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A Bibliometric Analysis of Keywords of HyFlex Learning for the English Language Learning Skills of Teacher Students

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Abstract

Listening, speaking, reading, and writing are important skills in English language learning. However, some students are not successful in learning English due to several factors. The model for improving the English learning skills of students is essential. However, except for the HyFlex learning model, no suitable model for learners has been found following the new normal. This research, therefore, identify the bibliographic keywords of HyFlex learning for the English learning skills of teacher students. According to a total of 465 documents published in the Scopus database, 40 articles met the research inclusion criteria and keywords related to HyFlex learning could be used to guide the development of the model of English language learning skills of students. Findings, the keywords of HyFlex learning for the English learning skills of teacher students 42 keywords related to Hyflex learning that clustered into seven categories: Higher education, Learning environment, Teaching and learning model, Digital technology for learning, Teacher, Student, and English language.

INTRODUCTION

English was spoken as a second language or natively by about 1.4 billion people globally (Statista, 2024). As a result, English is universally utilized for the dissemination and presentation of critical information from all over the world. Hence, almost all countries encourage their citizens to improve their four English language skills: listening, speaking, reading, and writing.

Thailand acknowledges that English is a crucial second language that must be prioritized (Chiablaem, 2021) since it is connected to Thai people's daily life (Rofiah et al., 2022) such as

communication and information exchange, entertainment and recreation, cultural exchange, travel trip, occupation education, and learning both in formal and non-formal education (Lin & Lei, 2020). Therefore, Thailand provides English language learning for students from kindergarten to graduate school and continually promotes all four English language skills through a variety of channels including onsite, online, on air, on demand, and on hand. In addition, the English language is usually critical for learners in many aspects as follows: First, proficiency in English provides students with an opportunity to be accepted or taken into a prospective educational institution or to receive a scholarship for their studies. Second, during the course of study in educational institutions, English is required. All students are required to learn and pass the exam. Moreover, many courses are primarily conducted in English and some courses offer the same subject area but are divided into Thai and English language courses. Third, before graduation, all students must pass all English language courses required by the study program. Moreover, before graduating with a bachelor's degree in Thailand, some students must pass an exit examination or English proficiency test (IELTS, TOEFL, TOEIC, CU-TEP, or TU-GET). For example, Suan Dusit University (2020) requires students to pass an English language proficiency test in order to graduate; that is, all undergraduate students must have a TOEIC score of at least 500 and the students enrolled in the Business English program, Aviation Business program, and any program taught in English must have a minimum TOEIC score of 600. Fourth, after graduating, the majority of students seek a job or continue their studies at a higher level, both of which require proficiency in English (Keesookpun et al., 2022).

All four English language skills are, therefore, essential and must be prioritized. Although English language proficiency is the skill that learners need to develop the most (Bootpala, 2020). Thai students find it challenging to learn, especially speaking English. This is because they have vocabulary problems, lack practice speaking English with teachers and other people, have a distaste for taking courses that emphasize English speaking skills, and always think in Thai first when speaking English (Ritthirat & Chiramanee, 2014). The factors that affect the improvement of the learners' English language skills include learners, instructors, teaching techniques, and learning styles (Doungphummes & Chandransu, 2017; Sukhphan, 2018).

Digital technology is an alternative way to learn and improve students' English language skills as well as supporting English learning among university students (Hidayat et al., 2022). For example, learners who learn to speak English through digital technologies have improved speaking performance compared to learners who learn conventionally. They are also able to speak fluently and accurately (Asratie et al., 2023). In addition, students have a positive attitude towards using digital technology to learn English for each skill (Moorhouse & Yan, 2023). HyFlex learning is a digital learning technology that has been reported to hep improve student learning effectively during the post-COVID-19 pandemic period (Ayub et al., 2022; Chai et al., 2022; Chen, 2022; Detyna et al., 2022; Nweke et al., 2022; Raes, 2022; Sanchez-Pizani et al., 2022; Sankey, 2022; Shek et al., 2022). HyFlex learning is flexible teaching and learning management. It combines time-based learning management (synchronous) (Mushtaha et al., 2022; Wannapiroon et al., 2022) with uncoordinated learning management (asynchronous) where teachers record their classroom instruction for some students who wish to study online without time synchronization or who are too busy to attend both regular and online classrooms, to be able to learn and do activities at the time when they are convenient and ready to learn

through the Learning Management System (LMS) (Jitsupa et al., 2022). Through HyFlex learning, learners can design their own learning style for each activity or subject in each period (Beatty, 2019) without informing the teacher in advance. It has been found that students appreciate this method of learning since they can fully participate in the lessons that the teachers have planned (Kohnke et al., 2021). Although HyFlex learning can enhance student learning results, a model for the systematic development of English language learning skills for learners who use HyFlex learning has not been developed, particularly for students. Systematic literature review and meta-analysis are credible research and have been researched in many fields for a long time (Rethlefsen et al., 2021). Therefore, this study systematically reviews the literature and meta-analysis using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)to analysis bibliographic of keywords of HyFlex learning the English language learning skills of teacher students.

Objective of research

The purpose of this study aimed to identify keywords of HyFlex learning for the English language learning skills of teacher students.

LITERATURE REVIEW

HyFlex learning

HyFlex learning stands for Hybrid Learning and Flexible Learning (Beatty, 2019). It is flexible learning management that combines asynchronous learning management with two types of time-based learning management (onsite face-to-face and online face-to-face). Onsite face-to-face is a long-established course in which learners must come to a school or academy which has various resources for learners to learn with teachers or instructors. On-site face-to-face learning has a fixed schedule of sessions and learning activities for each subject. If learners miss a class, they may lose the opportunity and not gain knowledge from the teacher. Later, information technology and communication has been developed to be more advanced and modern resulting in blended learning management. Blended learning is learning management that alternates between managing learning in a traditional classroom and managing learning online using information technology and communication (Bower et al., 2015; Heilporn et al., 2021) such as Microsoft Teams, video cameras, microphones, applications and computer monitors (Sanchez-pizani et al., 2022; Ndlovu & Merisi, 2022; Detyna et al., 2022). With blended learning, teachers must schedule lessons for students who study in the regular classroom at the same time as students who have to study online from home for any reason such as having to quarantine due to Covid-19. Moreover, both groups of learners can study and do activities in unison relying on the capabilities of information technology and communication (Sanchez-Pizani et al., 2022).

Research on Hyflex learning will grow even more after the COVID-19 pandemic since it can arrange classes in many formats according to the needs of higher educational institutions, learning environments, teaching and learning models, digital technologies for learning, teachers,

students, and the English language. Even in non-COVID-19 situations, Hyflex learning can be used as strategies for improving the English language learning skills of students. HyFlex learning is flexible and customizable. Students can choose learning styles according to their desire. More importantly, the learners are satisfied with the HyFlex learning method (Donham et al., 2022; Nweke et al., 2022; Shek et al., 2022) However, when learning with HyFlex learning, learners should direct themselves to be able to learn until the end of the course (Özdal et al., 2022; Tomak & Seferoğlu, 2021; Zhong et al., 2022), especially those learning English as a second language (Tomak & Seferoğlu, 2021).

Learning in general

Learning refers to the changes in behavior both externally and internally due to previous experiences causing people to face the same situation differently. Behavioral changes are classified into four types: doing new behaviors, undoing them, increasing old behaviors, and reducing behaviors that have been. Any behaviors that do not change are not called learning. The learning will lead to knowledge, skills, and attitudes. (Munna & Kalam, 2021) has stated that learning is the process of changing one's old behavior to new permanent behavior. This new behavior results from experiences or practices, not from natural responses or instincts. This statement is in accordance with the original learning concepts and theories of Bloom (1959) or Bloom's Taxonomy which divides learning into 3 aspects: cognitive, affective, and range skills. The concept of Bloom's learning has been revamped to Bloom's Revised Taxonomy by Anderson et al. (2001). The cognitive aspect is therefore divided into six levels: remembering, understanding, applying, analyzing, evaluating, and creative thinking. The cognitive skill corresponds with the changes in digital technology. Churches (2008) revised Bloom's Revised Taxonomy again by introducing digital technologies that can be used at each level of knowledge, to support learning in the cognitive aspect. So, it can be used to manage learning in the classroom with Bloom's Digital Taxonomy in the context of learning and digital technology that is rapidly changing, such as levels of memorization including recognizing, listing, describing, identifying, retrieving, and naming. Digital transactions can be made using MS Word, PDF, Bookmarking, Favoriting, etc. From the concept and theory of Bloom's Digital Taxonomy developed by Churches (2008), digital learning activities can be organized in a variety of formats. The learning skills of low to advance learners can be developed through a wide range of digital technologies, especially digital technologies for learning and for life. Digital technologies encourage teachers to organize activities to enhance various learning skills of students (Pradubwate, 2017) such as remembering, the ability to search for information and to choose useful information accurately, e-Learning interaction design, the ability to search for knowledge through search engines, and the ability to convey the main idea of a story by interpreting the main idea and summarizing it (Chiablaem, 2021).

PRISMA

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) is a method or process for synthesizing quantitative research by synthesizing various research topics with the same research problem and analyzing the results from the statistical values of each research to draw conclusions from those studies (Rethlefsen et al., 2021). PRISMA is used to draw

a single general conclusion from a variety of research findings using statistical methods that consider both the similarities and variations among subjects. The meta-analytical method for research synthesis employs statistical analysis to make it more systematic and objective. Meta-analysis data consists of research results from each research subject and research characteristics. Each research may study different variables or has different storage designs making it difficult to draw a conclusion. Therefore, it is necessary to convert research findings into standard indices using the collected research results or existing statistics as a standard index. The purpose of meta-analysis is 1) to summarize a large amount of data in an easy-to-understand manner, 2) to summarize the results obtained from collected data that contain factors of cause and effect, 3) to increase the explanatory power and predictive accuracy of the research, 3) to resolve conflicts between studies, 4) to demonstrate the need for data for research, 5) to illustrate the area of various fields that are less studied, 6) to explore the relationships between variables, and 7) to reduce capital resources and time. Meta-analysis is widely used since it can clearly compare comparative parts in the form of statements, numbers, priorities, and the relationships between variables; can collect data from various formats into the best format for processing; and can obtain estimates compiled from multiple data sources and detailed studies that have been published (Bellucci et al., 2022; Lynch et al., 2022; Rethlefsen et al., 2021). Meta-analysis consists of five steps. Step 1 is the research design. Step 2 is compiling the bibliometric data. Step 3 is analysis. Step 4 is visualization. Finally, step 5 is the interpretation (Zupic & Čater, 2015).

Bibliometric analysis

A bibliometric analysis is a quantitative and statistical analysis to describe patterns or trends in research; to assess an author, a writer, or the relationship between authors and writings; and to quantitatively assess the academic quality of journals or authors using statistical methods such as citation rates (Ahamer & Kumpfmüller, 2014). It is a quantitative analysis method that uses mathematical and statistical tools to measure the interrelationship and impact of publications within a given area of research. This can visualize large-scale academic literature. It can also be used to identify influential studies, authors, journals, organizations, and countries over time (Van Eck & Waltman, 2010; Wang & He, 2022). A bibliometric analysis is conducted by selecting a group of keywords. To access journal databases using keyword groups on the topic and subject of the research, information is provided on the conceptual framework and writing style of the subject area studied. Searching electronic bibliographic databases will increase the opportunity to access the database faster without limitation (Jatmiko et al., 2021). Bibliometric analysis is commonly used in conjunction with the VOS viewer program (Van Eck & Waltman, 2010), which creates diagrams of bibliographic analysis, including citations, bibliographic coupling, co-citation, co-authorship, and key terms taken from the content of scientific research (co-occurrence). Although bibliometric analysis is a long-standing research method, it is still widely used, especially in science and applied science (Abuhassna et al., 2022a; 2022b). This is because there are enough completed and published research papers to be analyzed using bibliographic analysis. Coinciding with the present, which is an era where technology has advanced rapidly, a large amount of data is linked together as big data (Lafuente-Lechuga et al., 2021) stored on large reliable international research databases such as Web of Science and Scopus. The application of this method is to give the researcher

a broader view of the content of interest as well as the complex systematic linkages from content groups that are in the same direction or gaps in the content of interest for the benefit of further development (Omar et al., 2021; Raman et al., 2021; Yu & Li, 2022). These make a bibliometric analysis different from reviewing related papers as a bibliometric analysis is primarily intended to consider the progress, challenges, and future directions of a particular topic (Bawack et al., 2022; Lafuente-Lechuga et al., 2021; Lynch et al., 2022).

METHODS

This study was to systematically review the literature and the meta-analysis with PRISMA to find bibliometric keywords related to HyFlex learning to be used as a strategy to develop a model for developing the English learning skills of students. The samples were document published in Scopus such as article, conference proceeding, and book chapter. Scopus was selected as the database because it includes a large number of journal indexes and a format that can define complex search conditions, resulting in highly accurate search results; studies published in Scopus tend to obtain more citations than those published in other databases (Sweileh, 2020). Also, Scopus provides tools to retrieve and export data for systematic literature review, PRISMA meta-analysis, and bibliometric analysis (Hallinger & Kovačević, 2019). The study inclusion criteria were only the article that were published in open-access journals, were presented at academic conferences, were full edition, were published since 2018, were conducted during the COVID-19 pandemic; the research papers whose title, abstract, and keywords matched the keywords of HyFlex learning, blended learning, and hybrid learning; and the research papers that related to improving the English language skills of higher education students. The keywords used included ((hyflex AND learning) AND (((higher AND education)) AND (hybrid AND learning)) OR (blended AND learning)) AND (synchronous) OR (asynchronous) AND (LIMIT-TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018)) AND (LIMIT-TO (SRCTYPE, "j") OR LIMIT-TO (SRCTYPE, "p")) AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "cp")) AND (LIMIT-TO (OA, "all")).

RESULTS

A total of 465 documents published in Scopus were obtained. The first year of d 0scovery was in 2010 with three published research papers. An average of 18 research papers per year was published on HyFlex learning during the COVID-19 pandemic, during 2019 and 2020. As shown in Figure 1, 29 research papers were published in 2021, a significant increase from the previous year. HyFlex learning was developed and organized prior to the Covid-19 pandemic; however, it was more widespread during the Covid-19 pandemic. As shown in Figure 2, the top three countries with the most published research papers on HyFlex learning were the United States, the United Kingdom, and China, respectively. Thailand ranked 15th.

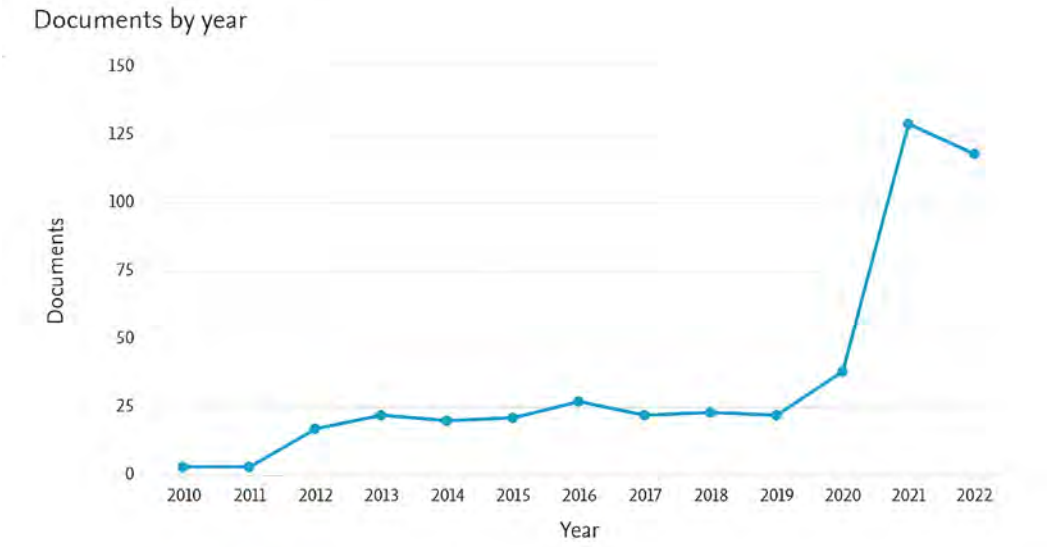

Figure 1 The number of research papers on HyFlex learning each year

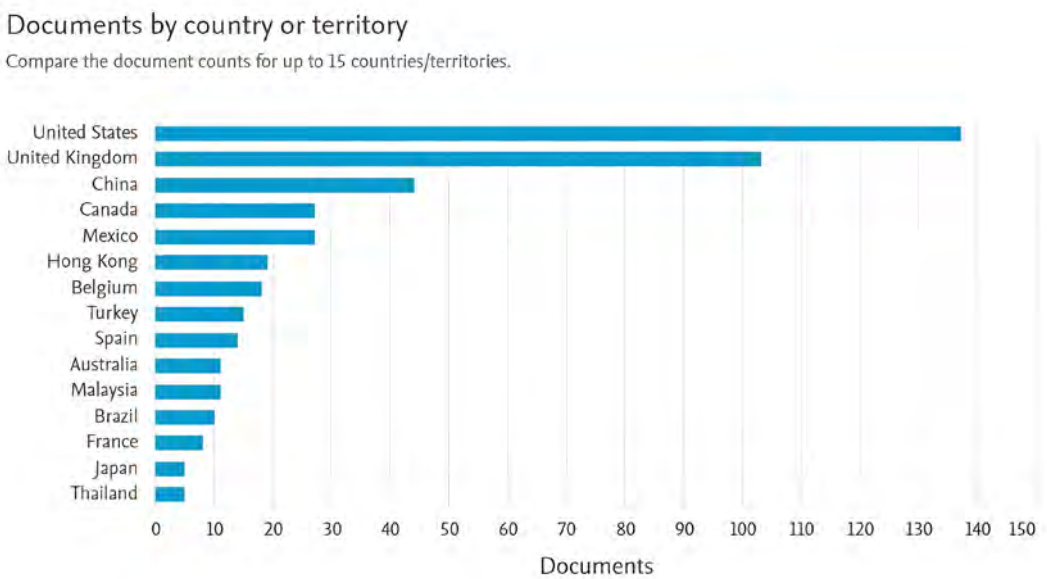

Figure 2 The number of research papers on HyFlex learning in each country

Table 1 shows the top 10 journals that published research papers on HyFlex learning. Of all 465 research papers, most of the document types were article, conference proceeding, book chapter, review, and book as in Table 2. Source types included journal, conference proceeding, book series, and book as shown in Table 3. Table 4 presents the top 10 subject areas: computer science; social science; mathematics; engineering; decision science; business, management and accounting; arts and humanities; environmental science; medicine; and psychology.

Table 1

Journals that published research papers on HyFlex learning

Rank	Journals	Publications	Percentage	Impact Factor
1	European Journal of Operational Research	6	1.29	6.363
2	Information Sciences	6	1.29	8.233
3	Sustainability Switzerland	6	1.29	3.889
4	Applied Soft Computing	5	1.07	8.263
5	Education and Information Technologies	5	1.07	3.666
6	International Journal of Environmental Research and Public Health	5	1.07	4.614
7	Evolutionary Computation	4	0.86	4.766
8	Expert Systems with Applications	4	0.86	8.665
9	International Journal of Educational Technology in Higher Education	4	0.86	7.826
10	Journal of Computer Assisted Learning	4	0.86	3.761

Table 2

Document types

Rank	Document Types	Frequency	Percentage
1	Article	236	50.75
2	Conference proceeding	155	33.33
3	Book chapter	32	6.88
4	Review	17	3.65
5	Book	14	3.01
6	Note	5	1.07
7	Conference review	3	0.65
8	Editorial	2	0.43
9	Retracted	1	0.22
	Total	**465**	**100.00**

Table 3

Source types

Rank	Source types	Frequency	Percentage
1	Journal	261	56.13
2	Conference proceeding	127	27.31
3	Book series	44	9.46
4	Book	33	7.10
	Total	**465**	**100.00**

Table 4

Subject areas

Rank	Subject areas	Document	Percentage
1	Computer science	247	53.12
2	Social sciences	179	38.49
3	Mathematics	108	23.23
4	Engineering	104	22.36
5	Decision science	40	8.60
6	Business, management, and accounting	29	6.24
7	Arts and humanities	15	3.23
8	Environmental science	14	3.01
9	Medicine	14	3.01
10	Psychology	11	2.36

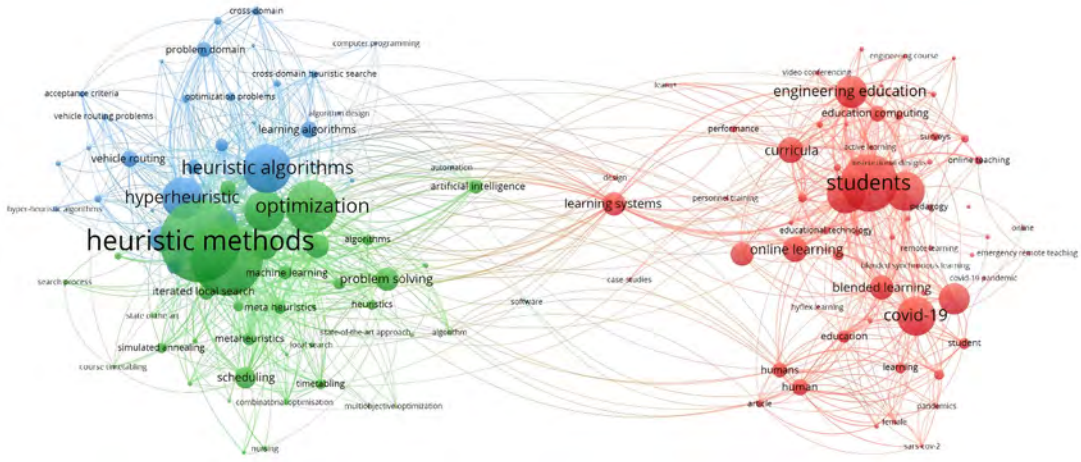

Figure 3 Bibliographic from HyFlex learning queries in Scopus database

After querying results with HyFlex learning keywords published in Scopus, the 465 research papers were analyzed using a bibliometric analysis. The results are shown in Figure 3. It was shown that there were 3 groups of keywords according to the color they appeared: the red group such as learning systems, blended learning, online learning, active learning, and Hyflex learning, the green group such as heuristic methods, optimization, and the blue group. Many keywords could not be used as keywords of Hyflex learning for the English language learning skills of teacher students. Therefore, the 465 research papers from the Scopus database were used to systematically review the literature and meta-analysis. According to the research selection criteria,

1. when excluding non-higher education research, there were 254 research papers remained,
2. when excluding non-hybrid learning or blended learning research, there were 222 research papers remained,
3. when excluding non-synchronous or asynchronous research, there were 131 research papers remained,

4. when excluding research published since 2018, there were 113 research papers remained,
5. when excluding research that was not published in research journals and academic conferences, there were 97 research papers remained,
6. when excluding non-research articles and conference proceedings, there were 91 research papers remained, and
7. when excluding non-open access research studies, there were 41 research papers remained.

Considering the abstracts and content of all 41 research papers, one research paper was inconsistent and not related to HyFlex learning; therefore, it was excluded. Hence, 40 research papers were selected for the bibliometric analysis as shown in Figure 3.

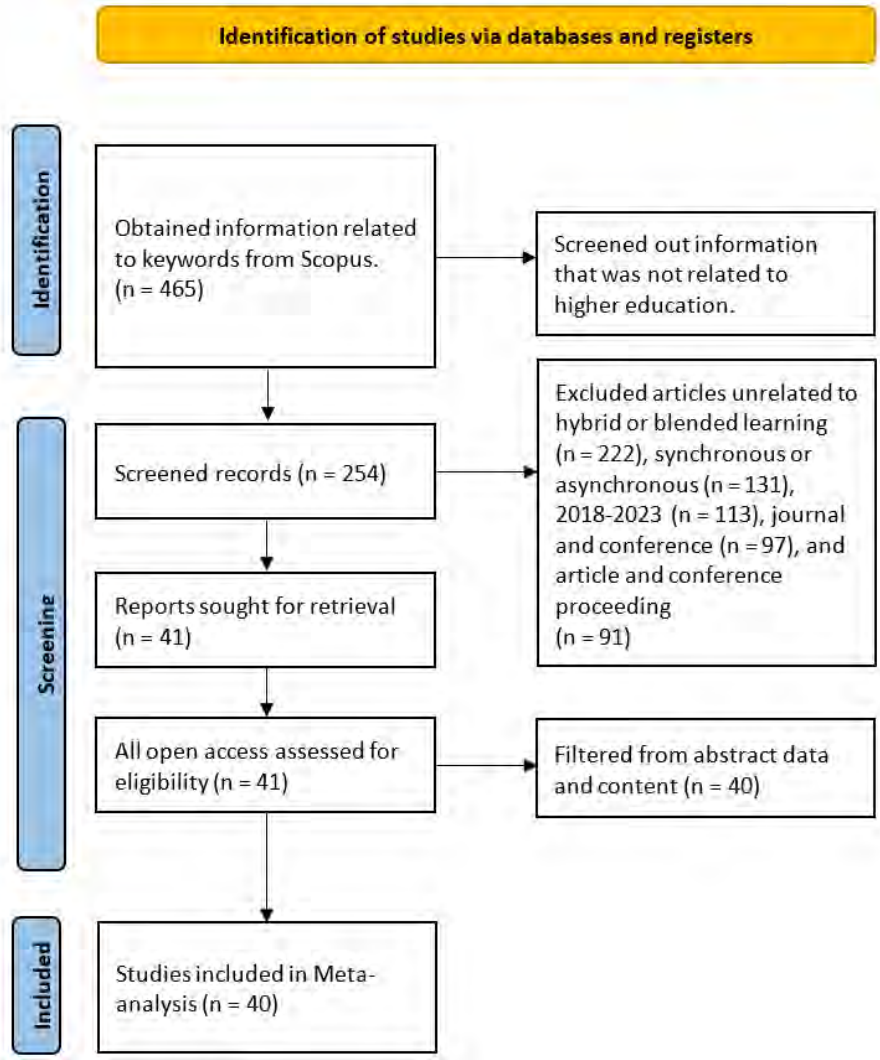

Figure 4 PRISMA framework

As shown in Figure 4, search results for keywords of HyFlex learning for the English language learning skills of teacher students could be grouped into eight keyword clusters: The red group included flexible learning, hybrid education, hybrid flexible methodology, hybrid learning, Hyflex, learning modalities, learning technology, online learning, onsite and online learning, and student perceptions. The green group comprised distance education, engagement, hybrid, hybrid flexible, hybrid learning environment, hybrid virtual classroom, learning space, teaching space, and user experience. The blue group contained challenges, emergency remote teachers, English for academic purposes, English medium instruction, opportunities, synchronous, teachers, and teaching. The yellow group covered Covid 19 teaching, faculty training, faculty-centric, higher education institute, hybrid teaching, online teaching, and remote teaching. The purple group consisted of academic performance, blended learning, English as a medium of instruction, pedagogical design, social media, and student-centered. The light blue group included language learning, learning strategies, online, post-pandemic, self-regulated learning, and technology-enhanced learning. The orange group comprised Covid-19, distance learning, and e-learning. The brown group contained digital interactions, student engagement, teachers' strategies, and virtual learning environments.

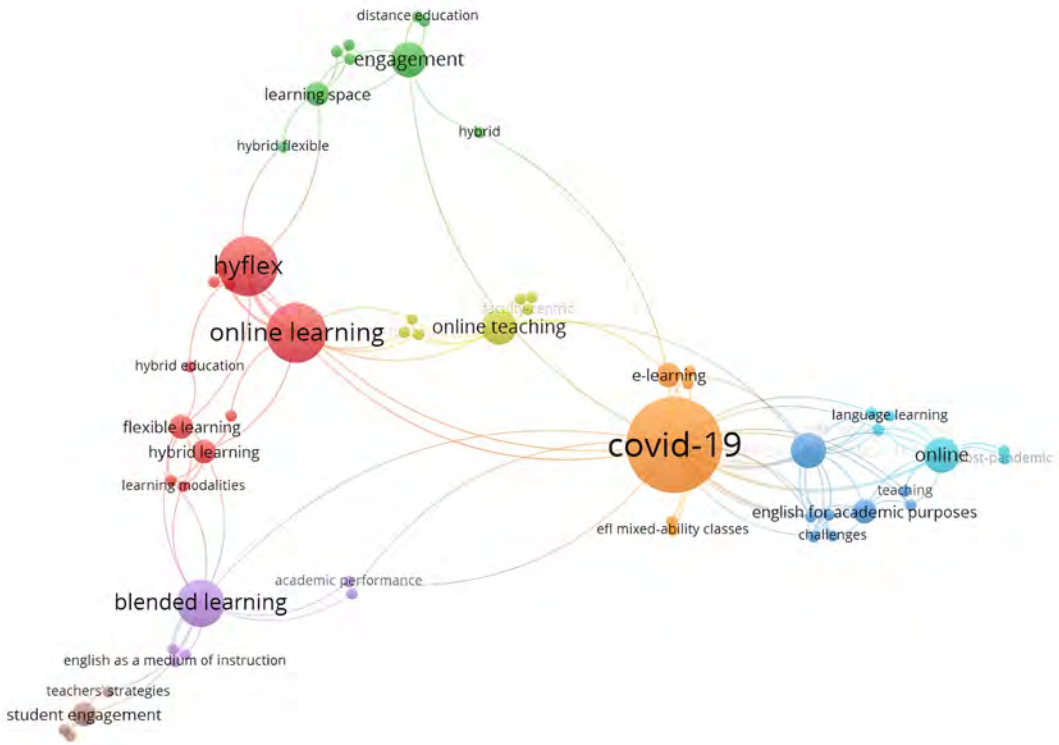

Figure 5 Clusters of keywords in titles and abstracts.

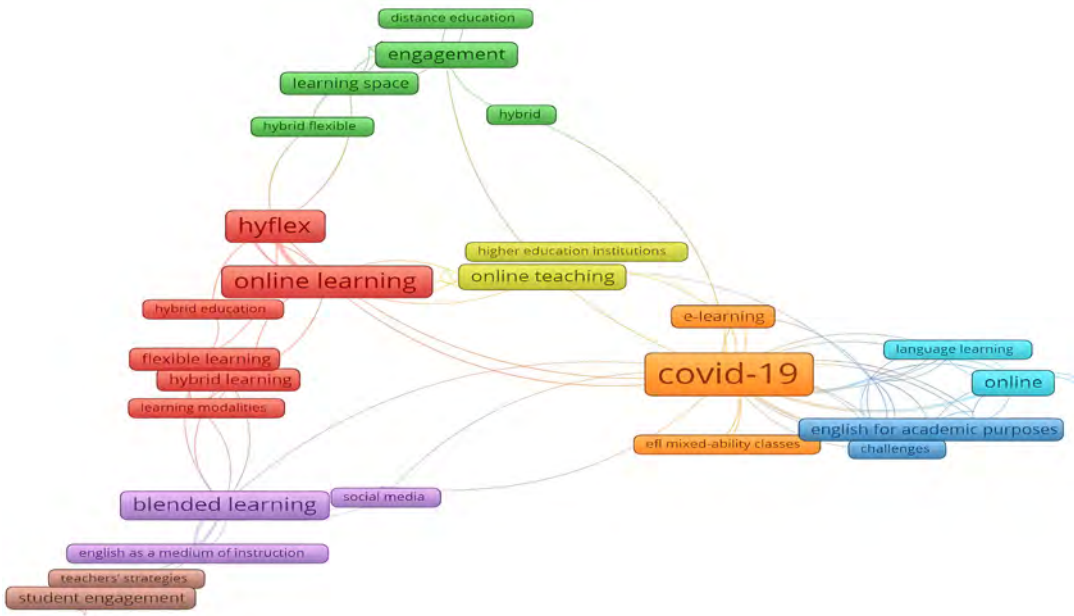

Figure 6 Clustering frames of keywords in titles and abstracts

When the keywords of HyFlex learning for the English learning skills of teacher students from Figure 4 are connected together, they can be clustered into seven categories: 1) Higher education consisted of higher education institutions, academic performance, and learning strategies, 2) Learning environment consisted of hybrid learning environment, hybrid virtual classroom, virtual learning environment, learning space, and teaching space, 3) Teaching and learning model consisted of Hyflex learning, hybrid education, flexible learning, hybrid flexible, hybrid learning, blended learning, distance learning, online learning, distance education, onsite learning, synchronous and asynchronous learning, hybrid teaching, and online teaching, 4) Digital technology for learning consisted of learning technology, social media, technology enhanced learning, e-Learning, and digital interaction, 5) Teacher consisted of teacher teaching, faculty training, faculty-centric, teachers' strategies, emergency remote teacher, learning modalities, and pedagogical designs, 6) student consisted of student perception, user experience challenges, opportunities, student-centered, self-regulated learning, and student engagement, and 7) English language consisted of English for academic purpose, English language learning, and English medium instruction as shown in Table 5.

Table 5

Keywords of Hyflex learning for the English language learning skills of teacher students

Keyword Categories	Keywords	References
Higher education	Higher education institutions, Academic performance, and Learning strategies	(Asghar et al., 2021; Bozkurt, 2022; Hapke et al., 2021; Heilporn et al., 2021; Hutson & Herrell, 2021; Johnson & Poulin, 2022; Kohnke & Moorhouse, 2021; la Rosa & Mavroudi, 2022; Lakhal et al., 2020, 2021; Morales, 2020; Rodriguez, 2022; Sankey, 2022; Scaringella et al., 2022; Verde & Valero, 2021; Wigal, 2021; Zhong et al., 2022)
Learning environment	Hybrid learning environment, Hybrid virtual classroom, Virtual learning environment, Learning space, and Teaching space	(Hapke et al., 2021; Raes, 2022; Raes et al., 2020; Solé-Beteta et al., 2022)
Teaching and learning model	HyFlex learning, Hybrid education, Flexible learning, Hybrid flexible, Hybrid learning, Blended learning, Distance Learning, Online learning, Distance education, Onsite learning, Synchronous and asynchronous learning, Hybrid teaching, and Online teaching	(Angelone et al., 2020; Bai, 2022; Bozkurt, 2022; Daniels & Appenzeller, 2022; Davis et al., 2022; Detyna et al., 2022; Donham et al., 2022; Hapke et al., 2021; Heilporn et al., 2021; Keiper et al., 2021; Kohnke & Jarvis, 2021; Kohnke & Zou, 2021; la Rosa & Mavroudi, 2022; Masters et al., 2022; Morales, 2020; Mushtaha et al., 2022; Raes, 2022; Rodríguez et al., 2022; Romero-Hall & Ripine, 2021; Sanchez-Pizani et al., 2022; Zhong et al., 2022)
Digital technology for learning	Learning technology, Social media, Technology enhanced learning, e-Learning, and Digital interaction	(Asghar et al., 2021; Mushtaha et al., 2022; Sankey, 2022; Solé-Beteta et al., 2022)
Teacher	Teacher teaching, Faculty training, Faculty-centric, Teachers' strategies, Emergency remote teacher, Learning modalities, and Pedagogical designs	(Heilporn et al., 2021; Kohnke et al., 2021; Kohnke & Jarvis, 2021; Kohnke & Moorhouse, 2021; Kohnke & Zou, 2021; Lin et al., 2021; Morales, 2020; Verde & Valero, 2021)
Student	Student perception, User experience challenges, Opportunities, Student-centered, Self-regulated learning, and Student engagement	(Donham et al., 2022; Hapke et al., 2021; Heilporn et al., 2021; Hutson & Herrell, 2021; Keiper et al., 2021; Kohnke et al., 2021; Kohnke & Zou, 2021; Laforune, 2019; Mushtaha et al., 2022; Raes et al., 2020; Solé-Beteta et al., 2022; Zhong et al., 2022)
English language	English for academic purpose, English language learning, English medium instruction	(Hanh & Huong, 2021; Kohnke & Jarvis, 2021; Kohnke & Zou, 2021; Lin et al., 2021)

DISCUSSION

From the COVID-19 pandemic until the present, there has been a constant need for Hyflex learning. Since it may be managed with flexibility by integrating a variety of teaching modes, such as online learning, in-class learning, and video follow-up recorded on an LMS (Kohnke & Moorhouse, 2021). The goal of this study was to identify keywords associated with HyFlex learning for improving student teachers' proficiency in the English language. Regarding the enhancement of student teachers' English language learning skills as discovered in this research, there are 42 keywords can be grouped into the following seven categories: The higher education, the learning environment, the teaching and learning model, the digital technology for learning, the teacher, the student, and the English language.

These keywords can be relevant to improving student teachers' English language learning abilities using Hyflex learning. However, the style of classroom management known as Hyflex learning only became well-known during the COVID-19 outbreak, which explains why there aren't many written publications about it. Since there are just 40 publications that are relevant to this study, it's possible that the keywords that were identified are not very broad and don't adequately cover student teacher' learning skills. For example, the English language category has the keywords English for academic purpose, English language learning, and English medium instruction, and the higher education category has the keywords higher educational institutions, academic performance, and learning strategies.

When certain categories are taken into account, it's possible that there are enough keywords to be used in order to help teachers using Hyflex learning improve their English language proficiency. For example, the learning environment category contains keywords related to Hybrid learning environments, hybrid virtual classrooms, learning spaces, and teaching spaces and the teaching and learning model category has several keywords associated with it, including HyFlex learning, hybrid education, flexible learning, hybrid flexible, blended learning, online learning, distance learning, onsite learning, synchronous and asynchroneus learning, hybride teaching, and online teaching. However, if align these keywords with hybrid learning, it will be discovered that the two forms of teaching that are most appropriate for usage in hybrid learning are flexible learning and hybrid learning. Considering that hybrid learning combines onsite and online instruction. The remaining keywords include: blended learning, distance learning, synchronous and asynchroneus learning all have similar meanings and online learning and Onsite learning, simply select distinct terms to refer to one another. Or even the digital technology for learning category, which includes learning technology, social media, technology enhanced learning, e-Learning, and digital interaction. It can be sufficient if want to apply the keyword digital technology for learning, it might only need some further explanation.

However, there are two categorys of keywords that are likely to be critical to the development of English language learning skills of student teachers with Hyflex learning: the teacher category, with the keyword teacher teaching, faculty training, faculty-centric, teachers' strategies, emergency remote teacher, learning modalities, and pedagogical designs, and the student category, which has the key words student perception, user experience challenges, opportunities,

student-centered, self-regulated learning, and student engagement. Because if a teacher doesn't have a good teaching management design, no strategies and teaching skills, no further learning and training it is possible that developing a student's English learning skills with Hyflex learning will not be successful. Similarly, Hyflex learning is a teaching model that focuses on the student center. For learning to be successful, the student must participate in the lesson and possess the self-control to follow the teacher's instructions to ensure that learning is successful.

CONCLUSION

This study provides further clarity on keywords to use Hyflex learning to improve student teacher's English language proficiency. Given the abundance of relevant keyword categorys that have been researched, both the higher education, learning environment, teaching and learning model, digital technology for learning, teacher, student, and English language. Therefore, these keywords may be very effectively employed by a teacher who want to examine and enhance the language abilities of student teachers. Additionally, it's possible that student teachers will acquire the English language much more successfully.

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REFERENCES

Abuhassna, H., Awae, F., Bayoumi, K., Alzitawi, D. U., Alsharif, A. H., & Yahaya, N. (2022a). Understanding online learning readiness among university students: A bibliometric analysis. *International Journal of Interactive Mobile Technologies, 16*(13), 81–94. https://doi.org/10.3991/ijim.v16i13.30605

Abuhassna, H., Van, N. T., Yahaya, N., Zakaria, M. A. Z. M., & Awae, F. (2022b). Strategies for successful blended learning- A bibliometric analysis and reviews. *International Journal of Interactive Mobile Technologies, 16*(13), 66–80. https://doi.org/10.3991/ijim.v16i13.30739

Ahamer, G., & Kumpfmüller, K. A. (2014). *Education and literature for development in responsibility: Partnership hedges globalization*. In Handbook of Research on Transnational Higher Education (pp. 526-584). IGI Global.

Anderson, L. W., Krathwohl, D. R., Airasian P. W., Cruikshank, K. A., Mayer, R., Pintrich, P. R., Raths, J. D., & Wittrock, M. C. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. Allyn & Bacon.

Angelone, L., Warner, Z., & Zydney, J. M. (2020). Optimizing the technological design of a blended synchronous learning environment. *Online Learning Journal, 24*(3), 222–240. https://doi.org/10.24059/olj.v24i3.2180

Asghar, M. Z., Iqbal, A., Seitamaa-Hakkarainen, P., & Barbera, E. (2021). Breaching learners' social distancing through social media during the covid-19 pandemic. *International Journal of Environmental Research and Public Health, 18*(21), 1-21. https://doi.org/10.3390/ijerph182111012

Asratie, M. G., Wale, B. D., & Aylet, Y. T. (2023). Effects of using educational technology tools to enhance EFL students' speaking performance. *Education and Information Technologies, 28*, 10031-10051. https://doi.org/10.1007/s10639-022-11562-y

Ayub, E., Lim, C. L., Yeo, D. C. H., & Ismail, S. R. (2022). Developing a solution for hybrid classroom: A pilot study from a Malaysian Private University. *Frontiers in Education, 7*, 1-12. https://doi.org/10.3389/feduc.2022.841363

Bai, X. (2022). Preservice teachers' evolving view of the impact of the COVID-19 pandemic on online learning. *International Journal of Emerging Technologies in Learning, 17*(4), 212–224. https://doi.org/10.3991/ijet.v17i04.25923

Bawack, R. E., Wamba, S. F., Carillo, K. D. A., & Akter, S. (2022). Artificial intelligence in E-commerce: a bibliometric study and literature review. *Electronic Markets, 32(*1), 297–338. https://doi.org/10.1007/s12525-022-00537-z

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

Bellucci, M., Cesa Bianchi, D., & Manetti, G. (2022). Blockchain in accounting practice and research: Systematic literature review. *Meditari Accountancy Research, 30*(7), 121–146. https://doi.org/10.1108/MEDAR-10-2021-1477

Bloom, B. S. (1959). *Taxonomy of educational objectives, Handbook I: The cognitive domain*. David Mckay Group Inc.

Bootpala, N. (2020). A development students' listening and speaking skills in english for communication using simulations. *Journal of Education, Mahasarakham University, 14*(1), 98–108.

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 and Education, 86*, 1–17. https://doi.org/10.1016/j.compedu.2015.03.006

Bozkurt, A. (2022). A retro perspective on blended/hybrid learning: systematic review, mapping and visualization of the scholarly landscape. *Journal of Interactive Media in Education, 2022*(1), 1-15. https://doi.org/10.5334/jime.751

Chai, W., Li, X., & Shek, D. T. L. (2022). The effectiveness of a leadership subject using a hybrid teaching mode during the pandemic: Objective outcome and subjective outcome evaluation. *International Journal of Environmental Research and Public Health, 19*(16), 9809. https://doi.org/10.3390/ijerph19169809

Chen, L. L. (2022). Designing online discussion for HyFlex learning. *International Journal of Educational Methodology, 8*(1), 191–198. https://doi.org/10.12973/IJEM.8.1.191

Chiablaem, P. (2021). Enhancing English communication skills of Thai university students through Google Apps for Education (GAFE) in a digital era during Covid-19 Pandemic. *Shanlax International Journal of Education, 9*(3), 91-98. https://doi.org/10.34293/education.v9i3.3921

Churches, A. (2008). *Bloom's digital taxonomy*. https://www.researchgate.net/publication/228381038_Bloom's_Digital_Taxonomy.

Daniels, R. A., & Appenzeller, K. (2022). Let all voices be heard: Creating an engaging and inclusive asynchronous QR classroom. *Numeracy, 15*(2), 1-31. https://doi.org/10.5038/1936-4660.15.2.1415

Davis, D., McLaughlin, M. K., & Anderson, K. M. (2022). Universal design for learning. *Nurse Educator, 47*(3), 133-138. https://doi.org/10.1097/NNE.0000000000001116

Detyna, M., Sanchez-Pizani, R., Giampietro, V., Dommett, E. J., & Dyer, K. (2022). Hybrid flexible (HyFlex) teaching and learning: Climbing the mountain of implementation challenges for synchronous online and face-to-face seminars during a pandemic. *Learning Environments Research, 26*, 145-159. https://doi.org/10.1007/s10984-022-09408-y

Donham, C., Pohan, C., Menke, E., & Kranzfelder, P. (2022). Increasing student engagement through course attributes, community, and classroom technology: Lessons from the pandemic. *Journal of Microbiology & Biology Education, 23*(1), 1-6. https://doi.org/10.1128/jmbe.00268-21

Doungphummes, N., & Chandransu, N. (2017). Approaches to enhance English communicative competence of Thai people: A synthetic account of targeted research series in English learning promotion. *Journal of Language and Culture, 35*(2), 77-96.

Hallinger, P., & Kovačević, J. (2019). A bibliometric review of research on educational administration: Science mapping the literature, 1960 to 2018. *Review of Educational Research, 89*, 335-369. https://doi.org/10.3102/0034654319830380

Hanh, L. T. T., & Huong, T. T. B. (2021). Applying flipgrid-based portfolio to improve Vietnamese EFL high school students' speaking scores. *3L: Language, Linguistics, Literature, 27*(4), 85-100. https://doi.org/10.17576/3L-2021-2704-07

Hapke, H., Lee-Post, A., & Dean, T. (2021). 3-IN-1 Hybrid learning environment. *Marketing Education Review, 31*(2), 154-161. https://doi.org/10.1080/10528008.2020.1855989

Heilporn, G., Lakhal, S., & Bélisle, M. (2021). An examination of teachers' strategies to foster student engagement in blended learning in higher education. *International Journal of Educational Technology in Higher Education, 18*(1), 1-25. https://doi.org/10.1186/s41239-021-00260-3

Hidayat. D. N., Lee, J. Y., Mason, J. & Khaerudin, T. (2022). Digital technology supporting English learning among Indonesian university students. *Research and Practice in Technology Enhanced Learning, 23*, 4-15. https://doi.org/10.1186/s41039-022-00198-8

Hutson, J., & Herrell, K. (2021). Faculty and student perceptions of strategies for effective student engagement in the performing arts before and during COVID-19. *Journal of Higher Education Theory and Practice, 21*(13), 1-12. https://doi.org/10.33423/jhetp.v21i13.4781

Jatmiko, B., Prahani, B. K., Suprapto, N., Admoko, S., Deta, U. A., Lestari, N. A., Jauhariyah, M. N. R., Yantidewi, M., & Muliyati, D. (2021). Bibliometric analysis on online physics learning during COVID-19 Pandemic: Contribution to physics education undergraduate program. *Journal of Physics: Conference Series, 2110*(1), 1-7. https://doi.org/10.1088/1742-6596/2110/1/012018

Jitsupa, J., Takomsane, M., Bunyawanich, S., Songsom, N., & Nilsook, P. (2022). Combining online learning with gamification: An exploration into achievement, motivation, and satisfaction of the undergraduate. *International Journal of Information and Education Technology, 12*(7), 643-649. https://doi.org/10.18178/ijiet.2022.12.7.1665

Johnson, N., & Poulin, R. (2022). Defining different modes of learning: Resolving confusion and contention through consensus. *Online Learning Journal, 26*(3), 91-110. https://doi.org/10.24059/olj.v26i3.3565

Keesookpun, B., Jitsupa, J., & Koednat, A. (2022). Model of preparing teacher students for the examination for a teacher license according to the competency criteria of the Teachers' Council of Thailand. *International Education Studies, 15*(3), 95-106. https://doi.org/10.5539/ies.v15n3p95

Keiper, M. C., White, A., Carlson, C. D., & Lupinek, J. M. (2021). Student perceptions on the benefits of Flipgrid in a HyFlex learning environment. *Journal of Education for Business, 96*(6), 343-351. https://doi.org/10.1080/08832323.2020.1832431

Kohnke, L., & Jarvis, A. (2021). Coping with English for academic purposes provision during covid-19. *Sustainability, 13*(15), 1-10. https://doi.org/10.3390/su13158642

Kohnke, L., & Moorhouse, B. L. (2021). Adopting HyFlex in higher education in response to COVID-19: students' perspectives. *Open Learning, 36*(3), 231-244. https://doi.org/10.1080/02680513.2021.1906641

Kohnke, L., & Zou, D. (2021). Reflecting on existing English-for-academic-purposes practices: Lessons for the post-COVID classroom. *Sustainability, 13*(20), 1-12. https://doi.org/10.3390/su132011520

Kohnke, L., Zou, D., & Zhang, R. (2021). Pre-service teachers' perceptions of emotions and self-regulatory learning in emergency remote learning. *Sustainability, 13*(13), 1-14. https://doi.org/10.3390/su13137111

la Rosa, A. D., & Mavroudi, A. (2022). A case study of hybrid learning in higher education using quantitative research design. *8th International Conference on Higher Education Advances (HEAd'22) Universitat Politècnica de València, València,* 943-950. https://doi.org/10.4995/head22.2022.14680

Laforune, A. M. (2019). Differences in students' perceptions of the community of inquiry in a blended synchronous delivery mode. *Canadian Journal of Learning and Technology, 45*(3), 1-19. https://doi.org/10.21432/cjlt27839

Lafuente-Lechuga, M., Cifuentes-Faura, J., & Faura-Martínez, U. (2021). Sustainability, big data and mathematical techniques: A bibliometric review. *Mathematics, 9*(20), 1-21. https://doi.org/10.3390/math9202557

Lakhal, S., Khechine, H., & Mukamurera, J. (2021). Explaining persistence in online courses in higher education: A difference-in-differences analysis. *International Journal of Educational Technology in Higher Education, 18*(1), 1-32. https://doi.org/10.1186/s41239-021-00251-4

Lakhal, S., Mukamurera, J., Bédard, M. E., 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*(1), 1-22. https://doi.org/10.1186/s41239-020-0180-z

Lin, S. L., Wen, T. H., Ching, G. S., & Huang, Y. C. (2021). Experiences and challenges of an English as a medium of instruction course in Taiwan during COVID-19. *International Journal of Environmental Research and Public Health, 18*(24), 1-21. https://doi.org/10.3390/ijerph182412920

Lin, Z., & Lei, L. (2020). The research trends of multilingualism in applied linguistics and education (2000-2019): A bibliometric analysis. *Sustainability, 12*(15), 1-14. https://doi.org/10.3390/su12156058

Lynch, P., Singal, N., & Francis, G. A. (2022). Educational technology for learners with disabilities in primary school settings in low- and middle-income countries: a systematic literature review. *Educational Review, 76*(2), 405–431. https://doi.org/10.1080/00131911.2022.2035685

Masters, K., Taylor, D., Loda, T., & Herrmann-Werner, A. (2022). AMEE guide to ethical teaching in online medical education: AMEE guide no. 146. *Medical Teacher, 44*(11), 1194-1208. https://doi.org/10.1080/0142159X.2022.2057286

Moorhouse, B. L., & Yan, L. (2023). Use of digital tools by English language schoolteachers. *Education Science, 13*, 26, 1-15. https://doi.org/10.3390/educsci13030226

Morales, C. R. (2020). Leading the educational response during the COVID-19 pandemic: The perspective from an online campus. *Proceedings - 10th International Conference on Virtual Campus, JICV 2020*. https://doi.org/10.1109/JICV51605.2020.9375733

Munna, A. S., & Kalam, M. A. (2021). Teaching and learning process to enhance teaching effectiveness: A literature review. *International Journal of Humanities and Innovation, 4*(1), 1–4. https://doi.org/10.33750/ijhi.v4i1.102

Mushtaha, E., Abu Dabous, S., Alsyouf, I., Ahmed, A., & Raafat Abdraboh, N. (2022). The challenges and opportunities of online learning and teaching at engineering and theoretical colleges during the pandemic. *Ain Shams Engineering Journal, 13*(6), 1-13. https://doi.org/10.1016/j.asej.2022.101770

Ndlovu, T. A., & Merisi, P. O. (2022). Hyflex teaching and learning: An alternative modality for meaningful engagement and epistemological access in South African higher education. *E-Journal of Humanities, Arts and Social Sciences, 3*(6), 199-212. https://doi.org/10.38159/ehass.2022361

Nweke, L. O., Bokolo, A. J., Mba, G., & Nwigwe, E. (2022). Investigating the effectiveness of a HyFlex cyber security training in a developing country: A case study. *Education and Information Technologies, 27*, 10107-10133. https://doi.org/10.1007/s10639-022-11038-z

Omar, R., Kaliappen, N., Khamis, K. A., & Sulisworo, D. (2021). Blended learning approach in graduate studies: A bibliometric analysis from 1997-2021. *International Journal of Information and Education Technology, 11*(11), 546-552. https://doi.org/10.18178/ijiet.2021.11.11.1563

Özdal, H., Özden, C., Atasoy, R., & Güneylİ, A. (2022). Effectiveness of self-regulated learning skills on web-based instruction attitudes in online environments. *Pegem Egitim ve Ogretim Dergisi, 12*(1), 182-193. https://doi.org/10.47750/pegegog.12.01.18

Rodriguez, B. C. P. (2022). The Rise and Fall of the HyFlex Approach in Mexico. *TechTrends, 66*, 911-913. https://doi.org/10.1007/s11528-022-00780-3

Pradubwate, R. (2017). Technology Learning ManagementGuidelines by using Bloom's taxonomy. *Veridian E-Journal, Silpakorn University, 10*(3), 1051-1065.

Raes, A. (2022). Exploring student and teacher experiences in Hybrid learning environments: Does presence matter? *Postdigital Science and Education, 4*(1), 138-159. https://doi.org/10.1007/s42438-021-00274-0

Raes, A., Vanneste, P., Pieters, M., Windey, I., Noortgate, W., & Depaepe, F. (2020). Learning and instruction in the hybrid virtual classroom: An investigation of students' engagement and the effect of quizzes. *Computers and Education, 143*. https://doi.org/10.1016/j.compedu.2019.103682

Raman, A., Thannimalai, R., Don, Y., & Rathakrishnan, M. (2021). A bibliometric analysis of blended learning in higher education: Perception, achievement and engagement. *International Journal of Learning, Teaching and Educational Research, 20*(6), 126-151. https://doi.org/10.26803/IJLTER.20.6.7

Rethlefsen, M. L., Kirtley, S., Waffenschmidt, S., Ayala, A. P., Moher, D., Page, M. J., Koffel, J. B., Blunt, H., Brigham, T., Chang, S., Clark, J., Conway, A., Couban, R., Kock, S., Farrah, K., Fehrmann, P., Foster, M., Fowler, S. A., Glanville, J., Young, S. (2021). PRISMA-S: An extension to the PRISMA statement for reporting literature searches in systematic reviews. *Systematic Reviews, 10*(1), 2-19.https://doi.org/10.1186/s13643-020-01542-z

Ritthirat, N., & Chiramanee, T. (2014). Problems and obstacles to developing English speaking skill of Thai University students. *The 15th Graduate Research Conferences*, 2839–2848.

Rodríguez, C., Rahimzadeh, V., Bartlett-Esquilant, G., & Carver, T. (2022). Insights for teaching during a pandemic: Lessons from a pre-COVID-19 international synchronous hybrid learning experience. *Family Medicine, 54*(6), 471-476. https://doi.org/10.22454/FamMed.2022.319716

Rofiah, N. L., Sha Ar, M. Y. M. A., & Waluyo, B. (2022). Digital divide and factors affecting Englis synchronous learning during covid-19 in Thailand. *International Journal of Instruction, 15*(1), 633-652. https://doi.org/10.29333/iji.2022.15136a

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

Sanchez-Pizani, R., Detyna, M., Dance, S., & Gomez-Agustina, L. (2022). Hybrid flexible (HyFlex) seminar delivery – a technical overview of the implementation. *Building and Environment, 216*. https://doi.org/10.1016/j.buildenv.2022.109001

Sankey, M. D. (2022). The state of Australasian online higher education post-pandemic and beyond. *Journal of University Teaching and Learning Practice, 19*(2), 14-26. https://doi.org/10.53761/1.19.2.2

Scaringella, L., Górska, A., Calderon, D., & Benitez, J. (2022). Should we teach in hybrid mode or fully online? A theory and empirical investigation on the service–profit chain in MBAs. *Information and Management, 59*(1), 103575-103582. https://doi.org/10.1016/j.im.2021.103573

Shek, D. T. L., Zhu, X., Li, X., & Dou, D. (2022). Satisfaction with HyFlex teaching and law-abiding leadership education in Hong Kong university students under COVID-19. *Applied Research in Quality of Life, 17*, 2833-2858. https://doi.org/10.1007/s11482-022-10040-4

Solé-Beteta, X., Navarro, J., Gajšek, B., Guadagni, A., & Zaballos, A. (2022). A data-driven approach to quantify and measure students' engagement in synchronous virtual learning environments. *Sensors, 22*(9), 1-27. https://doi.org/10.3390/s22093294

Statista. (2024, Jan 10). The most spoken languages worldwide in 2023. In *Statista - The Statistics Portal*. https://www.statista.com/statistics/266808/the-most-spoken-languages-worldwide/

Sukhphan, P. (2018). The development of English communication skills as graduate in modern times. *Journal of Southern Technology, 2*(2), 89-100. https://so04.tci-thaijo.org/index.php/JMHR/article/view/182762/129211

Sweileh, W. M. (2020). Research trends and scientific analysis of publications on burnout and compassion fatigue among healthcare providers. *Journal of Occupational Medicine and Toxicology*, *15,* 23. https://doi.org/10.1186/s12995-020-00274-z

Tomak, B., & Seferoğlu, G. (2021a). Self-regulated learning strategies of learners of English in a Turkish state university to improve their language proficiency. *Advances in Language and Literary Studies, 12*(3), 22-27. https://doi.org/10.7575/aiac.alls.v.12n.3.p.22

Van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics, 84*(2), 523-538. https://doi.org/10.1007/s11192-009-0146-3

Verde, A., & Valero, J. M. (2021). Teaching and learning modalities in higher education during the pandemic: Responses to coronavirus disease 2019 from Spain. *Frontiers in Psychology, 12*, 1-12. https://doi.org/10.3389/fpsyg.2021.648592

Wang, G., & He, J. (2022). Bibliometric analysis on research trends of digital literacy in higher education from 2012 to 2021. *International Journal of Emerging Technologies in Learning, 17*(16), 43–58. https://doi.org/10.3991/ijet.v17i16.31377

Wannapiroon, P., Nilsook, P., Jitsupa, J., & Chaiyarak, S. (2022). Digital competences of vocational instructors with synchronous online learning in next normal education. *International Journal of Instruction, 15*(1), 293-310. https://doi.org/10.29333/iji.2022.15117a

Wigal, C. M. (2021). Teaching the design process in a HyFlex environment. *Journal of Higher Education Theory and Practice, 21*(10), 226-235. https://doi.org/10.33423/jhetp.v21i10.4637

Yu, Z., & Li, M. (2022). A bibliometric analysis of community of inquiry in online learning contexts over twenty-five years. *Education and Information Technologies, 27*, 11669-11688. https://doi.org/10.1007/s10639-022-11081-w

Zhong, Q., Wang, Y., Lv, W., Xu, J., & Zhang, Y. (2022). Self-regulation, teaching presence, and social presence: Predictors of students' learning engagement and persistence in blended synchronous learning. *Sustainability, 14*(9), 1-18. https://doi.org/10.3390/su14095619

Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization. *Organizational Research Methods, 18*(3), 429-472. https://doi.org/10.1177/1094428114562629