HyFlex Graduate Education: A Systematic Review

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Abstract
This paper presents the findings of a systematic literature review examining HyFlex instruction in graduate education over the past decade. The study aims to synthesize existing research on how universities are addressing the diverse needs of their graduate students through HyFlex instruction. This systematic review provides a comprehensive analysis of current research trends, including the distribution of publications over time, publication outlets, geographic location, and author affiliations. Additionally, it explores the research purpose, subject-matter domains, methodologies, and outcomes associated with HyFlex instruction in graduate education. Using updated PRISMA guidelines, the researchers conducted a systematic search across five databases. Ultimately, 28 peer-reviewed journal articles met the inclusion criteria. The findings reveal a growing body of literature on HyFlex instruction in graduate education, spanning diverse subject areas and employing various research methodologies. Key areas of focus include graduate students' academic performance, interaction channels, class attendance, attentiveness, engagement, perceived satisfaction, and dimensions of dialogue. Other studies examined faculty perspectives on HyFlex instruction, particularly in relation to technology design, instructional design, organization and logistics, and skills and attitudes. Although HyFlex teaching gained significant traction during the COVID-19 pandemic, this review highlights the need for further research into its long-term relevance and effectiveness in a post-pandemic educational landscape.

Keywords: Hybrid flexible instruction, HyFlex, graduate education, systematic review, online learning

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The increased presence of online learning is one of the most prominent manifestations of educational evolution at all levels. Hodges et al. (2020) posits that online education has experienced unprecedented growth, offering learners flexibility, accessibility, and opportunities for personalized learning experiences. From K-12 to higher education, institutions are harnessing the power of digital platforms to deliver content, facilitate discussions, and engage students in diverse learning activities (Picciano, 2017). However, the efficacy and scalability of online learning has been a subject of ongoing debate, with proponents highlighting its potential to democratize education and critics raising concerns about issues of equity, engagement, and academic integrity (Hodges et. al, 2020). Moreover, online education in higher education has been a dynamic and transformative force reshaping the traditional paradigms of teaching and learning. Ali (2020) highlights that with the advent of digital technology and the proliferation of Internet connectivity, online education has become increasingly prevalent in higher education institutions worldwide.

One of the most significant benefits of online education in higher education is its flexibility (Sun & Chen, 2016). Unlike traditional classroom-based instruction, asynchronous and HyFlex online courses allow students to engage with course materials at their own pace and convenience. This flexibility is particularly advantageous for non-traditional students, such as working professionals, parents, and individuals with busy schedules, who may struggle to attend regular classes on campus. By removing the constraints of time and place, online education empowers students to pursue higher education while balancing other commitments.

Within the realm of higher education, the concept of HyFlex learning has emerged as a hybrid approach that combines the best elements of traditional and online instruction. HyFlex learning environments allow students to seamlessly choose between attending classes in person, participating remotely, or accessing asynchronous learning materials, thereby accommodating diverse learning preferences and schedules (Beatty, 2019). Beatty (2019) suggests that this flexible model holds promise for enhancing student engagement, promoting active learning, and optimizing resource utilization within educational institutions. As educators and policymakers navigate these transitions to alternative modalities of learning, it becomes imperative to critically examine the opportunities and challenges associated with each approach (Aldosemani, 2023). The aim of this systematic review is to delineate the main characteristics of the scientific literature pertaining to HyFlex learning in graduate education.

Literature Review

Today students may face many barriers in completing their education at traditional brick and mortar institutions (Beatty, 2019; Bower et al., 2015; Goldrick-Rab, 2023; Irvine, 2020; Seaman et al., 2018). In 2023, an estimated one in five undergraduate students in the United States were raising a dependent child, 59% had full time employment outside of their studies, and 11% were working two or more jobs (Goldrick-Rab, 2023). Lack of childcare and changes in life circumstances often lead to students not completing their education (Rosen, 2021). Many students are geographically isolated (Caparas & Yango, 2023; Cunningham, 2014; Lakhal et al., 2021; Norberg, 2012; Olelewe & Agomuo, 2016; Wong, et al., 2023) and lack reliable transportation (Rosen, 2021).

Similar to asynchronous online learning, HyFlex instruction offers universities the opportunity to promote equity in education for students who otherwise would be unable to attend (Beatty, 2019; Bower et al., 2015; Caparas & Yango, 2023; Cunningham, 2014; Irvine, 2013; Lakhal et al., 2021; Norberg, 2012; Olelewe & Agomuo, 2016) and allows for the flexibility to prevent students from dropping out due to circumstances such as illness and unforeseen life events (Li et al., 2022; Zydney et al., 2020). Research has pointed to HyFlex instruction as a way to provide an equitable learning environment (Imran et al., 2023) that allows for diverse learners (Olelewe & Agomuo, 2016) to achieve high levels of student engagement (Irman et al., 2023; Wong et al., 2023) without sacrificing high quality learning (Irman et al., 2023) and live social interactions with peers and instructors (Romero-Hall & Vicentini, 2017). The benefits of a HyFlex learning environment not only apply to the students, but also to the institutions. By offering HyFlex classes, institutions can accommodate increased enrollment (Howell, 2022), enabling students who are unable to attend in-person classes to participate through online learning modalities, such as remote participation or accessing asynchronous learning materials. With instructors simultaneously able to teach two groups of students, online and in-person, institutions can also see decreased infrastructure cost (Howell, 2022; Irman et al., 2023).

HyFlex instruction, while offering flexibility and inclusivity, is not without its challenges. One significant issue involves the psychological difficulties faced by students in HyFlex settings, such as struggles with social interaction (Howell, 2022; Irman et al., 2023; Wong et al., 2023). Research highlights a frequent lack of natural communication and meaningful social interactions between distance learners and their in-person counterparts. These psychological challenges are often compounded by physical and technological barriers, such as the complexities of arranging classroom environments to effectively integrate online participants (Howell, 2022; Irman et al., 2023; Wong et al., 2023). Privacy concerns also emerge as a critical issue. Some technologies employed in hybrid or HyFlex settings have questionable privacy safeguards (Blackmon & Major, 2023) which can negatively influence students' perceptions of the learning environment. Additionally, the unique demands of HyFlex instruction place significant strain on faculty who are already managing heavy workloads. Research by Romero-Hall and Ripine (2021) underscores that faculty members do not feel prepared to manage the intricacies that are unique to HyFlex instruction. Furthermore, instructors have consistently underscored the importance of robust institutional support and adequate resources, which are often insufficient, for the successful design and implementation of HyFlex courses (Morris, 2025).

With HyFlex educational environments offering so many potential benefits, it is important that institutions have access to the breadth of research conducted on the subject. Currently systematic reviews and meta-analysis have been conducted on many topics related to technology education. Bervell and Umar (2017) investigated the use of learning management systems in higher education. Amaechi et al. (2022), Imran et al. (2023), and Zhou et al. (2023) researched how teaching in higher education changed during the COVID-19 pandemic. These systematic reviews referenced HyFlex settings, but the modality was not the central focus, resulting in a lack of a targeted attention to HyFlex research.

Several systematic reviews have explored HyFlex instruction, providing valuable insights into its implementation and impact across various educational contexts (Barr & Luo, 2025; Chen & Lai, 2024; Cumming et al., 2024; Howell, 2022; Mahrishi et al., 2025; Romero-Hall et al.,

2025; Wong et al., 2023). Wong et al. (2023) conducted a comprehensive review examining the benefits, challenges, and existing research on HyFlex instruction across all education levels (i.e., elementary, secondary, and higher education). Other reviews have focused specifically on higher education settings. Howell (2022), Chen and Lai (2024), Cumming et al. (2024), Mahrishi et al. (2025), and Barr and Luo (2025) focused their systematic reviews on HyFlex instruction within higher education, analyzing research literature that comprised both undergraduate and graduate education. Howell's review identified three major themes in studies published between 2011 and 2021: definitions and purposes of HyFlex instruction, implementation strategies for educators, and future research directions. While Howell's work primarily targeted higher education institutions, it emphasized the application of HyFlex settings in research contexts. Chen and Lai (2024) narrowed their focus to interdisciplinary English courses, reviewing studies published between 2008 and 2023 to explore HyFlex instruction within this specific domain. The results pointed to deficiencies, including a lack of framework to assess higher order thinking skills in interdisciplinary English courses, and challenges facilitating meaningful discourse across modes. Cumming et al. (2024) examined the experiences of university instructors and students with the HyFlex model through a systematic review. Their findings highlighted a lack of research emphasizing instructors' perspectives while also addressing learning satisfaction, benefits, barriers, challenges, and external factors influencing teaching and learning in HyFlex environments. Mahrishi et al. (2025) mapped research dissemination on the HyFlex model in higher education from 2018 to 2023. Their review identified trends in research output, geographical distribution of scholarly work, influential authors, and critical themes such as the need for ongoing infrastructure adaptation and digital tools. Barr and Luo (2025) contributed by analyzing learning outcomes, challenges, beneficial technologies, and instructional strategies specific to higher education contexts. Most recently, Romero-Hall et al. (2025) conducted a systematic review focusing on HyFlex instruction in undergraduate education. Their work provided detailed instructional and learning strategies tailored to the needs of this student population.

This paper presents a systematic review as part of a broader, comprehensive examination of HyFlex instruction in higher education. The overarching research explores its implementation, effectiveness, and pedagogical implications across various educational levels, including the previously mentioned systematic review of HyFlex instruction in undergraduate education (Romero-Hall et al., 2025). While the overarching research encompasses a wide range of contexts, this specific systematic review focuses exclusively on HyFlex instruction within graduate programs. By narrowing the scope to the graduate context, this study aims to uncover how HyFlex instruction is uniquely applied in graduate education, where students often (a) navigate distinct challenges such as balancing professional, academic, and personal responsibilities, (b) engage with coursework that demands advanced critical thinkings skills, (c) are often building their professional identity, and (d) are asked to apply theoretical knowledge to real-world problems as part of their coursework. The findings from this focused review will complement the broader research by providing deeper insights tailored to the graduate experience.

Purpose Statement & Research Questions

By systematically analyzing existing literature, this review intends to shed light on the evolution of HyFlex learning research. It also examines how universities are leveraging this

approach to address the diverse needs of their graduate student population. This systematic review explores current trends in peer-reviewed literature on HyFlex learning between 2013-2023, with a particular focus on its application within graduate education. This study addresses the following research questions:

- What were the main characteristics of the scientific literature on HyFlex learning in graduate education, considering factors such as year of publication, publication outlets, number of authors, geographical distribution, subject-matter domains, and number of participants?

- What are the major research methodologies, funding sources, and research outcomes in studies of HyFlex learning in graduate education?

Methods

A systematic review (Newman & Gough, 2020) was conducted to answer the research questions and synthesize information for future researchers and practitioners. A systematic review is an in-depth literature review that seeks to comprehensively locate research conducted on a topic and synthesize the findings to present an overview of current research methods and findings (American Psychological Association, 2016).

This systematic review adheres to Beatty's (2019) definition of HyFlex instruction, which combines online and on-ground (classroom-based) students in the same class session. The researchers also acknowledge that the term *HyFlex instruction* is often used interchangeably with other terms in the literature, such as hybrid synchronous instruction (Romero-Hall & Vicentini, 2017), blended synchronous learning (Hastie et al., 2010), synchronous online teaching (Park & Bonk, 2007), and synchronous hybrid delivery (Butz et al., 2014). Each study included in this review was meticulously examined by the research team to ensure alignment with Beatty's (2019) principles of HyFlex instruction.

Search Strategy

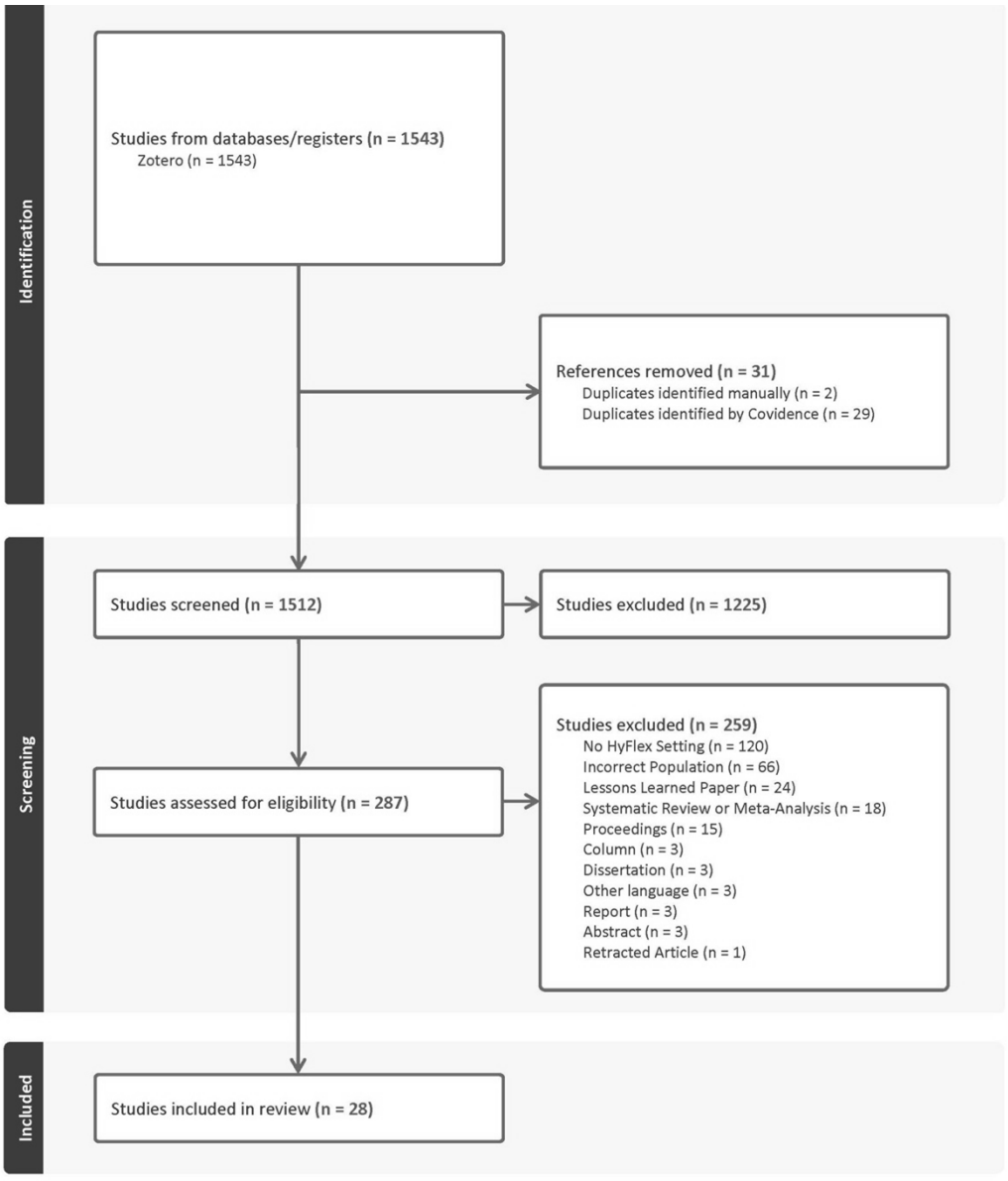
Researchers followed updated PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) principles (Page et al., 2021) to conduct this systematic review to offer transparency in research procedures and adhere to evidence-based protocols (see Figure 1). A search of literature on HyFlex instruction was conducted using electronic databases. The search for journal articles for the systematic review was conducted in November 2023. Five databases were searched: ERIC, Education Source, Academic Search Complete, Web of Science, and Scopus. After a consultation with an institutional librarian, these specific databases were selected for the systematic review because they could provide access to education-related research published in peer-reviewed publications.

Similar to the procedure described in Romero et al. (2025), the following search terms were used across all five databases to search within the title, descriptors, keywords, or abstracts: (*HyFlex* OR *blended synchronous* OR *hybrid synchronous* OR *synchronous online* OR *synchronous hybrid*) AND (*learning* OR *instruction* OR *courses* OR *teaching* OR *delivery*),

(*multimodal instruction*), and (*multimodal learning*). These search terms were chosen as they are words commonly used when referring to HyFlex learning. These searches were cross-searched with the following search terms: *higher education* OR *university* OR *college* OR *tertiary education* OR *post-secondary* OR *postsecondary*.

Figure 1

PRISMA Diagram



Inclusion & Exclusion Criteria

The review was guided by specific inclusion criteria, which articles were required to meet in order to be considered for further analysis. These criteria were as follows: (a) studies conducted within graduate education settings, (b) publications appearing in peer-reviewed

journals between 2013 and 2023, (c) articles written in English, and (d) alignment with the researchers' definition of HyFlex instruction. Conversely, exclusion criteria for this review included: (a) research conducted outside graduate education settings, (b) systematic reviews, meta-analyses, or conceptual papers, (c) studies set in contexts that did not adhere to the agreed-upon definition of HyFlex instruction, (d) unpublished manuscripts or works not appearing in peer-reviewed journals, and (e) peer-reviewed publications not written in English.

Procedure

The initial searches of the databases yielded 1,543 unique papers, after elimination of 355 duplicates. The 1,543 papers were uploaded to Covidence for review. Once in Covidence, the software identified an additional 29 duplicates, and 2 duplicates were identified by one of the research team members. These duplicates were removed, leaving 1,512 papers to screen. The first level of screening included reviewing titles and abstracts by at least one member of the research team. The review of titles and abstracts was conducted to determine whether each article met, potentially met, or did not meet the inclusion criteria. Articles were categorized as "yes," "no," or "maybe" based on this evaluation. A total of 287 were marked yes or maybe.

These 287 papers were further reviewed in a second level of screening involving a full text review by two members of the research team. Each paper was independently read by two researchers who voted either to *include* or *exclude* it from the systematic review. To reduce bias, the two researchers did not know how the others voted until all articles were reviewed. Once all articles were reviewed, the members of the research team met to discuss and resolve any conflicts. After the researchers reached agreement, 28 articles met the inclusion criteria for the systematic review.

Data Extraction and Coding

Nine elements were selected for analysis based on the research questions: (1) year of publication, (2) publication outlets, (3) number of authors, (4) geographical distribution, (5) subject-matter domains, (6) number of participants, (7) methodologies, (8) funding sources, (9) research questions, and (10) research outcomes. Based on these research elements, a data extraction form was created in Covidence. The data extraction form, in Covidence, allowed the research team to retrieve the research elements as reported in the journal articles. The initial data extraction was completed by one member of the research team. Afterwards, a second team member reviewed and approved all the data retrieved. After data was extracted from all 28 articles, the data collected was exported as an MS Excel spreadsheet for further coding and analysis. With all the data compiled in an MS Excel spreadsheet, information on (1) year of publication, (2) number of authors, (3) geographical distribution, (4) subject-matter domains, (5) number of participants, (6) methodologies, and (7) funding source was organized into separate tables according to each research element. These tables include the categories of research elements and the distribution of articles across each category. Subsequently, graphs were created to visually represent each research element.

The research outcomes were coded using a priori codes. The researchers developed a codebook based on the variables explored in the research questions extracted from the journal articles. The codes included: (a) perceived satisfaction, motivation, and success, (b) academic performance, (c) class attendance, (d) attentiveness, (e) interactions, (f) channels of interactions,

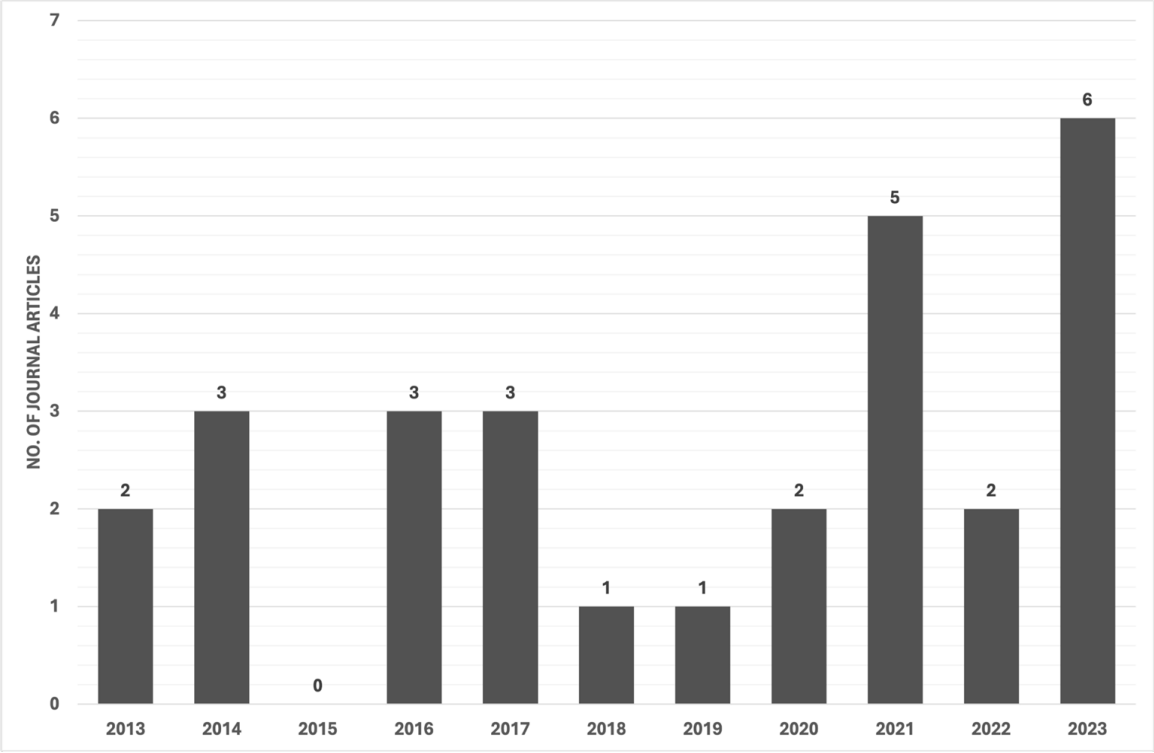
(g) robot-mediated learning, (h) benefits of HyFlex instruction, (i) challenges of HyFlex instruction, (j) technological design, (k) organization and logistics, (l) engagement, (m) dimensions of dialogue, (n) skills and attitudes, and (o) instructional design. Using an iterative coding approach, we systematically analyzed the outcomes of each journal article and related them to the pre-established codes. This process involved multiple rounds of coding to ensure consistency and accuracy. Each outcome was carefully examined to determine its alignment with one or more of the predefined codes. Discrepancies were discussed among the researchers until a consensus was reached.

Results

What were the main characteristics of the scientific literature on HyFlex learning in graduate education, considering factors such as (a) year of publication, (b) publication outlets, (c) number of authors, (d) geographical distribution, (e) subject-matter domains, and (f) number of participants?

Figure 2

Journal Articles Published on HyFlex Instruction in Graduate Education



The systematic review of the literature on HyFlex instruction in graduate education revealed that 46% of the 28 journal articles included were published in the last three years of the review period. These results show a trend towards more research focusing on HyFlex instruction (see Figure 2), which could be attributed to the increased interest in online learning modalities due to the COVID-19 pandemic. The pandemic highlighted the importance of education frameworks that can quickly adapt to changing circumstances. This surge could also reflect the

urgent need for more flexible and adaptive learning models that can accommodate students in person and online simultaneously.

The journal articles that met the inclusion criteria were published in a range of different publication outlets. Most of the publication outlets focused on educational technology, learning design, and online learning research; however, a few were focused on other specific subjects such as hospitality, medical education, health research, and management education (see Table 1). This highlights that need for HyFlex instruction for teaching and learning in different disciplines. For instance, in medical education, HyFlex instruction can facilitate flexible learning schedules for students who may have clinical rotations or other commitments. In hospitality and management education, HyFlex models can support students who are balancing work and study. It reflects the growing recognition of HyFlex instruction as a valuable pedagogical approach.

As part of the analysis of the publications, the researchers categorized the journal articles based on the number of collaborators. The analysis revealed that research in HyFlex instruction in graduate education is a highly collaborative endeavor. As shown in Figure 3, 93% of the publications were co-authors by two or more researchers. Additionally, a cross-tabulation analysis between the years of publication and the number of authors for each publication included in the review showed that 2021 and 2023 were the years with the most collaborative research efforts focused on HyFlex instruction in graduate education.

Figure 3

Number of Collaborators

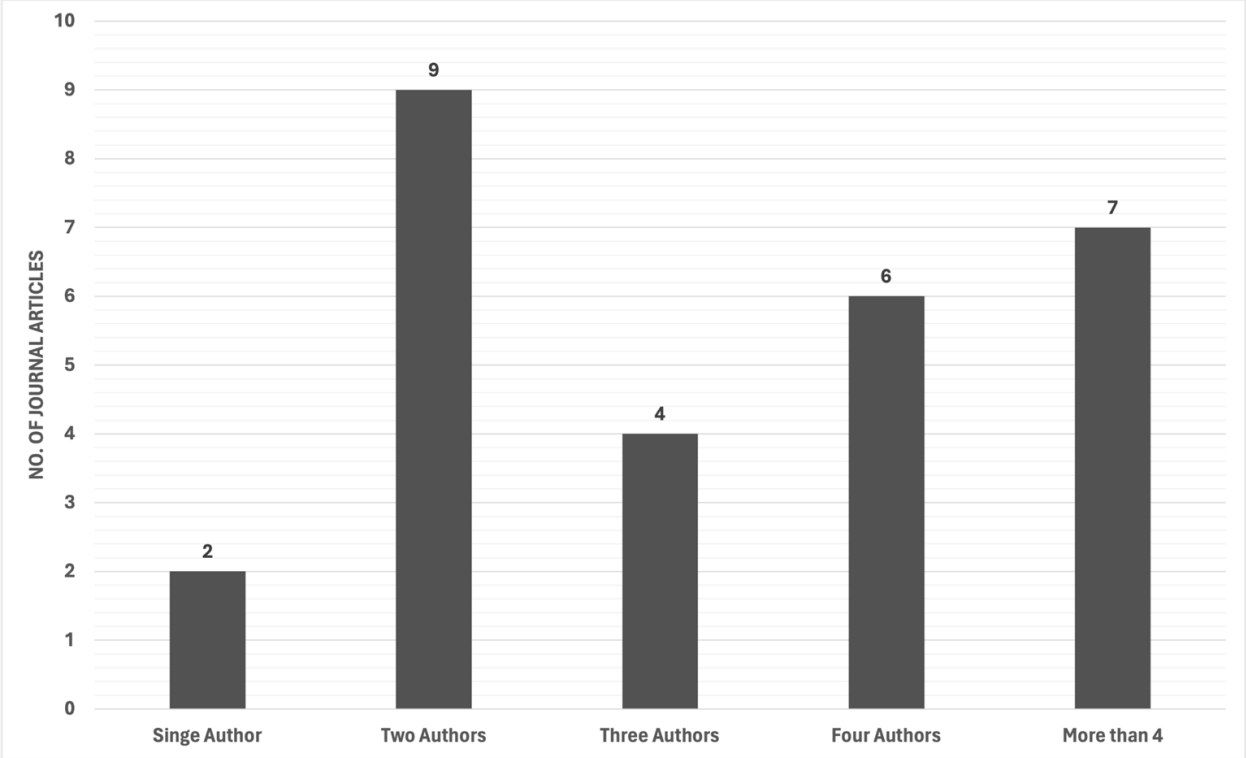


Table 1

Journal Articles Focused on HyFlex Instruction in Graduate Education Published Between 2013 and 2023

Author(s)	Title	Journal
Angelone et al., 2020	Optimizing the technological design of a blended synchronous learning environment	Online Learning
Bell et al., 2016	From 2D to Kubi to Doubles: Designs for student telepresence in synchronous hybrid classrooms	International Journal of Designs for Learning
Butz et al., 2014	Motivation in synchronous hybrid graduate business programs: A self-determination approach to contrasting online and on-campus students	MERLOT Journal of Online Learning and Teaching
Butz & Askim-Lovseth, 2015	Oral communication skills assessment in a synchronous hybrid MBA programme: Does attending face-to-face matter for US and international students?	Assessment & Evaluation in Higher Education
Butz et al., 2016	The impact of emotions on student achievement in synchronous hybrid business and public	Decision Sciences Journal of Innovative Education

Author(s)	Title	Journal
	administration programs: A longitudinal test of control-value theory	
Chen, 2022	Designing online discussion for HyFlex learning	International Journal of Educational Methodology
Conklin et al., 2019	Graduate students' perceptions of interactions in a blended synchronous learning environment: A case study	The Quarterly Review of Distance Education
Cunningham, 2014	Teaching the disembodied: Othering and activity systems in a blended synchronous learning situation	The International Review of Research in Open and Distance Learning
Joanpere-Foraster et al., 2023	Dialogic teaching beyond words	Multidisciplinary Journal of Educational Research
Gleason & Greenhow, 2017	Hybrid learning in higher education: The potential of teaching and learning with robot-mediated communication	Online Learning
Hayes & Tucker, 2021	Using synchronous hybrid pedagogy to nurture a community of inquiry: Insights from a tourism master's programme	Journal of Hospitality, Leisure, Sport & Tourism Education
Heilporn & Lakhal, 2021	Converting a graduate-level course into a HyFlex modality: What are effective engagement strategies?	The International Journal of Management Education
Ho et al., 2023	Linking the choice of the class format and pre-class learning experiences sheds light on a step further in blended medical education	Medical Education Online
Howell et al., 2023	HyFlex pedagogy: Six strategies supported by design-based research	Journal of Applied Research in Higher Education
Kohnke & Moorhouse, 2021	Adopting HyFlex in higher education in response to COVID-19: Students' perspectives	Open Learning: The Journal of Open, Distance and eLearning
Lakhal et al., 2020	Features fostering academic and social integration in blended synchronous courses in graduate programs	International Journal of Educational Technology in Higher Education
Lakhal et al., 2021	Students and instructors' perspective on blended synchronous learning in a Canadian graduate program	Journal of Computer Assisted Learning
Macharaschwili & Coggin, 2013	A skype-buddy model for blended learning	Journal of Interactive Learning Research

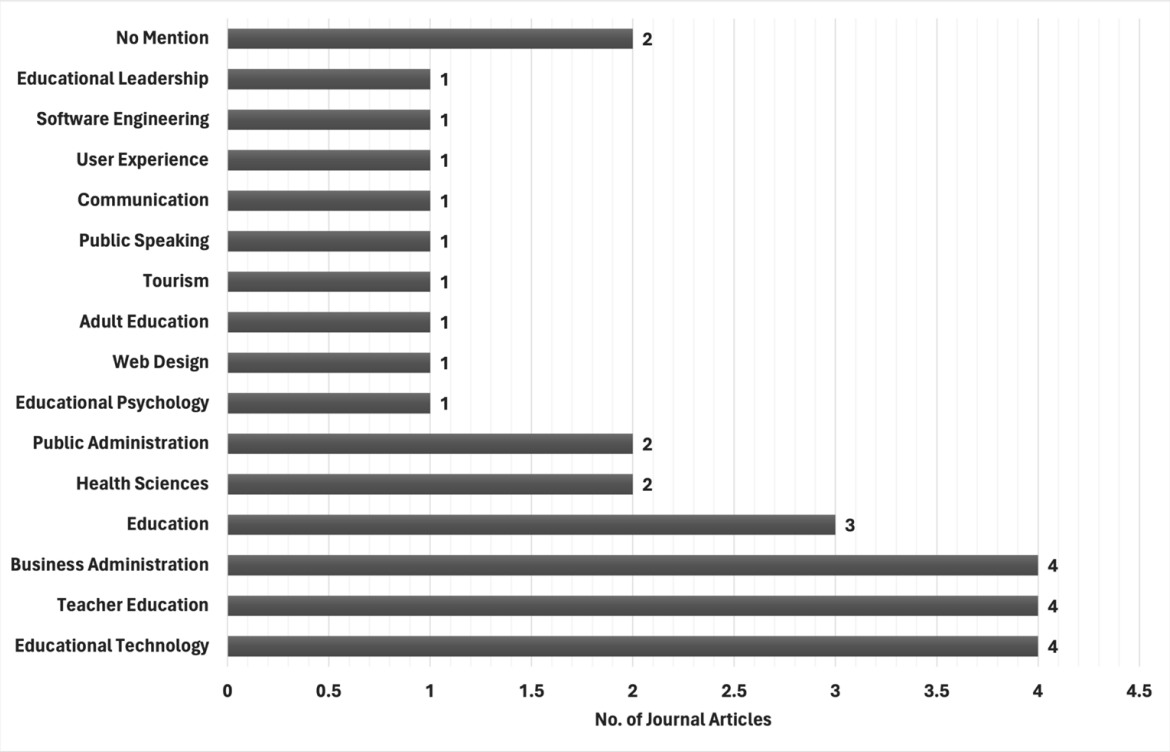
Author(s)	Title	Journal
Mccaw et al., 2023	From "Am I just too old for this?" to "Hey, I think I could do that!": a collaborative self-study of the implementation of blended synchronous learning in initial teacher education	Education and Information Technologies
Nykvist et al., 2021	Key factors needed for developing a higher education cross-campus learning environment in a Nordic context	Frontiers in Education
Petchamé et al., 2023	Digital transformation in higher education: A qualitative evaluative study of a hybrid virtual format using a smart classroom system	Heliyon
Protsiv et al., 2016	Blended learning across universities in a South-North-South collaboration: a case study	Health Research Policy and Systems
Romero-Hall & Vicentini, 2017	Examining distance learners in a hybrid synchronous course: Successes and challenges	Online Learning
Smith et al., 2020	Are they paying attention, or are they shoe-shopping? Evidence from online learning	International Journal of Multidisciplinary Perspectives in Higher Education
Verdecchia & Lago, 2023	Tales of hybrid teaching in software engineering: Lessons learned and guidelines	IEEE Transactions on Education
Vu & Fadde, 2013	When to talk, when to chat: Student interactions in live virtual classrooms	Journal of Interactive Online Learning
Wang et al., 2017	Designing and improving a blended synchronous learning environment: An educational design research	International Review of Research in Open and Distributed Learning
Wang et al., 2018	Students' perspectives on the design and implementation of a blended synchronous learning environment	Australasian Journal of Educational Technology

An analysis of the publications based on geographical location revealed that most of the research 43% (*n*=12) is being conducted in the United States. However, the analysis also revealed that research in HyFlex instruction in graduate education is being explored globally. Research in HyFlex instruction in graduate education was also conducted in Canada (*n*=3), New Zealand (*n*=2), Singapore (*n*=2), Uganda (*n*=1), Taiwan (*n*=1), Sweden (*n*=1), Spain (*n*=1), South Africa (*n*=1), Norway (*n*=1), Netherlands (*n*=1), China (*n*=1), and Australia (*n*=1).

Some of the research projects reported in the analyzed journal articles were conducted across multiple countries. Additionally, two publications did not specify the geographical location where the research was conducted. The international scope of the research suggests that there are shared opportunities and challenges implementing HyFlex instruction across different regions of the world. Moreover, it highlights the importance for researchers to consider cultural factors that may influence research outcomes.

Figure 4

Overview of All the Subjects Discussed in the Journal Articles

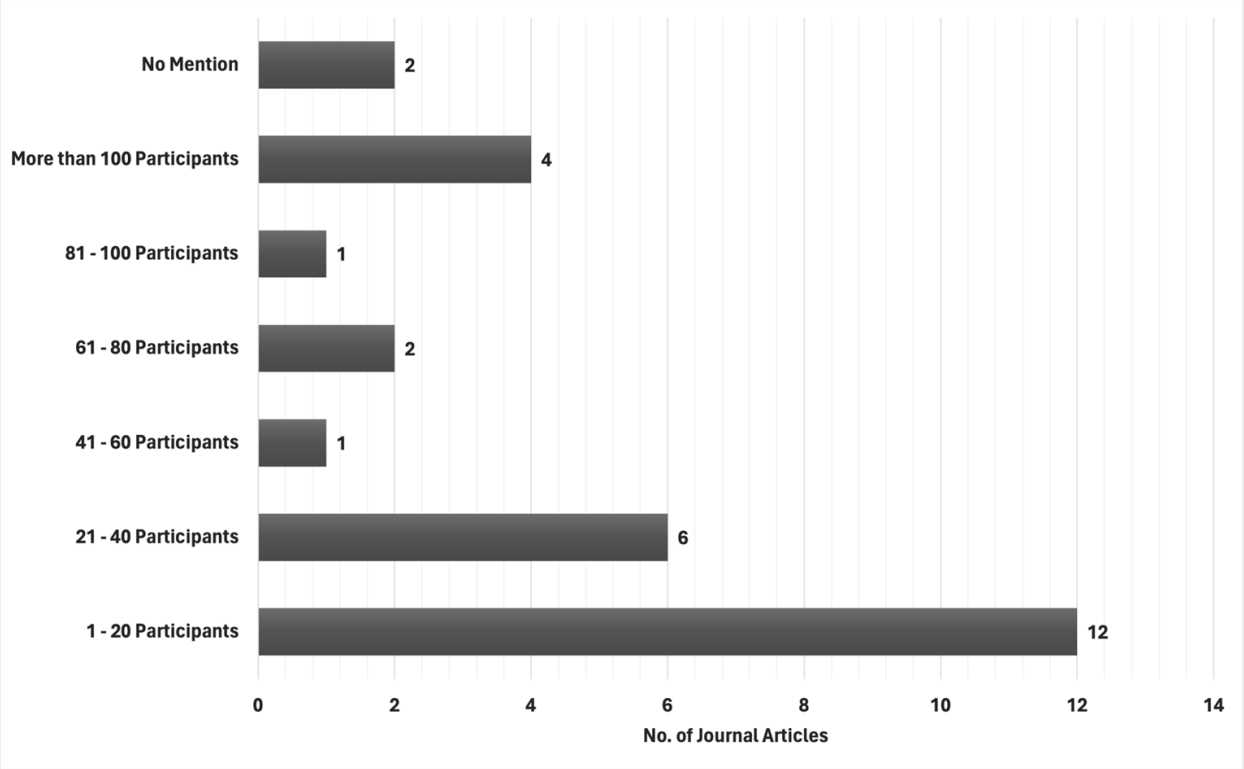


The journal articles included in the review conducted research in courses, programs, or degrees with a variety of subject-matters. Figure 4 provides an overview of all the subjects discussed in the journal articles. Teacher education (14%), business administration (14%), educational technology (14%), and education (11%) were the primary subjects in which HyFlex instructional modality was most often frequently implemented and researched. The two journal articles did not specify the subject-matter context in which the research occurred. These findings are connected to the diversity of journals in which this research is published, as noted earlier in this paper. Since the research spans various subjects, it is also disseminated through journal articles that cover topics beyond education and educational technology.

The journal article analysis also focused on the number of participants in each investigation published (see Figure 5). Six categories were created to classify each research project: (a) 1 – 20 participants, (b) 21 – 40 participants, (c) 41 – 60 participants, (d) 61 – 80 participants, (e) 81 – 100 participants, and (f) over 100 participants. The results of the analysis showed that in 43% of the journal articles there were 1 – 20 participants and in 20% of the journal articles there were 21 – 40 participants. Although four of the 28 studies were conducted with a sample size of over 100 participants, the results indicate that most of the research on HyFlex instruction in graduate education was conducted with a smaller sample size. Two of the journal articles did not report their sample size. This distribution suggests that while large-scale studies are valuable for generalizability, much of the current research relies on smaller sample sizes, which may offer more detailed insights but could limit broader applicability.

Figure 5

Number of Participants in the Investigations Published

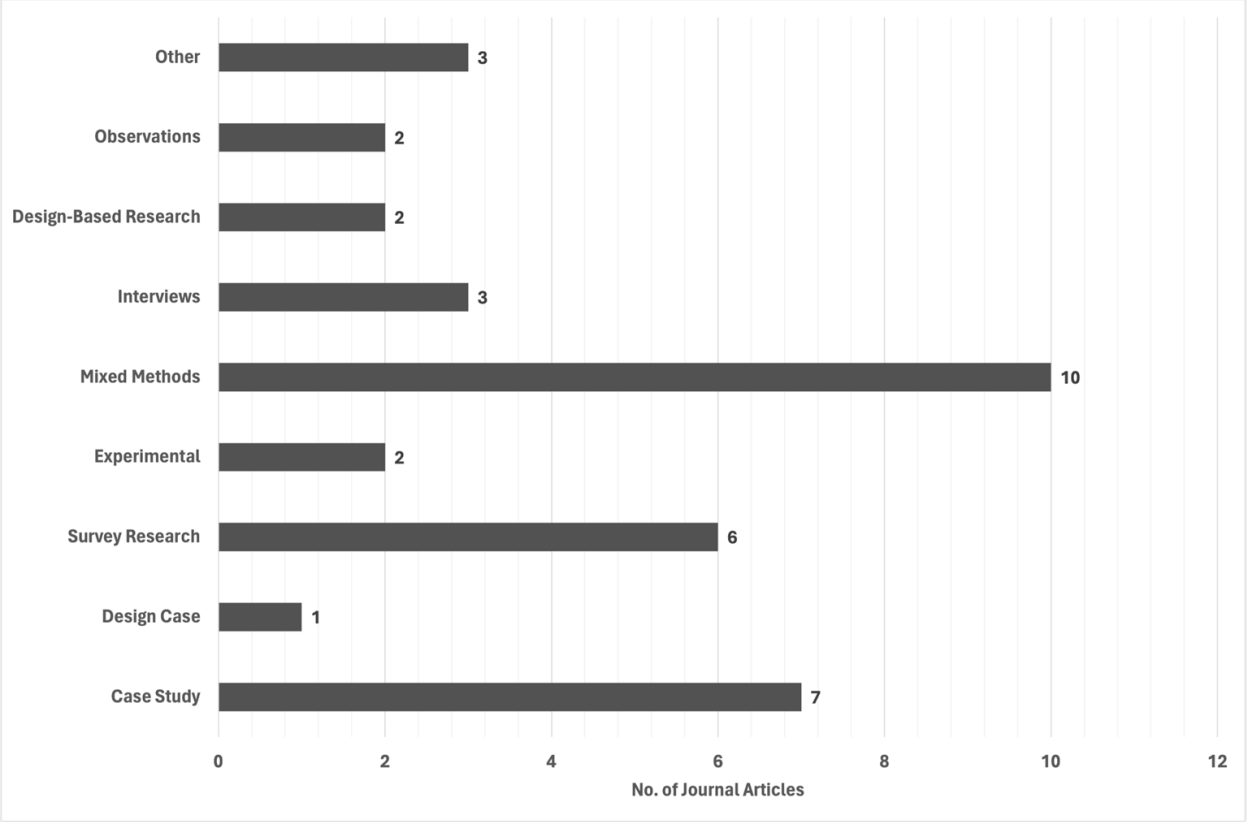


What are the major research methodologies, funding sources, and research outcomes in studies of HyFlex learning in graduate education?

Another important trend that we wanted to explore in the literature included in this systematic review was the types of methodologies used by scholars to explore and research HyFlex instruction in graduate education. Some research projects used multiple methods of data collection. If multiple methods of data collection were acknowledged individually within the manuscript, then they were accounted for individually in the analysis. However, if the multiple methods were referred to as "mixed methods" in the journal article, then they were acknowledged within the "mixed methods" category. The results show that overall mixed methods (n=10) were the primary methodology used by researchers to investigate HyFlex instruction in graduate education. Case study (n=7) and survey research (n=6) methodology were also often used as a method of inquiry. Other methodologies mentioned less often included interviews, observations, experimental design, design-based research, and a design case (see Figure 6).

Figure 6

Types of Research Methods Used



Of the 28 journal articles, 11 acknowledged receiving funding from an organization in support of the research conducted. Five journal articles received funding from government funding agencies (i.e., Social Sciences and Humanities Research Council of Canada, Ministere de l'Education et de l'Enseignement du Québec, European Union, and the National Science Foundation of China). The researchers in the remaining six journal articles disclosed receiving funding from institutional sponsors (i.e., California State University East Bay, University of Otago Teaching Development Grant, University of Melbourne Learning and Teaching Initiative Grant, Norwegian University of Science and Technology Teaching Excellence project SALTO, Challenges in University Teaching in the Post-COVID 19 Era at the Aristos Campus Mundus, and the Nanyang Technological University EdeX Teaching and Learning Project).

The research findings from the journal articles were analyzed to gain a comprehensive understanding of the key insights and conclusions drawn from the studies (see Table 2). The results highlight the complexity and multifaceted nature of HyFlex instruction in graduate education. The specific variables explored, and the corresponding outcomes reported in the journal articles included in this review are detailed below:

- **Perceived Satisfaction, Motivation, and Success:** Butz et al. (2014) explored differences in "need satisfaction" among students enrolled in synchronous hybrid

programs. Need satisfaction refers to the fulfillment of psychological needs for autonomy, competence, and relatedness—key drivers of intrinsic motivation. This intrinsic motivation plays a critical role in influencing students' persistence, creativity, and perceived success. The study revealed minimal differences between online and on-campus students in terms of need satisfaction, motivation, and perceived success. However, online students reported experiencing greater isolation, likely due to their focus on completing academic programs while managing work and family responsibilities, rather than seeking new social connections. Despite these challenges, both groups maintained high expectations for success in their courses. In a subsequent study, Butz et al. (2016) examined perceived success in relation to achievement emotions such as enjoyment, anxiety, and boredom. The findings indicated that while online and on-campus students experienced similar emotions, their levels of activation varied depending on the learning environments associated with their respective attendance modes. As anticipated, perceived success showed a positive correlation with enjoyment and a negative correlation with anxiety and boredom.

- **Academic Performance:** Butz & Askim-Lovseth (2015) found no significant differences in academic performance, including individual competencies and oral communication scores, between online and on-campus students in synchronous hybrid programs. Similarly, no differences were observed between domestic and international students. Chen (2022) also explored academic performance, focusing on non-text-based online discussions in HyFlex environments. The study revealed mixed results for task completion rates, with the highest rates observed in the initial sections of GoReact and Facebook classes, facilitated by their integration into Blackboard. Ho (2023) investigated short-term learning outcomes among medical students across different synchronous class formats (face-to-face, online, HyFlex), finding similar outcomes across all groups.

- **Class Attendance:** Verdecchia & Lago (2023) and Vu & Fadde (2013) both explored differences between online class attendance compared to in-person. Verdecchia & Largo noted that online attendance consistently exceeded in-person attendance, while Vu & Fadde observed a similar trend in Live Virtual Classrooms (LVC) across two semesters.

- **Attentiveness:** Smith (2020) explored the statistical difference between average attentiveness in courses in which all students participate via Zoom, compared with courses in which some students are in a physical classroom and some join via Zoom. Analysis showed that online courses where all the students as well as the instructor are logged on to Zoom synchronously had slightly statistically significantly higher average attentiveness compared to hybrid format courses where some students are physically in the classroom, and some are on Zoom.

- **Interactions:** Verdecchia & Lago (2023) observed differences in punctuality and engagement within a HyFlex classroom: In-person students arrived on time, whereas online students tended to join sporadically during the first 30 minutes. Web camera usage steadily decreased during lectures, with few remaining active until the end. Challenges in interaction were prominent, with many students struggling to engage effectively in class. Research in a blended synchronous learning environment (BSLE) found that although

students felt instructors distributed attention equally between online and in-person students, actual interaction data showed discrepancies (Conklin et al., 2019). Face-to-face students, who constituted 37% of the class, were responsible for most interactions with instructors, whereas online students, making up 63% of the class, only accounted for 25.7% of these interactions. Student-to-student engagement was among in-person students, revealing a gap in virtual connectivity.

- **Channels of Interactions:** In a study on HyFlex instruction, Vu & Fadde (2013) found that students preferred text interactions via chat (80%) over verbal interactions (20%) in Live Virtual Classrooms. Text interactions were comments (71%) and questions (29%), while verbal interactions included comments (88%) and questions (12%). Students were notably more inclined to use text for asking questions.

- **Robot-Mediated Learning (RML):** Gleason and Greenhow (2017) and Bell et al. (2016) investigated the role of robot-mediated learning (RML) in HyFlex classrooms, emphasizing its impact on embodiment and social presence. RML involves the use of mobile social robotic systems, such as Double and Kubi telepresence robots, to enhance the HyFlex learning experience. Students reported that RML improved engagement by facilitating recognition of addressed individuals and enabling observation of non-verbal cues, effectively simulating physical presence in the classroom. However, challenges were noted, including limited visibility and audibility for online students using the robots, particularly at a distance. Furthermore, successful implementation required instructors to actively coordinate interactions to bridge communication gaps between online and in-person participants.

- **Benefits of HyFlex Instruction:** Kohnke & Moorhouse (2021), Wang et al. (2018), and Petchamé et al. (2023) highlighted flexibility as a primary benefit of HyFlex and blended synchronous learning. Kohnke & Moorehouse noted that students valued the return to face-to-face classes after a semester of remote learning during the COVID-19 pandemic, appreciating the adaptability HyFlex provided. Similarly, Wang et al. and Protsiv et al., 2016's research emphasized that such flexibility allowed students to engage in lessons when unable to attend in person. This included enabling students to remotely attend classes from abroad (Petchamé et al., 2023). The three studies also pointed out that active involvement was crucial, with students taking initiative in their learning by communicating with peers and participating in classroom activities.

- **Challenges of HyFlex Instruction:** Research by Kohnke & Moorehouse (2020), Petchamé et al. (2023), and Romero-Hall & Vicentini (2017) identified several challenges of HyFlex instruction. One significant issue was the difficulties with handover and turn-taking, which impacted students' collaboration, progress monitoring, and feedback responsiveness. Additionally, students reported limited communication with face-to-face peers unless involved in team projects, highlighting the persistence of pre-existing relationships. Technical issues, such as inconsistent Internet connections, poor audio quality, issues framing the instructor through the camera, and not having the option of splitting the screen to have the view of multiple cameras, also adversely affected the

learning experience. In group settings, distance learners often felt undervalued and perceived unequal treatment compared to their face-to-face counterparts.

- **Technological Design:** Angelone et al. (2020) emphasized the critical role of technological design in enhancing blended synchronous learning environments, advocating for the selective integration of technologies that support effective pedagogy and foster co-presence among learners. Key recommendations include using technologies that allow constant visual connections, such as displaying online students' faces throughout the session, to promote a cohesive group feel. Additionally, creating separate breakout groups for online and on-campus students can facilitate direct communication and reduce frustration. Lakhal et al. (2021) further identified technological challenges, such as the need for ongoing training due to evolving technologies, the necessity of reliable technology and Internet connections, and how technological issues can disrupt participation and delay course sessions.

- **Organization and Logistics:** In terms of logistics and organization, students and faculty expressed that key factors are a) flexibility and accessibility, b) pairing of each instructor with a teaching assistant, c) adequate HyFlex room settings, and d) considerations for optimal group size (Lakhal et al., 2021).

- **Engagement:** Macharaschwili and Coggin (2013) investigated learner engagement with Skype in HyFlex instruction, revealing that chat functions were predominantly utilized to address technical issues and clarify classroom activities, while personal comments emerged as the second most common use. Academic discussions, however, were minimal. Despite this, both distance and in-person students expressed surprise at the meaningful personal connections formed during the course. Notably, technological issues did not impede these connections; rather, the day when the distance learner felt most disconnected was one marked by an absence of technical problems but minimal interaction with in-person students. Similarly, Cunningham (2014) and Hayes & Tucker (2021) found that online students valued being part of the class, hearing the instructor, and participating in discussions. However, online students often felt unwelcome by campus-based students. Feedback from campus students supported this perception, indicating some resentment toward the time and effort required to accommodate the technical needs of online learners (Cunningham, 2014). Additionally, there appeared to be a lack of understanding regarding how online students' mode of participation influenced their ability to interpret social cues (Hayes & Tucker, 2021).

- **Dimensions of Dialogue:** Joanpere-Foraster et al. (2023) explored the role of dimensions of dialogue in a HyFlex instructional setting. Results indicated that there are many communicative acts with mutual understanding but without agreement. The participants agreed that communicative acts were different from when they were online.

- **Skills and Attitudes:** Lakhal et al. (2020) identified key skills and attitudes for HyFlex instruction, recommending the following strategies: a) instructors with significant experience and a clear course vision ensure quality, regardless of the technology used; b) the instructor's attitude, openness, enthusiasm, and support are crucial for students'

academic and social integration; c) instructors' technological skills enhance online students' satisfaction and motivation; d) face-to-face students must recognize that online peers have different learning experiences; and e) online students should develop appropriate attitudes and technological skills to succeed.

- **Instructional Design:** A key area of HyFlex instruction research focuses on instructional design. Howell et al. (2023) outlined essential strategies for successful HyFlex course design, including: a) using chat as a backchannel for discussion, b) adopting a flipped classroom approach, c) using synchronous time for conferencing rather than whole-class instruction, d) scaffolding breakout room discussions with the 4A's protocol (assumptions, agreement, argument, aspirations), e) intentional student grouping, and f) optimizing classroom space, including camera and audio equipment. Mccaw et al. (2023) examined blended synchronous learning (BSL), revealing that despite educators' confidence in technology, implementation has proved more complex. Success was linked to co-teaching and technical support, with the most effective model involving a lead tutor and on-site BSL support who was also a subject tutor.

  Nykvist et al. (2021) and Protsiv et al. (2016) explored factors essential to designing supportive learning experiences in HyFlex instruction, including the planning and variation of activities, digital tool selection for solving real-world problems, fostering student-teacher interaction, and prioritizing ownership of learning, collaborative and social learning experiences, prompt feedback (via email or during live sessions, or providing access to structure course materials). A focus on creating rich learning experiences using a pedagogy, space, and technology (PST) framework was emphasized. Wang et al. (2017) identified strategies for providing equivalent learning experiences for both classroom and online students, such as redesigning activities for online participation, balanced focus on online and classroom students and fostering communication through partnership strategies and ensuring clear video and voice communication. Wang et al. further noted that learning partnership strategies facilitated student engagement, enabling smoother participation. Technical training and sufficient classroom equipment, including multiple cameras and microphones, were also recommended.

  Some journal articles examined supportive learning strategies in HyFlex instruction, as reported by graduate students. Heilporn & Lakhal (2021) found that course organization promoted continuous behavioral engagement, and recorded sessions enhanced cognitive engagement, with one student suggesting all sessions be recorded to support learning. Collaborative assignments, where students remained on the same team, boosted emotional engagement. Romero-Hall & Vicentini (2017) noted that distance learners felt more connected when other classmates were also remote, allowing for collaborative projects. Additionally, being online encouraged better study habits, with easy access to course materials and technology tools supporting their learning.

Table 2

Summary of Research Findings from the Journal Articles Included in the Systematic Review

Variables	Author(s)	Key Finding
Perceived Satisfaction, Motivation, and Success	Butz et al., 2014; Butz et al., 2016	Online and on-campus students exhibited minimal differences in need satisfaction, motivation, and perceived success. However, online students reported experiencing greater isolation, likely due to the challenges of balancing work and family responsibilities. Despite these differences, both groups maintained high expectations for success. However, perceived success was positively associated with enjoyment and negatively correlated with anxiety and boredom.
Academic Performance	Butz & Askim-Lovseth, 2015; Chen, 2022; Ho, 2023	There were no significant differences in academic performance between online and on-campus students. Research shows mixed results for task completion rates in HyFlex environments. Similarly, research show short-term learning outcomes across face-to-face, online, and HyFlex formats among medical students.
Class Attendance	Verdecchia & Lago, 2023; Vu & Fadde, 2013	Online attendance consistently exceeded in-person attendance. Research on Live Virtual Classrooms showed a similar trend over two semesters.
Attentiveness	Smith, 2020	Courses where all participants joined via Zoom synchronously had slightly higher average attentiveness compared to hybrid courses with mixed participation formats.
Interactions	Verdecchia & Lago, 2023; Conklin et al., 2019	In-person students were more punctual and engaged than online students. Discrepancies in instructor attention and student-to-student engagement were observed, with face-to-face students dominating interactions.
Channels of Interactions	Vu & Fadde, 2013	Students preferred text-based interactions (80%) over verbal interactions (20%) in Live Virtual Classrooms. Text was primarily used for comments and questions.
Robot-Mediated	Gleason & Greenhow, 2017; Bell et al., 2016	RML enhanced engagement by simulating physical

Variables	Author(s)	Key Finding
Learning (RML)		presence but faced challenges like (a) limited visibility and audibility for online students and (b) coordination demands on instructors.
Benefits of HyFlex Instruction	Kohnke & Moorhouse, 2021; Petchamé et al., 2023; Protsiv et al., 2016; Wang et al., 2018	Highlighted flexibility is a key benefit, allowing students to engage in lessons despite physical absence. However, active involvement of students is crucial for effective learning.
Challenges of HyFlex Instruction	Kohnke & Moorhouse, 2020; Petchamé et al., 2023; Romero-Hall & Vicentini, 2017	Identified issues like turn-taking difficulties, limited communication between online and face-to-face peers, technical problems, and unequal treatment of distance learners in group settings.
Technological Design	Angelone et al., 2020; Lakhal et al., 2021	Emphasized the importance of reliable technology, ongoing training, and tools that foster co-presence among learners. Recommended strategies include constant visual connections and separate breakout groups for online and on-campus students.
Organization and Logistics	Lakhal et al., 2021	Key organization and logistics factors included flexibility, accessibility, pairing instructors with teaching assistants, adequate HyFlex room settings, and optimal group size considerations.
Engagement	Macharaschwili & Coggin, 2013; Cunningham, 2014; Hayes & Tucker, 2021	Chat functions were primarily used to address technical issues and clarify activities rather than foster academic discussions. Despite limited academic engagement, personal connections developed between distance and in-person students. However, online students often felt unwelcome due to campus-based peers' resentment over accommodating their technical needs.
Dimensions of Dialogue	Joanpere-Foraster et al., 2023	Communicative acts often lacked agreement despite mutual understanding; significant differences existed between online and face-to-face communication dynamics.
Skills and Attitudes	Lakhal et al., 2020	Recommended strategies include experienced instructors with clear course vision, supportive attitudes from instructors, technological skills to enhance satisfaction and motivation, recognition of different learning experiences by face-to-face peers,

Variables	Author(s)	Key Finding
		and appropriate attitudes and skills from online students for success.
Instructional Design	Howell et al., 2023; Mccaw et al., 2023; Nykvist et al., 2021; Wang et al., 2017; Heilporn & Lakhal, 2021; Protsiv et al., 2016; Romero-Hall & Vicentini, 2017	Suggested strategies include using chat as a backchannel, flipped classrooms, scaffolding discussions with protocols like the 4A's, intentional grouping, optimizing classroom space/equipment, providing technical training, and fostering balanced communication between online/classroom students to ensure equivalent learning experiences.

Discussion

The purpose of this systematic review was to delineate key features of academic research related to HyFlex learning within the context of graduate education, specifically between 2013-2023. This included an analysis of the distribution of publications over time, the geographic distribution of research, and the number of collaborators. Secondly, the review aims to identify major research trends in terms of the subject matter domains explored, the methodologies employed, the number of participants in the research conducted, the funding sources, and outcomes observed in studies focused on HyFlex learning in graduate education. Through a synthesis of existing literature, we seek to offer insights into effective practices, identify areas for improvement, and foster dialogue around the evolving landscape of education in the digital age. This serves to inform educators, administrators, and researchers about the current state of the field and guide future directions for research and practice of HyFlex learning.

The research literature reviewed in this systematic study highlights that graduate students in HyFlex courses maintain high expectations for success, with no significant differences in academic performance observed between online and on-campus students. The findings also emphasize that graduate students demonstrate strong online attendance and attentiveness in HyFlex courses, while in-person students tend to be more punctual and exhibit higher levels of engagement. Challenges related to online student engagement are often attributed to technological issues, the absence of communication cues, and insufficient instructor facilitation mechanisms. Despite these obstacles, online students frequently leverage text-based communication channels to ask questions, share comments, clarify activities, and address technical difficulties. The literature underscores the importance of providing robust technological, organizational, logistical, and instructional design support to effectively implement HyFlex instruction in graduate education. Additionally, it recognizes the need for instructors to possess specific skills and dispositions tailored to teaching within this modality. Above all, graduate students favor HyFlex instruction for its flexibility and affordability, particularly because it eliminates the need for travel.

When comparing the findings of this systematic review to those from our previous review on undergraduate education (Romero-Hall et al., 2025), it is evident that the number of publications related to HyFlex instruction has remained relatively consistent for graduate

education. In contrast, studies focusing on HyFlex instruction in undergraduate education experienced a notable surge in publications during 2022 and 2023. Research on HyFlex instruction at both graduate and undergraduate levels reflects highly collaborative efforts, predominantly conducted in the United States, with additional studies representing diverse global contexts across various subject areas. Systematic reviews comparing HyFlex research between undergraduate and graduate students reveal distinct differences: Most undergraduate-focused studies involved more than 100 participants, whereas graduate-focused research typically included smaller sample sizes of 1–20 participants. Furthermore, while survey research was the primary methodology employed in undergraduate HyFlex studies, mixed methods approaches were more commonly used in research on graduate-level HyFlex courses.

In terms of research outcomes, studies on HyFlex instruction at the graduate and undergraduate levels reveal distinct areas of focus. At the graduate level, research emphasizes questions such as "How should graduate HyFlex courses be designed?" addressing aspects like technology, instructional design, logistics, and instructor predisposition, as well as, exploring "What are the experiences of graduate students in HyFlex learning environments?" Conversely, research on HyFlex instruction at the undergraduate level also investigates "How should undergraduate HyFlex be designed?" and "What are the experiences of undergraduate students in HyFlex settings?" Additionally, undergraduate-focused studies often explore how to better prepare students for positive and successful learning experiences within HyFlex courses (Romero-Hall et al., 2025).

Limitations

While this systematic review offers valuable insights into the research related to the implementation and outcomes of HyFlex instruction in graduate education, it is essential to acknowledge certain limitations to contextualize the findings and their applicability. This systematic review focuses on research published in five specific databases within a defined timeframe, which may not encompass all existing studies on HyFlex learning in graduate education. Additionally, journal articles not published in English were excluded, limiting the representation of literature available in other languages. Furthermore, the search strategy did not account for grey literature (e.g., conference papers, dissertations, or proceedings), potentially omitting some relevant studies.

Identified Gaps and Future Research

Despite the increasing research on HyFlex teaching in graduate education, several gaps remain that warrant further exploration. First, there is a notable lack of longitudinal studies examining the long-term impacts of HyFlex teaching. While much of the current literature focuses on short-term outcomes like student satisfaction and immediate academic performance (Butz, 2014; Ho et al., 2023), few studies have explored how HyFlex impacts students' long-term progress, retention, and overall academic success. Further research is needed to assess whether HyFlex models truly support sustained academic achievement, particularly for students balancing coursework with professional and personal responsibilities. This is especially important in graduate programs, where students often juggle various life commitments. Understanding how these learners navigate the demands of HyFlex over the course of their entire program can provide insight into whether this model meets the long-term educational needs of diverse student populations.

Additionally, the integration of technology in HyFlex environments remains an underexplored area. Although studies have mentioned challenges related to technological infrastructure (Lakhal et al., 2021), few have examined how to design more inclusive and equitable digital environments. These environments should support both online and in-person learners equally, ensuring that students in both modalities have access to comparable learning experiences and resources (Wang et al., 2018). For instance, while technological tools such as learning management systems and video conferencing platforms are integral to HyFlex classrooms, the effectiveness of these tools in creating an engaging and interactive learning experience for both online and in-person students have not been sufficiently examined. Further research should investigate how these technologies can be optimized to promote engagement, interaction, and equity across learning modalities. Additionally, the role of emerging technologies like virtual and augmented reality, which have the potential to bridge the gap between online and in-person learners, remains a critical area for future study.

Moreover, further investigation is required to understand the dynamics of interaction and engagement between online and in-person students. Studies indicate that there are often differences in interactions between these two groups, with distance learners frequently feeling undervalued and perceiving themselves as treated unequally (Romero-Hall & Vicentini, 2017; Kohnke & Moorhouse, 2020). Research should focus on developing strategies to foster stronger engagement and collaboration across modalities, such as structured group activities or peer mentoring programs, to enhance integration between online and face-to-face students (Howell et al., 2023; Wang et al., 2018). Additionally, it is essential to explore the psychological and social factors that may lead to feelings of isolation among online learners and how intentional course design and instructional support can help alleviate these challenges.

The systematic review underscores a pressing need for more empirical research on faculty attitudes toward HyFlex instruction. As demonstrated in this review, the adoption of HyFlex instruction has grown significantly since 2020, providing ample opportunity for faculty to experiment with and adapt to this learning modality. Understanding faculty perspectives through robust empirical evidence would not only enrich graduate education but also offer valuable insights for institutional leaders and educators across all levels of academia. Such research could inform the development of targeted support systems, resources, and strategies to enhance the effectiveness and sustainability of HyFlex instruction.

Although HyFlex teaching gained prominence during the COVID-19 pandemic, there is still a need for deeper research into its relevance in the post-pandemic landscape. As the immediate demand for flexible learning decreases, it is crucial to explore how HyFlex can continue to meet the evolving needs of graduate students, especially those with geographic or professional constraints (Kohnke & Moorhouse, 2021). While many students benefited from the flexibility HyFlex offered during the pandemic, the shift of higher education institutions back toward more traditional models highlights a critical need to evaluate whether HyFlex can sustain institutional support and student interest in this new context. Future research should focus on how the model can be adapted to align with shifting educational priorities and rising student expectations. Addressing these gaps will be essential for ensuring the continued efficacy and scalability of the HyFlex model in higher education.

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References

Aldosemani, T. (2023). Adopting HyFlex course design: Actions for policymakers, researchers, and practitioners. *Active and Transformative Learning in STEAM Disciplines*, 197–227. https://doi.org/10.1108/978-1-83753-618-420231010

Ali, W. (2020). Online and remote learning in higher education institutes: A necessity in light of COVID-19 pandemic. *Higher Education Studies*, *10*(3), 16–25. http://doi.org/10.5539/hes.v10n3p16

Amaechi, C. V., Amaechia, E. C., Onumonu, U. P., & Kgosiemang, I. M. (2022). Systematic review and annotated bibliography on teaching in higher education academies (HEAs) via group learning to adapt with COVID-19. *Education Sciences, 12*(699). https://doi.org/10.3390/educsci12100699

American Psychological Association (2016, August). *APA databases methodology field values*. https://www.apa.org/pubs/databases/training/method-values

Angelone, L. Warner, Z., & Zydney, J. M. (2020). Optimizing the technological design of a blended synchronous learning environment. *Online Learning, 24*(3), 222–40. https://doi.org/10.24059/olj.v24i3.2180

Beatty, B. J. (2019). Hybrid-flexible course design: Implementing student-directed hybrid classes (B. J. Beatty, Ed.), EdTech Books. https://edtechbooks.org/hyflex/book_intro

Bell, J., Cain, W., Peterson, A., & Cheng, C. (2016). From 2D to Kubi to doubles: Designs for student telepresence in synchronous hybrid classrooms. *International Journal of Designs for Learning, 7*(3), 19–33. https://doi.org/10.14434/ijdl.v7i3.19520

Bervell, B., & Umar, I. N. (2017). A decade of LMS acceptance and adoption research in Sub-Sahara African higher education: A systematic review of models, methodologies, milestones and main challenges. *EURASIA Journal of Mathematics, Science and Technology Education, 13*(11), 7269–86. http://doi.org/10.12973/ejmste/79444

Blackmon, S. J., & Major, C. H. (2023). Inclusion or infringement? A systematic research review of students' perspectives on student privacy in technology-enhanced, hybrid and online courses. *British Journal of Educational Technology, 54*, 1542–65. http://doi.org/10.1111/bjet.13362

Bower, M., Dalgarno, B., Kennedy, G. E., Lee, M. J. W., & Kenney, J. (2015). Design and implementation factors in blended synchronous learning environments: Outcomes from a cross-case analysis. *Computers & Education, 86*, 1–17. https://doi.org/10.1016/j.compedu.2015.03.006

Butz, N. T., & Askim-Lovseth, M. K. (2015). Oral communication skills assessment in a synchronous hybrid MBA programme: Does attending face-to-face matter for US and

international students? *Assessment & Evaluation in Higher Education, 40*(4), 624–39. https://doi.org/10.1080/02602938.2014.940577

Butz, N. T., Stupniski, R. H., Pekrun, R., Jensen, J. L., & Harsell, D. M. (2016). The impact of emotions on student achievement in synchronous hybrid business and public administration programs: A longitudinal test of control-value theory. *Decisions Sciences Journal of Innovative Education, 14*(4), 441–75. http://doi.org/10.1111/dsji.12110

Butz, N. T., Stupnisky, R. H., Peterson, E. S., & Majerus, M. M. (2014). Motivation in synchronous hybrid graduate business programs: A self-determination approach to contrasting online and on-campus students. *MERLOT Journal of Online Learning and Teaching, 10*(2), 211–28. https://jolt.merlot.org/vol10no2/butz_0614.pdf

Caparas, S. M. L., & Yango, A. R. (2023). Digital divide, digital equity, and online learning engagement among selected college students in Pamantasan ng Cabuyao. *Technical Social Science Journal, 44,* 206–19. http://doi.org/10.47577/tssj.v44i1.8937

Chen, L. (2022). Designing online discussion for HyFlex learning. *International Journal of Educational Methodology, 8*(1), 191–98. https://doi.org/10.12973/ijem.8.1.191

Conklin, S., Trespalacios, J., & Lowenthal, P. (2019). Graduate students' perception of interactions in a blended synchronous learning environment: A case study. *The Quarterly Review of Distance Education, 20*(4). 45–59.

Cunningham, U. (2014). Teaching the disembodied: Othering and activity systems in a blended synchronous learning situation. T*he International Review of Research in Open and Distance Learning, 15*(6), 33–51. http://doi.org/10.19173/irrodl.v15i6.1793

Gleason, B., & Greenhow, C. (2017). Hybrid learning in higher education: The potential of teaching and learning with robot-mediated communication. *Online Learning, 21*(4), 159–176. http://doi.org/10.24059/olj.v21i4.1276

Goldrick-Rab, S. (2023, October 11). *Twenty percent of US undergraduates have children - We must do more to support them.* Times Higher Education. https://www.timeshighereducation.com/campus/twenty-cent-us-undergraduates-have-children-we-must-do-more-support-them

Hastie, M., Hung, I. C., Chen, N. S., & Kinshuk. (2010). A blended synchronous learning model for educational international collaboration. *Innovations in Education and Teaching International, 47*(1), 9–24. http://doi.org/10.1080/14703290903525812

Hayes, S., & Tucker, H. (2021). Using synchronous hybrid pedagogy to nurture a community of inquiry: Insights from a tourism Master's programme. *Journal of Hospitality, Leisure, Sport & Tourism Education, 29,* Article 100339. https://doi.org/10.1016/j.jhlste.2021.100339

Heilporn, G., & Lakhal, S. (2021). Converting a graduate-level course into a HyFlex modality: What are effective engagement strategies? *The International Journal of Management Education, 19*, 1–12. https://doi.org/10.1016/j.ijme.2021.100454

Ho, C., Yeh, C., Wang, J., Hu, R., & Lee, P. (2023) Linking the choice of the class format and preclass learning experiences sheds light on a step further in blended medical education. *Medical Education Online, 28*(1), Article 2186207. http://doi.org/10.1080/10872981.2023.2186207

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020, March 27). *The difference between emergency remote teaching and online learning.* Educause Review. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Howell, E. (2022). HyFlex model of higher education: Understanding the promise of flexibility. *International Journal of Learning Futures, 30*(4), 173–181. http://doi.org/10.1108/OTH-04-2022-0019

Howell, E., Hubbard, K., Linder, S., Madison, S., Ryan, J., & Bridges, W. C. (2023). HyFlex pedagogy: Six strategies supported by design-based research. *Journal of Applied Research in Higher Education, 1*(1), 1–13. http://doi.org/10.1108/JARHE-02-2023-0050

Imran, R., Fatima, A., Salem, I. E., & Allil, K. (2023). Teaching and delivery modes in higher education: Looking back to move forward post-COVID-19 era. *The International Journal of Management Education, 21*, Article 100805. https://doi.org/10.1016/j.ijme.2023.100805

Irvine, V. (2020, October 26). *The landscape of merging modalities.* Educause Review. https://er.educause.edu/articles/2020/10/the-landscape-of-merging-modalities

Irvine, V., Code, J., & Richards, L. (2013). Realigning higher education for the 21st-century learning through multi-access learning. *MERLOT Journal of Online Learning and Teaching, 9*(2), 172–86.

Joanpere-Foraster, M., Egetenmeyer, R., Soler-Gallart, M., López, A., & Flecha, R. (2023). Dialogic teaching beyond words. *Multidisciplinary Journal of Educational Research, 13*(3), 313–24. http://dx.doi.org/10.17583/remie.12867

Kohnke, L., & Moorhouse, B. L. (2021) Adopting HyFlex in higher education in response to COVID-19: students' perspectives. *Open Learning: The Journal of Open, Distance and e-Learning, 36*(3), 231–44. http://doi.org/10.1080/02680513.2021.1906641

Lakhal, S., Mukamurera, J., Bédard, M., Heilporn, G., & Chauret, M. (2020). Features fostering academic and social integration in blended synchronous courses in graduate programs. *International Journal of Educational Technology in Higher Education, 17*(5), 1–22. https://doi.org/10.1186/s41239-020-0180-z

Lakhal, S., Mukamurera, J., Bédard, M., Heilporn, G., & Chauret, M. (2021). Students and instructors perspective on blended synchronous learning in a Canadian graduate program. *Journal of Computer Assisted Learning, 37*(5), 1383–1396. https://doi.org/10.1111/jcal.12578

Li, X., Yang, Y., Chu, S. K. W., Zainuddin, Z., & Zhang, Y. (2022). Applying blended synchronous teaching and learning for flexible learning in higher education: An action research study at a university in Hong Kong. *Asia Pacific Journal of Education, 42*(2), 211–227. https://doi.org/10.1080/02188791.2020.1766417

Macharaschwili, C. E., & Coggin, L. S. (2013). A skype-buddy model for blended learning. *Journal of Interactive Learning Research, 24*(2), 167–90. https://www.learntechlib.org/primary/p/40523/

McCaw., C.T., Mendus, A., Cameron, S., Leve, A., & Messer, R. (2023). From "Am I 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. *Education and Information Technologies.* http://doi.org/10.1007/s10639-023-12210-9

Morris, A.A. (2025). Factors that impact the implementation of HyFlex learning environments of higher education institutions within a Caribbean context (Publication No. 26942) [Doctoral Dissertation, University of Georgia]. UGA Open Scholar. https://openscholar.uga.edu/record/26942?ln=en&v=pdf

Newman, M., & Gough, D. (2020). Systematic reviews in educational research: Methodology, perspectives and application. In O. Zawacki-Richter, M. Kerres, S. Bedenlier, M. Bond, & K. Buntins (Eds.), *Systematic reviews in educational research* (pp. 3–22). Springer. https://doi.org/10.1007/978-3-658-27602-7_1

Norberg, A. (2012). Blended learning and new education logistics in Northern Sweden. In D. G. Oblinger (Ed.), *Game changers: Education and information technologies* (pp. 327-330). EDUCAUSE. https://www.educause.edu/~/media/files/library/2012/5/pub7203cs13-pdf.pdf?la=en

Nykvist S. S., De Caro-Barek, V., Støckert, R., & Lysne, D. A. (2021). Key factors needed for developing a higher education cross-campus learning environment in a Nordic context. *Frontiers in Education, 6*, Article 763761. http://doi.org/10.3389/feduc.2021.763761

Olelewe, C. J., & Agomuo, E. E. (2016). Effects of b-learning and f2f learning environments on students' achievement in QBASIC programming. *Computers & Education, 103,* 7686. http://dx.doi.org/10.1016/j.compedu.2016.09.012

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann T. C., Mulrow, C. D., Cynthia, D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W.,

Mayo-Wilson, E., … Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ (Online), 372*, Article 71. http://doi.org/10.1136/bmj.n71

Park, Y., & Bonk, C. J. (2007). Is online life a breeze? A case study for promoting synchronous learning in a blended graduate course. *MERLOT Journal of Online Learning and Teaching*, *3*(3).

Petchamé, J., Iriondo, I., Korres, O., & Paños-Castro, J. (2023). Digital transformation in higher education: A qualitative evaluative study of hybrid virtual format using a smart classroom system. *Heliyon, 9,* Article e16675. https://doi.org/10.1016/j.heliyon.2023.e16675

Picciano, A. G. (2017). Theories and frameworks for online education: Seeking an integrated model. *Online Learning, 21*(3), 166–190. http://doi.org/10.24059/olj.v21i3.1225

Protsiv, M., Rosales-Klintz, S., Bwanga, F., Zwarenstein, M., & Atkins, S. (2016). Blended learning across universities in a South-North-South collaboration: A case study. *Health Research Policy and Systems, 14*(67), 1–12. http://doi.org/10.1186/s12961-016-0136-x

Romero-Hall, E. & Vicentini, C. (2017). Examining distance learners in a hybrid synchronous course: Successes and challenges. *Online Learning, 21*(4), http://dx.doi.org/10.24059/olj.v21i4.1258.

Romero-Hall, E. & Ripine, C. (2021). Hybrid flexible instruction: Exploring faculty preparedness. *Online Learning, 25*(3), 289-312. http://doi.org/10.24059/olj.v25i3.2426

Romero-Hall, E., Allen, E., Duan, Y. & Morris, A. (2025). A decade of HyFlex learning: A systematic review in undergraduate education. *Educational Technology Research and Development*. https://doi.org/10.1007/s11423-025-10544-4

Rosen, D. J. (2021) BlendFlex and HyFlex models to increase student engagement. (2021, Summer). *Adult Literacy Education, 73–78.* http://doi.org/10.35847/DRosen.3.2.73

Seaman, J.E., Allen, I. E., & Seaman, J. (2018). Grade increase: Tracking distance education in the United States. *Bay View Analytics.* https://www.bayviewanalytics.com/reports/gradeincrease.pdf

Smith , J., Schreder, K., & Porter, L. (2020). Are they paying attention, or are they shoe-shopping? Evidence from online learning. *International Journal of Multidisciplinary Perspectives in Higher Education, 1*(2020), 200–09. http://doi.org/10.32674/jimphe.v5i1.2643

Sun, A., & Chen, X. (2016). Online education and its effective practice: A research review. *Journal of information technology education, 15*, 157–90. http://doi.org/10.28945/3502

Verdecchia, R., & Lago, P. (2023). Tales of hybrid teaching in software engineering: Lessons learned and guidelines. *IEEE Transactions on Education, 66*(3), 234–43. Advance online publication. https://doi.org/10.1109/TE.2022.3221802

Vu, P., & Fadde, P. J. (2013). When to talk, when to chat: Student interactions in live virtual classrooms. *Journal of Interactive Online Learning, 12*(2), 41–2. https://www.ncolr.org/jiol/issues/pdf/12.2.1.pdf

Wang, Q., Huang, C., & Quek, C. L. (2018). Students' perspectives on the design and implementation of a blended synchronous learning environment. *Australasian Journal of Educational Technology, 34*(1), 1–13. http://doi.org/10.14742/ajet.3404

Wang, Q., Quek, C. L., Hu, X. (2017). Designing and improving a blended synchronous learning environment: An educational design research. *International Review of Research in Open and Distributed Learning, 18*(3), 99–118. http://doi.org/10.19173/irrodl.v18i3.3034

Wong, B. T. M., Li, K. C., Chan, H. T., & Cheung S. K. S. (2023). HyFlex learning research and practice: A longitudinal analysis. *Sustainability, 15*, Article 9699. https://doi.org/10.3390/su15129699

Zhou, X., MacBride Smith, C. J., & Al-Samarrie H. (2023). Digital technology adaptation and initiatives: A systematic review of teaching and learning during COVID-19. *Journal of Computing in Higher Education.* https://doi.org/10.1007/s12528-023-09376-z

Zydney, J. M., Warner, Z., & Angelone, L. (2020). Learning through experience: Using design based research to redesign protocols for blended synchronous learning environments. *Computers & Education, 143*, Article 103678. https://doi.org/10.1016/j.compedu.2019.103678