., 2024) while solving faculty allocation challenges. Particularly noteworthy is how instructor presence in hybrid environments significantly promotes student engagement and satisfaction (Roque-Hernandez et al., 2024; Zhong et al., 2022), with this effect positively influencing multiple dimensions including social presence, cognitive presence, and learning satisfaction through technological efficacy (Shu et al., 2024). Compared to traditional face-to-face instruction, hybrid learning creates more engaging learning environments (Krishnan & Nagaratnam, 2023), with this appeal stemming from both the diversity of teaching methods (Dragicevic, 2020) and the potential for personalized learning (Mei, 2024).

The optimized allocation of educational resources constitutes another important advantage of hybrid learning. In terms of physical space, hybrid learning can reduce classroom capacity by 50% (Elmehdi, 2022), enabling increased student numbers without large-scale infrastructure expansion (Rehatschek, 2023); regarding faculty utilization, cross-campus (Stockert, 2024) and multi-campus teaching allows broader sharing of high-quality instructors. This resource optimization not only carries economic value but also provides feasible pathways for institutions to expand educational scale. Pandemic-era practices particularly demonstrated that preserving face-to-face learning opportunities in hybrid learning effectively mitigates learning loss caused by emergencies (Ross et al., 2024), with this flexible response mechanism proving crucial for ensuring educational continuity.

Cross-cultural communication and diverse interaction represent unique potential advantages of hybrid learning. Synchronous hybrid environments are particularly conducive to fostering trust, equity, and diversity (Zydney et al., 2020), potentially creating valuable cross-cultural learning experiences when local and remote learners participate together (Dragicevic, 2020; Shi et al., 2020). These diverse interactions not only broaden students' perspectives but also provide natural settings for developing the intercultural competencies needed in our globalized era. Educators note that well-designed hybrid environments can create inclusive learning spaces that better recognize and respect the multidimensionality and diversity of student backgrounds (Esposito, 2025).

The cultivation of learning autonomy and self-regulation skills represents a deeper advantage of hybrid learning. Hybrid environments require students to develop stronger time management abilities (Fabian et al., 2024; Munir, 2022) and self-regulated learning strategies (Mei, 2024), skills crucial for lifelong learning. Interestingly, remote students often appreciate this learning autonomy more than their on-site counterparts (Alwadood, 2023; Amirova et al., 2024; Zhao,

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2023), suggesting hybrid learning may be particularly suitable for developing adult learners' self-directed learning capabilities. This cultivation extends beyond cognitive dimensions to include key future-ready skills like digital literacy and transmedia communication (De Caro-Barek & Støckert, 2024).

The promotion of educational innovation serves as a derivative advantage of hybrid learning. By requiring instructors to reconsider course design, student interaction, and assessment methods, this reflective process objectively drives pedagogical innovation (Mensonen et al., 2024). Against the backdrop of sustainable development goals, hybrid learning provides a practical pathway for building flexible education systems (De Caro-Barek & Støckert, 2024), enabling higher education to better adapt to lifelong learning needs. Particularly in our rapidly changing digital era, hybrid learning environments themselves become experimental grounds for cultivating students' future-ready skills.

The support for institutional development strategies represents a macro-level advantage of hybrid learning. More than just a teaching method, hybrid learning can become an integral component of institutional strategic development. Through hybrid learning, institutions can more flexibly respond to challenges like demographic changes, technological innovation, and shifting societal demands (De Caro-Barek & Støckert, 2024). Some leading institutions have already incorporated hybrid learning into long-term planning as a key lever for enhancing educational quality and expanding social impact (Wang & Guo, 2024).

Challenges Of Hybrid Learning In Higher Education (RQ2)

Despite its numerous advantages, hybrid learning implementation faces complex, multidimensional challenges that extend beyond technical issues to deeper pedagogical, organizational, and psychological domains. Through systematic literature analysis, these challenges can be categorized into several key areas.

Technological challenges form fundamental barriers to effective hybrid learning. Research consistently documents how network latency (Shi et al., 2020), improper hardware configuration (Shi et al., 2020), and inadequate classroom equipment (Elmehdi, 2022; Sattayaraksa et al., 2023) frequently disrupt learning processes, creating significant frustration for both instructors and students (Chiluiza, 2023; Mata et al., 2023). These issues are particularly pronounced in cross-institutional teaching scenarios where disparities in technological infrastructure (Oktavia, 2023; Toprakli & Satir, 2025) and unstable internet connectivity (Esposito, 2025) exacerbate educational inequities. More critically, these technical problems collectively contribute to the "virtual back row" phenomenon, where remote students experience marked disadvantages in accessing social cues (Sawada et al., 2024) and participating in classroom interactions (Teoh et al., 2025), potentially creating new forms of educational inequality (Mei, 2024).

Instructional design challenges reveal deep tensions between traditional pedagogies and hybrid environments. Instructors universally struggle with simultaneously managing onsite and online students (Asaad, 2022; Huang, 2023; Ross et al., 2024), a dual focus that increases cognitive load (McCaw et al., 2024) and fundamentally challenges conventional classroom organization. Many teachers lack the necessary skills to design interactive hybrid courses (Li et al., 2023; van Wyk, 2024), particularly in balancing participation opportunities across modalities (Zhao, 2023), designing cross-modal collaborative activities (Ortega-Arranz et al., 2024; Pishtari et

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al., 2020), and implementing equitable assessment methods (Mensonen et al., 2024). These difficulties are especially acute in practice-oriented disciplines where hybrid learning struggles to accommodate group work and laboratory components (Verma, 2024), reflecting inherent tensions between hybrid models and certain disciplinary pedagogies.

Faculty workload and psychological stress present critical sustainability challenges. Studies consistently report substantially increased preparation time (Ayala-Carabajo, 2024; Lakhal et al., 2020; Li et al., 2023) and classroom management pressures (Pham & Tran, 2022), stemming from both technological demands (Gupta, 2022; McCaw et al., 2024) and the need to manage multiple information streams simultaneously (Ross et al., 2024). Chronic cognitive overload (McCaw et al., 2024) and technology-related stress (Abbas, 2023) are eroding professional identity and self-efficacy, with current institutional support systems proving inadequate (Mensonen et al., 2024). Without intervention, this may lead to faculty resistance and compromised teaching quality.

Student experience disparities introduce novel equity concerns in hybrid environments. Remote students consistently report reduced social interaction (La Rosa & Mavroudi, 2022; Munir, 2022; Pandey & Panda, 2023), weakened peer connections (Schermeier et al., 2025), and unequal participation opportunities (Teoh et al., 2025; Zhao, 2023). These differences not only impact learning outcomes but may also affect mental health (Munir, 2022). The requirement for advanced self-regulation skills (Ali & Hanna, 2022) to navigate hybrid environments' complexity (Uukkivi et al., 2022) creates additional barriers for some learners. Importantly, these challenges disproportionately affect students from different socioeconomic backgrounds, with variations in technology access and digital literacy (Musliadi et al., 2024) potentially amplifying existing educational inequalities (Esposito, 2025).

Institutional management challenges reveal structural mismatches between traditional higher education systems and hybrid learning requirements. Existing management systems, designed for single-mode teaching, struggle to accommodate hybrid learning's spatiotemporal flexibility across classroom scheduling (Toprakli & Satir, 2025), technical support (Costa Cornejo et al., 2024; Melcher et al., 2025; Nyman et al., 2024), faculty training (McCaw et al., 2024), and quality assessment (Krishnan & Nagaratnam, 2023). Cross-institutional collaborations face particular challenges with credit transfer, quality standards, and resource allocation (De Caro-Barek & Støckert, 2024; Griffin et al., 2022). This institutional lag constrains innovation and hinders effective sharing of quality educational resources.

Psychological and cognitive challenges, though often overlooked, have profound impacts. Significant variation exists in teachers' and students' acceptance and adaptability (Fedrick S et al., 2024; Lee, 2023; McCaw et al., 2024) with some exhibiting instinctive resistance to screen-mediated interactions (Fabula, 2023). Virtual environments alter traditional teacher-student power dynamics (Sawada et al., 2024), potentially creating communication barriers (Shu et al., 2024) and emotional distance (Martins et al., 2025) alongside new educational possibilities. Educators must recognize that hybrid learning represents not just technological adoption but a fundamental reconfiguration of educational relationships requiring psychological adaptation.
Socioemotional challenges particularly affect learning experience quality. The hybrid environment weakens sense of community (Schermeier et al., 2025), reduces nonverbal communication (Sawada et al., 2024), and provides insufficient emotional support (Huang et al., 2024; Munir, 2022). While research confirms socioemotional factors' critical role in

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successful implementation (Schermeier et al., 2025; Zhao, 2022), current attention to these aspects remains inadequate. This neglect risks creating a technology-centered approach that undermines educational effectiveness.

Future Directions Of Hybrid Learning In Higher Education (RQ3)

Based on systematic analysis of existing literature, hybrid learning in higher education is demonstrating several key future directions that reflect not only technological advancements but also profound transformations in educational paradigms. Through integration of prominent literature, we can anticipate the following important directions:

Cross-institutional collaboration and resource sharing models will undergo significant development. Research indicates that hybrid learning is transcending single-institution boundaries, evolving towards cross-campus (Meza-Fregoso et al., 2024), multi-institution (Kehrer & Nieder-Steinheuer, 2021; Marutschke, 2022), and even transnational collaborative models. Practices such as the joint Global Sustainability Challenge Master's program by European universities (Griffin et al., 2022) and Tsinghua University's Global Hybrid Classroom initiative (Wang & Guo, 2024) demonstrate that such collaboration not only optimizes resource allocation (Krishnamoorthy Srinivasan et al., 2024) but also provides students with diversified knowledge perspectives (Kehrer & Nieder-Steinheuer, 2021). Future applications of blockchain technology (Abu Zitar, 2021) and advanced synchronization technologies (Stockert & Tidemann, 2022) are expected to further reduce technical barriers to cross-institutional collaboration, creating truly borderless learning spaces (Ayub et al., 2022).
Technological integration is moving towards intelligent and immersive directions. Current technological applications have progressed from basic audiovisual equipment (Elmehdi, 2022) to include immersive technologies such as augmented reality (Alghamdi et al., 2022), mixed reality, and virtual reality (Sivak, 2022). Literature suggests that future hybrid learning environments will increasingly focus on creating seamless technological experiences, such as achieving true integration of physical and virtual spaces through advanced binaural audio technology (Stockert & Tidemann, 2022). Deep integration of artificial intelligence (Abu Zitar, 2021) will support more precise learning analytics (Naeem & Bosman, 2023) and personalized learning path planning, while professional communication platforms like Slack (Poskitt, 2022) may reshape teacher-student interaction patterns. These technological advancements will not only enhance learning experiences but may also give rise to entirely new educational paradigms.
Instructional model innovation will place greater emphasis on equity and participation. Research emphasizes that future hybrid learning design must pay particular attention to equal learning opportunities for students across different participation modes (Jakonen et al., 2024). Through role assignment (Zydney et al., 2020), optimized interaction practices (Jakonen et al., 2024), and professional communication tools (Poskitt, 2022), more equitable participation environments can be created. Special challenges in practice-oriented disciplines like veterinary science (Pienaar, 2021) are driving pedagogical innovations, such as combining online laboratories (Vanhoolandt, 2024) with immersive laboratory instruction (Gagnon et al., 2022). Notably, new teaching models like "pandemic pedagogy" (Ayub et al., 2022) are emerging, which may have profound implications for future educational crisis response.

Teacher professional development systems will undergo structural transformation. Literature consistently indicates that the deepening development of hybrid learning requires corresponding teacher support systems (Mettis & Väljataga, 2020; Zhao, 2023). Future teacher training will move beyond technical operation skills to focus more on helping teachers "move

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beyond existing pedagogical paradigms" (Mettis & Väljataga, 2020) and develop teaching competencies specific to hybrid spaces. Such training needs to incorporate authentic teaching practices (McCaw et al., 2024) and include ongoing professional development opportunities ((Mensonen et al., 2024). New support models like collaborative teaching support (McCaw et al., 2024) and teaching assistant development (Wadams & Schick-Makaroff, 2022) will also see broader application, forming comprehensive teacher development ecosystems.

Curriculum structure and certification systems may experience fundamental restructuring. The development of hybrid learning is challenging traditional course organization methods, such as addressing faculty allocation issues through large-scale hybrid learning (Krishnamoorthy Srinivasan et al., 2024) or meeting diverse student needs through flexible face-to-face scheduling (Gagnon et al., 2022). Against the backdrop of the Fourth Industrial Revolution (Abu Zitar, 2021), degree conferral methods and curriculum structures may become more diversified, with micro-credentials and online certifications(Abu Zitar, 2021) developing alongside traditional degrees. Practices in international accreditation of business master's programs (Voicu-Dorobanțu, 2024) demonstrate that hybrid learning is becoming an important pathway to meeting high-standard accreditation requirements.

Quality assurance and outcome assessment will become more data-driven. Deep analysis of learning management systems and campus activity data (Naeem & Bosman, 2023) provides new possibilities for hybrid learning quality monitoring. Future quality assurance will rely more heavily on formative assessment data (Auer, 2023) and real-time learning analytics, establishing evidence-based continuous improvement mechanisms (Liu, 2024). This data-driven approach can not only identify students needing support (Naeem & Bosman, 2023) but also provide basis for teaching strategy adjustments (Jiang, 2021; Nykvist et al., 2021), ultimately achieving precise enhancement of hybrid learning outcomes.

Sustainability will become a core consideration. Literature emphasizes that hybrid learning development must consider its contribution to educational sustainability (Pöysä-Tarhonen, 2025). This includes three aspects: environmental sustainability−reducing educational carbon footprint through optimized resource allocation; social sustainability−promoting educational equity and inclusion (Esposito, 2025); and operational sustainability−establishing long-term maintainable quality assurance systems. Infrastructure upgrade practices at institutions like Tsinghua University (Wang & Guo, 2024) demonstrate that sustainable hybrid learning requires coordinated development of hardware, software, and "humanware."

Discipline-specific development paths will become more distinct. Different disciplines are forming specialized hybrid learning models, such as immersive laboratory arrangements in health sciences (Gagnon et al., 2022), remote laboratory applications in engineering (Vanhoolandt, 2024), and cross-cultural discussion designs in humanities and social sciences (Zydney et al., 2020). This differentiated development suggests that future evolution of hybrid learning will focus more on deep alignment with disciplinary characteristics rather than pursuing standardized models.

Integration with lifelong learning systems will intensify. The flexibility advantages of hybrid learning (Schermeier et al., 2025; Xu, 2024) make it an ideal choice for supporting lifelong learning. Literature shows that higher education institutions are expanding continuing

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education markets through hybrid learning (Uskov, 2023), providing more flexible learning opportunities for working adults. This direction strongly aligns with calls for lifelong learning in sustainable development goals (De Caro-Barek & Støckert, 2024) and may reshape the social function positioning of higher education.

Discussions

This systematic review synthesizes 115 studies to provide a comprehensive understanding of hybrid learning in higher education. The following discussion interprets these findings, moving beyond mere restatement to offer critical analysis, theoretical grounding, and implications for practice and research.

RQ1: What Is The Current Implementation Status Of Hybrid Learning In Higher Education?

The findings confirm that hybrid learning has evolved from an emergency response into a standardized and diversified instructional model, with distinct operational patterns across global contexts. This institutionalization aligns with Graham (2006) framework of blended learning efficiency, where successful models strategically balance online autonomy with face-to-face interactivity. However, the persistence of varied definitions (e.g., HyFlex, Blended Synchronous Learning) indicates a lack of consensus, which can lead to confusion in policy and practice. The implementation status varies significantly by region and discipline; for instance, STEM fields face unique challenges in replicating lab experiences (Koort & Avall-Jaaskelainen, 2021), while humanities may find it easier to adapt seminar discussions. This variation underscores that there is no single "best" model; instead, institutions must adopt a context-sensitive approach, tailoring their hybrid strategies to local resources, faculty expertise, and student demographics.

RQ2: What Are The Advantages And Challenges Of Hybrid Learning In Higher Education?

The advantages of flexibility and accessibility are widely recognized, supporting Deci and Ryan's (1985) Self-Determination Theory by enhancing learner autonomy. However, this benefit is paradoxical: while it empowers many, it can exacerbate inequalities for students in rural or low-income areas with poor internet access (Mei, 2024), creating a "flexibility gap." Similarly, the reported challenges are not merely technical but deeply pedagogical and systemic. Faculty workload and cognitive load are major concerns (Li et al., 2023), which can be explained by the Technology Acceptance Model (Davis, 1989); when perceived usefulness is low due to inadequate support, resistance is inevitable. The most critical challenge, however, is the "dual presence" problem, where instructors struggle to engage both in-person and online students equitably (Lakhal et al., 2020). This is not a flaw of the technology but a failure of design. Findings are contradictory: some studies report high engagement (Pishtari et al., 2020), while others report disengagement (McCaw et al., 2024). This contradiction is resolved by examining the pedagogical model−courses with structured breakout rooms and peer facilitation (Griffin et al., 2022) succeed, whereas lecture-dominant models fail.

RQ3: What Are The Future Directions Of Hybrid Learning In Higher Education?

The future of hybrid learning lies in addressing its current limitations through innovation and systemic change. The integration of AI for personalized learning and VR/AR for simulated labs (Abu Zitar, 2021) holds great promise, but its success depends on bridging the digital divide. Future research must move beyond descriptive studies to conduct contextualized comparative analyses across disciplines and institution types to identify which models work best for whom and under what conditions. Furthermore, the long-term sustainability of hybrid

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learning must be evaluated not just pedagogically, but also economically and environmentally. The concept of a "green credit" system, which quantifies the carbon reduction from reduced commuting, could be a powerful incentive for institutional adoption. Ultimately, the future of hybrid learning is not about technology, but about reimagining the educational ecosystem to be more equitable, resilient, and learner-centered.

Conclusion

This systematic review synthesizes 115 studies to map the post-pandemic evolution of hybrid learning (HL) in higher education. Our analysis reveals that HL has transitioned from an emergency response to a diversified and institutionalized instructional model, yet its sustainability is challenged by technological inequity, faculty workload, and pedagogical design flaws.

The key contribution of this study lies in its integrated synthesis, which moves beyond a simple cataloging of advantages and challenges. We identify that the future of HL hinges on a paradigm shift: from merely adopting technology to reimagining the educational ecosystem. This requires three concrete actions: First, institutions must establish comprehensive faculty support systems that integrate technical training with pedagogical redesign and psychological well-being. Second, the development of cross-institutional credit transfer frameworks is critical for realizing the full potential of flexible learning. Third, the long-term success of HL demands the adoption of sustainability metrics that evaluate its environmental, social, and economic impacts.

For future research, we advocate for contextualized comparative studies across disciplines to identify optimal models, and for the exploration of AI-enhanced tools that prioritize equity and ethics. This review provides actionable insights for policymakers, institutions, and educators to navigate the complexities of hybrid learning and ensure its development is both effective and equitable.

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Zydney, J. M., McKimmy, P., Lindberg, R., & Schmidt, M. (2019). Here or There Instruction: Lessons Learned in Implementing Innovative Approaches to Blended Synchronous Learning. *TechTrends*, *63*(2), 123-132. https://doi.org/10.1007/s11528-018-0344-z

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APPENDIX

List of Articles Included in This Systematic Review

No.	Year	Author	Journal/Conference/Book	Title
1	2020	Samson, P.J.	Journal of Geoscience Education	Student behaviors in a blended synchronous course
2	2020	Zydney, JM, Warner, Z, Angelone, L, Zydney,	COMPUTERS & EDUCATION	Learning through experience: Using design based research to redesign protocols for blended synchronous learning environments
3	2020	Dragicevic, N., Pavlidou, L, Tsui, E.	Proceedings of the 14th IADIS International Conference e-Learning 2020, EL 2020 - Part of the	Use of hybrid classroom and open educational resources: Experience gained from a university in Hong Kong
4	2020	Vale, J, Oliver, M, Clemmer, RMC, Vale,	CANADIAN JOURNAL FOR THE SCHOLARSHIP OF TEACHING AND	The Influence of Attendance, Communication, and Distractions on the Student Learning Experience using Blended Synchronous Learning
5	2020	Shi, YF, Tong, MW, Sun, J, Dai, HB, Long, TT,	2020 11TH INTERNATIONAL CONFERENCE ON E-EDUCATION, E-BUSINESS, E-	Investigating Challenges and Benefits of Educational Equalization Oriented Blended Synchronous Learning
6	2020	Demazière, C.	International Conference on Physics of Reactors: Transition to a Scalable Nuclear Future, PHYSOR	Using active learning in hybrid learning environments
7	2020	Lakhal, S, Mukamurera, J, Bédard, ME, Heilporn,	NTERNATIONAL JOURNAL OF EDUCATIONAL TECHNOLOGY IN HIGHER	Features fostering academic and social integration in blended synchronous courses in graduate programs
8	2020	Pishtari, G, Rodríguez-Triana, MJ, Sarmiento-	BRITISH JOURNAL OF EDUCATIONAL TECHNOLOGY	Learning design and learning analytics in mobile and ubiquitous learning: A systematic review
9	2021	Zitar, R.A.	ACM International Conference Proceeding Series	Smart Learning and Fourth Industrial Age Effects on Higher Education
10	2021	Pienaar, M., Mostert, E.	Perspectives in Education	The teaching mix matters: Rethinking veterinary education at a South African university
11	2021	Mettis, K, Väljataga, T, Mettis, Kadri, Valjataga,	BRITISH JOURNAL OF EDUCATIONAL TECHNOLOGY	Designing learning experiences for outdoor hybrid learning spaces
12	2021	Koort, J., Ávall-Jääskeläinen, S.	FEMS Microbiology Letters	Redesigning and teaching veterinary microbiology laboratory exercises with combined on-site and online participation during the COVID-19 pandemic
13	2021	Kehrer, M, Nieder-Steinbauer, K, Kehrer,	PROCEEDINGS OF THE EUROPEAN CONFERENCE ON PATTERN LANGUAGES OF	Design Patterns for Synchronous Hybrid University Courses for Multiple Sites
14	2021	Giannatelli, A., Tomasini, A.	Proceedings - SEFI 49th Annual Conference: Blended Learning in Engineering Education:	PANDEMIC AND UNCHARTED NEW NORMAL: MOOCS, SERIOUS GAMES AND ONLINE LEARNING COMMUNITIES TO SUPPORT HYBRID CLASSROOMS
15	2021	Jiang, Y.	ACM International Conference Proceeding Series	Management system of hybrid classroom teaching process oriented to smart classroom
16	2021	Paiva, C.V., Cantarutti, C., Garcia-Huidobro, R.	Future of Educational Innovation Workshop Series - Machine Learning-Driven Digital Technologies for	Implementing and Evaluating Hybrid Classes in a Biostatistics Course for Dentistry
17	2021	Overton, S, Overton, Stefan	PROCEEDINGS OF THE 21ST EUROPEAN CONF	Engagement Challenges in a Hybrid Classroom: Reflections of a Higher Education Tutor
18	2021	Lakhal, S, Mukamurera, J, Bédard, ME, Heilporn,	OURNAL OF COMPUTER ASSISTED LEARNING	Students and instructors perspective on blended synchronous learning in a Canadian graduate program
19	2021	Nykvist, SS, De Caro-Barek, V, Stockert, R,	FRONTIERS IN EDUCATION	Key Factors Needed for Developing a Higher Education Cross-Campus Learning Environment in a Nordic Context
20	2022	Zhao, F., Fashola, O., Olarewaju, T., Moran, F.,	Eurasian Studies in Business and Economics	How Hybrid Learning Can Enhance the Student Experience and Teaching Outcomes in the Wake of COVID-19: A Case Study of a Business School in the United Kingdom
21	2022	Prihatmoko, Y., Nindiganha, N.,	Proceedings - International Conference on Education and Technology, ICET	The Effect of Hybrid Learning Strategy and Achievement Motivation on Student Learning Outcomes
22	2022	Yu, J., Li, X., Zhou, W.W.	Transitions: Journal of Transient Migration	Disrupted or sustained? Chinese international students' perceptions of transnational hybrid learning amid politics and pandemic
23	2022	Alghamdi, A., Iqbal, S., Trendova, K., Nkasu,	2022 Advances in Science and Engineering Technology International Conferences, ASET 2022	Undergraduate Students' Perspectives on Hybrid Education in the United Arab Emirates
24	2022	Raes, A.	Postdigital Science and Education	Exploring Student and Teacher Experiences in Hybrid Learning Environments: Does Presence Matter?
25	2022	Gagnon, K., Bachman, T., Beuning, B.,	Physical Therapy	Doctor of Physical Therapy Education in a Hybrid Learning Environment: A Case Report
26	2022	Marutschke, D.M., Kryssanov, V.V.,	Smart Innovation, Systems and Technologies	Case Study on Smart Education During a Global Pandemic: A Hybrid, International Course on Global Software Engineering
27	2022	Stockert, R., Tidemann, A.	International Conference on Systems, Signals, and Image Processing	Hybrid Learning Spaces with Spatial Audio
28	2022	Gupta, C.P., Ravi Kumar, V.V.	Proceedings of the 2022 9th International Conference on Computing for Sustainable Global	Hybrid Learning Challenges and Knowledge Management: Role of Information Technology
29	2022	La Rosa, AD, Mavroudi, A, La Rosa, Angela	8TH INTERNATIONAL CONFERENCE ON HIGHER EDUCATION ADVANCES (HEAD '22)	A case study of hybrid learning in higher education using quantitative research design
30	2022	Uukkivi, A, Labanova, O, Petjärv, B, Noukas, K,	8TH INTERNATIONAL CONFERENCE ON HIGHER EDUCATION ADVANCES (HEAD '22)	How to support cooperation in hybrid learning?
31	2022	Elmehdi, H.M., Iglesias, A.T.	Internoise 2022 - 51st International Congress and Exposition on Noise Control Engineering	Assessing Acoustic Conditions in Hybrid Classrooms with COVID-19 Social Distancing at the University of Sharjah
32	2022	Sivak, M., Thorne, J.	Proceedings of 2022 8th International Conference of the Immersive Learning Research Network, iLRN	Work-in-Progress - Extended Reality Pilots for Hybrid Learning: A New NUFlex for Northeastern University
33	2022	Van Pham, A.T., Pham, C.M.	ACM International Conference Proceeding Series	Students' Perceptions towards Hybrid Learning during the COVID-19 Pandemic
34	2022	Asaad, S., Salti, H., Farhat, M.	Proceedings of the International CDIO Conference	Engineering Students' Engagement in a Hybrid Learning Mode: Comparative Study
35	2022	Ali, A.D., Hanna, W.K.	Journal of Educational Computing Research	Predicting Students' Achievement in a Hybrid Environment Through Self-Regulated Learning, Log Data, and Course Engagement: A Data Mining Approach
36	2022	Poskitt, C.M., Shim, K.J., Lau, Y.M., Ong, H.S.	Proceedings of the Annual Hawaii International Conference on System Sciences	Mind the Gap: Reimagining an Interactive Programming Course for the Synchronous Hybrid Classroom
37	2022	Pham, A.T.V., Tran, T.H.	ACM International Conference Proceeding Series	Teachers' Perceptions of Synchronous Hybrid Teaching during the Covid-19 Pandemic
38	2022	Hadizadeh, A, Kanik, M, Hadizadeh, Abbas,	AFRICA EDUCATION REVIEW	Emergency Blended Synchronous Learning Model during the COVID-19 Pandemic: A Qualitative Analysis

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39	2022	Li, XH,2020 Yang, YQ, Chu, SKW, Zainuddin, Z,	ASIA PACIFIC JOURNAL OF EDUCATION	Applying blended synchronous teaching and learning for flexible learning in higher education: an action research study at a university in Hong Kong
40	2022	Zhong, QJ, Wang, Y, Lv, W, Xu, J, Zhang, YC,	SUSTAINABILITY	Self-Regulation, Teaching Presence, and Social Presence: Predictors of Students' Learning Engagement and Persistence in Blended Synchronous Learning
41	2022	Marey, A, Goubran, S, Tarabieh, K, Marey,	BUILDINGS	Refurbishing Classrooms for Hybrid Learning: Balancing between Infrastructure and Technology Improvements
42	2022	Ayub, E, Lim, CL, Yeo, DCH, Ismail, SR, Ayub,	FRONTIERS IN EDUCATION	Developing a Solution for Hybrid Classroom: A Pilot Study From a Malaysian Private University
43	2022	Munir, H, Munir, Hussan	EDUCATION SCIENCES	Reshaping Sustainable University Education in Post-Pandemic World: Lessons Learned from an Empirical Study
44	2022	Qiao, WF, Li, ML, Li, RM, Qiao, Weifeng, Li,	FRONTIERS OF EDUCATION IN CHINA	Beyond Tech: The Impact of Hybrid Classroom Climate on the Learning Outcomes of University Students
45	2022	Wadams, ML, Schick-Makaroff, K, Wadams,	JOURNAL OF FURTHER AND HIGHER EDUCATION	Teaching assistant development and contributions in online, MOOC and blended synchronous settings: an integrative review
46	2022	Griffin, D, Gallagher, S, Vigano, V, Mousa, D,	EDUCATION SCIENCES	Best Practices for Sustainable Inter-Institutional Hybrid Learning at CHARM European University
47	2023	Naseem, U., Bosman, L.	IEEE Global Engineering Education Conference, EDUCON	Learner Engagement Analytics in a Hybrid Learning Environment
48	2023	Chiluiza, K., Echeverria, V., Pinargote, A.,	Lecture Notes in Educational Technology	Implementing Synchronous Hybrid Learning: Insights from Teachers and Students' Experiences
49	2023	Sattayaraksa, W.D., Lumgrangsee, P.,	Pakistan Journal of Life and Social Sciences	Teaching and Learning Management in the Bachelor of Education Program of Thai Private Higher Education Institutions during COVID-19
50	2023	Oktavia, T.	Journal of System and Management Sciences	An Empirical Study on the Factors Influencing Readiness to Implement Hybrid Learning
51	2023	Mishra, J., Dholakia, K.	Sustainable Practices in Higher Education: Finance, Strategy, and Engagement	The Future of Hybrid Learning Models and Sustainable Education in the Post-Pandemic Era
52	2023	Alwadood, Z., Halim, S.A., Bakar, S.A., Noor,	International Journal of Evaluation and Research in Education	Assessing student perceptions on hybrid learning
53	2023	Kusumajati, D.A., Chairiyani, R.P.,	ACM International Conference Proceeding Series	Effectiveness of Hybrid Learning as Technology Based Learning Model in the New Normal Era
54	2023	Rehatschek, H, Rehatschek, Herwig	LEARNING IN THE AGE OF DIGITAL AND GREEN TRANSITION, ICL2022, VOL 2	Experiences and Challenges of Building up an Open Source Based Livestreaming System with Back Channel to Implement a Hybrid Classroom Scenario
55	2023	Leinonen, T., Mikkeli, T.	Smart Innovation, Systems and Technologies	Space and Time in Hybrid Teaching and Learning Environments: Two Cases and Design Principles
56	2023	Uskov, V.	Smart Innovation, Systems and Technologies	Smart Education: Students' Perception of Hybrid Learning in Graduate Computing Curriculum
57	2023	Auer, N.	Digital Teaching, Learning and Assessment: the Way Forward	Formative assessment in hybrid learning environments
58	2023	Mata, F., Torres-Ruiz, M., Zagal, R., González	Active and Transformative Learning in STEAM Disciplines: From Curriculum Design to Social	How a hybrid education model can support the COVID-19 sanitary emergency based on information and communication technologies
59	2023	Fabula, JB, Fabula, Jennifer B.	IAFOR JOURNAL OF EDUCATION	Hybrid Learning Experiences of College Students with Special Education Needs
60	2023	Huang, RH, Mustafa, MY, Tlili, A, Chang, TW,	BLENDED LEARNING: LESSONS LEARNED AND WAYS FORWARD, ICBL 2023	Ready or Not? Investigating Teachers' Readiness for Adopting Online Merge Offline (OMO) Learning in Digital Transformation
61	2023	Krishnan, J., Nagaratnam, S.	2023 11th International Conference on Information and Education Technology, ICIET 2023	Hybrid Learning: A Boon or Bane
62	2023	Zhao, X.	International Journal of Emerging Technologies in Learning	Hybrid Learning through Lecture Capture: Exploring Perspectives and Overcoming Challenges with Blackboard Encore Technology
63	2023	Patera, S., Del Gottardo, E., Tarantino, A.	Communications in Computer and Information Science	Two years of Blended Synchronous Mode Learning in Higher Education. The Students' Experience Told Through Their Metaphors
64	2023	Barannikov, K., Ananin, D., Strikun, N., Alkanova,	Voprosy Obrazovaniya / Educational Studies Moscow	Hybrid Learning: Russian and International Practice
65	2023	Cheung, KL, Wu, H, Cheung, Ka Ling, Wu,	PROPERTY MANAGEMENT	Evaluation of Hybrid Learning and Teaching Practices: The Perspective of Academics
66	2023	Gallardo, K, Glasserman, L, Rivera, N, Martinez-	CONTEMPORARY EDUCATIONAL TECHNOLOGY	Learning assessment challenges from students and faculty perception in times of COVID-19: A case study
67	2023	Li, KC, Wong, BTM, Kwan, R, Chan, HT, Wu,	SUSTAINABILITY	Evaluation of Hybrid Learning and Teaching Practices: The Perspective of Academics
68	2023	Abbas, A, Rincón, GB, Wang, LY, Siddiqui, MK,	ELECTRONIC JOURNAL OF E-LEARNING	Investigating the Impact of Technostress on Perceived Hybrid Learning Environment and Academic Performance
69	2023	Pandey, SC, Panda, S, Pandey, Satyendra C.,	QUALITY ASSURANCE IN EDUCATION	Universities and innovation - the case of hybrid courses
70	2024	Lee, Y.L., Ramasamy, R.T.	Journal of Institutional Research South East Asia	Hybrid Learning at Higher Education Institution: A Needs Analysis for Synergistic Scaffolds
71	2024	Fedrick, A.D.S., Rao, M.R.R., Gomathi, B.S.,	Pakistan Journal of Life and Social Sciences	A Demographic Analyses: A Survey on Faculty's Perspectives of Innovative Hybrid Learning Environment
72	2024	Eija, N, Sari, PS, Kristina, M, Tiina, T,	NURSE EDUCATION TODAY	The experiences of health sciences students with hybrid learning in health sciences education-A qualitative study
73	2024	Ortega-Arranz, A., Amarasinghe, I.,	COMPUTERS & EDUCATION	Collaborative activities in hybrid learning environments: Exploring teacher orchestration load and students' perceptions
74	2024	Mei, L., Balsiri, N.	Eurasian Journal of Educational Research	Integrating Hybrid Classroom Models Based on Academic Management to Enhance Student Success: A Systematic Literature Review
75	2024	Voicu-Dorobantu, R., Plese, C., Bobircă, A.B.,	Proceedings of the International Conference on Virtual Learning	Optimizing hybrid learning for international accreditation in business master's programs–A comprehensive framework
76	2024	Monachesi, P, Monachesi, Paola	TOWARDS A HYBRID, FLEXIBLE AND SOCIALLY ENGAGED HIGHER EDUCATION,	The Impact of Hybrid Spaces in Higher Education Experiential Learning
77	2024	Cornejo, P.C., Pierrot, L., Landa, M.S.	International Conference on Computer Supported Education, CSEDU - Proceedings	Development of an Instrument for Evaluating Learning Experiences in a Hybrid Learning Environment
78	2024	Seitl, C, Seitl, Camilla	INTERNATIONAL JOURNAL ON STUDIES IN EDUCATION	There Is Another Room on the Other Side of the Screen: Learning via Zoom in a Hybrid Context

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79	2024	Amirova, A., Zhumabayeva, A.,	Journal of Education and e-Learning Research	Students' perspectives of a hybrid learning system in Kazakhstani higher education: A case study
80	2024	Vanhoolandt, C., Vincke, B., Durracq, B., Aubert,	ecture Notes in Networks and Systems	Critical Analysis of a Hybrid Teaching Approach Using Remote Laboratories at University
81	2024	Cronin, S.	How to Use Digital Learning with Confidence and Creativity: A Practical Introduction	Technologies for hybrid learning
82	2024	Krishnamoorthy Srinivasan, S.S., Gupta,	SIGCSE 2024 - Proceedings of the 55th ACM Technical Symposium on Computer Science	An Experience Report on Teaching a Large Introductory Programming Course in Hybrid Mode
83	2024	Xu, J.	Teaching and Learning in the Digital Era: Issues and Studies	Teaching and Learning in the Digital Era: Issues and Studies
84	2024	Huang, Q., Kumarasinghe, P.,	Journal of Infrastructure, Policy and Development	Transformative learning experiences: An empirical analysis of hybrid learning effectiveness in management education in Sri Lanka
85	2024	Verma, C.	Procedia Computer Science	Machine Learning Model for Applicability of Hybrid Learning in Practical Laboratory
86	2024	Liu, N.	ACM International Conference Proceeding Series	Exploring the knowledge map and application prospects of hybrid learning research in the field of higher education
87	2024	Stockert, R, De Caro-Barek, V, Stockert,	LEARNING AND COLLABORATION TECHNOLOGIES, PT II, LCT 2024	Hybrid Spaces in Higher Education: A Comprehensive Guide to Pedagogical, Space and Technology Design
88	2024	Meza-Fregoso, JA, Alminada-Tello, E,	2024 IEEE COLOMBIAN CONFERENCE ON COMMUNICATIONS AND COMPUTING,	Transforming Higher Education: The Role of ICT in Baja California Before and After the COVID-19 Pandemic
89	2024	Ayala-Carabajo, R., Llerena-Izquierdo, J.	Lecture Notes in Networks and Systems	Bibliometric Review on a Hybrid Learning Model with VLEs from a Higher Education Context
90	2024	Mensonen, M, Pramila-Savukoski, S, Mikkonen,	NURSE EDUCATION TODAY	The experiences of social and health care and health sciences educators of implementing hybrid teaching in higher education: A qualitative study
91	2024	Wang, XX, Guo, SS, Wang, Xiaoxiao, Guo,	ECNU REVIEW OF EDUCATION	Technology-Supported University Teaching Models in China During the Pandemic: National Survey and Future Prospects
92	2024	De Caro-Barek, V, Stockert, R, De Caro-	FRONTIERS IN EDUCATION	Road works ahead: the journey of an innovative cross-campus hybrid learning space navigating higher education institutions' organizational setbacks
93	2024	Jakonen, T, Jauni, H, Sert, O, Jakonen, Teppo,	APPLIED LINGUISTICS	Achieving Joint Attention and Understanding of Task Responsibilities in Synchronous Hybrid L2 Classroom Group Work
94	2024	Roque-Hernández, RV, López-Mendoza, A,	HELIYON	Perceived instructor presence, interactive tools, student engagement, and satisfaction in hybrid education post-COVID-19 lockdown in Mexico
95	2024	Sawada, S, Kim, S, Hirokawa, M, Suzuki, K,	MULTIMODAL TECHNOLOGIES AND INTERACTION	MirrorCampus: A Synchronous Hybrid Learning Environment That Supports Spatial Localization of Learners for Facilitating Discussion-Oriented Behaviors
96	2024	Usher, M, Hershkovitz, A, Usher, Maya,	LEARNING ENVIRONMENTS RESEARCH	From guides to jugglers, from audience to outsiders: a metaphor analysis of synchronous hybrid learning
97	2024	van Wyk, H, Rosa, C, van Wyk, H., Rosa, C.	SOUTH AFRICAN JOURNAL OF HIGHER EDUCATION	AN EXPLORATORY STUDY TO EVALUATE THE TEACHING STRATEGIES IN THE HYBRID HIGHER EDUCATION CLASSROOM
98	2024	Mccaw, CT, Menchs, A, Boxer, A, Cameron, S	EDUCATION AND INFORMATION TECHNOLOGIES	From "Am I just too old for this?" To "Hey - I think I could do that!": a collaborative self-study of the implementation of blended synchronous learning in initial teacher education
99	2024	Fabian, K, Smith, S, Taylor-Smith, E, Fabian,	TECHTRENDS	Being in Two Places at the Same Time: a Future for Hybrid Learning Based on Student Preferences
100	2024	Sun, J, Tong, MW, Long, TT, Wang, QY, Sun, Jia,	ETR&D-EDUCATIONAL TECHNOLOGY RESEARCH AND DEVELOPMENT	Innovation and diffusion of blended synchronous classroom in Chinese primary and junior middle schools
101	2024	Ross, SL, Jiang, SY, Young, MF, Meyer, JL,	PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED	In- person learning during the pandemic: Student take- up and school- level effects of remote and hybrid instruction on student outcomes
102	2024	Wolf, P, Cornican, K, Frederiksen, MH,	CREATIVITY AND INNOVATION MANAGEMENT	I think they just logged on and fell asleep: Challenges to facilitating creativity online in higher engineering education
103	2024	Musliadi, M, Triyono, S, Jamilah, J, Musliadi,	LANGUAGE LEARNING IN HIGHER EDUCATION	Enhancing speaking agility: unveiling Indonesian lecturers' hybrid teaching experiences in oral communication skills
104	2024	Lin, F, Sun, JJ, Lin, Feng, Sun, Jingjing	INFORMATION AND LEARNING SCIENCES	Lessons learned from the COVID-19 pandemic: a practical guide for designing synchronous online teaching in higher education
105	2024	Shu, FF, Liu, QT, Wang, QY, Tu, FJ, Li, HX,	EDUCATION AND INFORMATION TECHNOLOGIES	Examining Factors Influencing Online Adult Learners' Satisfaction with Blended Synchronous Learning
106	2025	Gudoniene, D, Staneviciene, E, Huet, I,	SUSTAINABILITY	Hybrid Teaching and Learning in Higher Education: A Systematic Literature Review
107	2025	Thompson, J, Helal, J, Thompson, James, Helal,	EDUCATIONAL RESEARCH AND EVALUATION	Here and elsewhere, together: how emerging blended synchronous learning approaches and perceptions can inform teaching guidance and support
108	2025	Martins, F, Cezarino, LO, Challco, GC, Liboni, L,	SUSTAINABLE DEVELOPMENT	The Role of Hybrid Learning in Achieving the Sustainable Development Goals
109	2025	Kee, T, Kuys, B, Zhang, J, Kee, Tris, Kuys, Blair,	EDUCATION AND INFORMATION TECHNOLOGIES	The architecture for synchronous hybrid peer learning using pedagogy-space-technology (PST) framework
110	2025	Esposito, C, Esposito, Catherine	BRITISH JOURNAL OF EDUCATIONAL TECHNOLOGY	Reimagining place in internationalization at a distance: An exploration of students' experiences in virtual exchange
111	2025	Pöysä-Tarhonen, J, Poysa-Tarhonen, Johanna	EUROPEAN JOURNAL OF HIGHER EDUCATION	Geographies of collaboration in hybrid learning spaces in the postdigital era: towards sustainable futures for higher education learning
112	2025	Schermeier, S, Deiglmayr, A, Rummel,	COMPUTERS IN HUMAN BEHAVIOR REPORTS	Small group collaboration in hybrid university learning: Comparing learners' perceived socio-affective state in hybrid, face-to-face and remote collaboration
113	2025	Toprakli, AY, Sahir, MS, Toprakli, Abdurrahman	FACILITIES	Shared learning spaces and social connectivity: a facility management perspective on hybrid learning environments
114	2025	Melcher, M, Rutherford, J, Secker, J, Wells, R,	COGENT EDUCATION	Evaluating hybrid teaching practices: a case study of staff and student experiences at City St George's, University of London
115	2025	Teoh, SH, Hong, JBZ, Shamsudin, NM, Singh,	COGENT EDUCATION	Students' engagement in a hybrid classroom: a comparison between face-to-face and virtual environments