**INTERNATIONAL JOURNAL OF
EDUCATION, PSYCHOLOGY
AND COUNSELLING
(IJEPC)**www.ijepec.com**A BIBLIOMETRIC ANALYSIS OF LEARNING MOTIVATION IN
BLENDED TEACHING ENVIRONMENT (2014-2024)**Zheng Yiqiao^{1-2*}, Mimi Mohaffyza Mohamad³, Nofouz Mafarja⁴¹ Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn Malaysia, Malaysia
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This work is licensed under [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/)**Abstract:**

From 2014 to 2024, research on learning motivation in blended teaching environments has developed for 10 years. The research hotspots, frontiers, and development trends in related fields urgently need to be explored in order to provide valuable references for future research endeavors. In this study, The CiteSpace literature visualization analysis tool is employed to conduct co-citation analysis, keyword analysis, burst detection analysis as well as keyword clustering and temporal zone analysis. The findings revealed that during the aforementioned period, research primarily focused on the influencing factors of learning motivation; the relationship between motivation and actions, learning performance, and self-regulated; as well as blended teaching design and strategies for enhancing learning motivation. The research hotspots in this field mainly include: studies on the impact of blended teaching design and strategies on learning motivation, students' behavioral intentions; and the practical application of learning motivation in blended teaching environments. The research trend has evolved from initial development to steady growth and then rapid growth with diversified development. The frontier areas include "performance," "medical education," "games," etc. These findings provide directions for future research on learning motivation in blended teaching environments.

Keywords:Blended Teaching Environment, Learning Motivation, Citespace,
Visualization Analysis**Introduction**

Blended teaching (BT) is a kind of modern teaching technique that combines the benefits of face-to-face and online teaching, utilizing information technology. It fosters active learning, enhances skills such as communication, collaboration, and creativity, and transforms classrooms into more flexible and dynamic environments (Bozkurt & Sharma, 2021). Since the 21st century, With the development of Cloud-based Smart Technologies, artificial intelligence and other technologies (Papadakis et al., 2023a), BT has become an important research focus in education (Ustun & Tracey, 2021), achieving positive results in teaching practices worldwide after nearly decades of development (Kundu, Nath Dey, 2021; Papadakis et al., 2023b). In this process, motivation is crucial to students' academic achievement as it combines internal and external driving forces (Irkinovich, 2021) that prompt an individual's activities (Rahiem, 2021). Highly motivated students are potentially more inclined to learn and make teaching more engaging (Filgona, et al., 2020). Research has shown that Learning motivation (LM) can enhance students' willingness to use technology (Lavidas et al., 2024), and assist students in conducting autonomous learning and managing the learning process, which is an important condition for effectively implementing BT (Adinda & Mohib, 2020). However, during the implementation of blended learning, the improvement of students' motivation was not satisfactory, which had a certain negative impact on the teaching effect (Berga, et al., 2021). Therefore, To gain a deeper understanding of the current research status, hot topics, cutting-edge trends, and potential development directions of motivation in the context of BT environments, this study utilized CiteSpace visualization software to conduct quantitative and qualitative analysis on relevant literature from 2015 to 2025. The findings were presented in the form of knowledge maps showcasing the spatiotemporal distribution and thematic characteristics of related research. From a scientific perspective, this study aims to provide an intuitive and systematic overview of research in this field by revealing its underlying patterns and development trends as well as offering references for future studies. The specific questions addressed by this study are as follows:

- (1) What are the research focuses in the field of LM in BT environments?
- (2) What are the research hotspots in the field of LM in BT environments?
- (3) What are the development trends and frontiers in the field of LM in BT environments?

Data Collection and Analysis Methods

Bibliometric analysis is a quantitative research method used to analyze scientific literature in a specific field. It employs various indicators and algorithms to mine text data, with the aim of evaluating the development trends and future research directions in a particular field (Rey-Martí, Ribeiro-Soriano & Palacios-Marqués, 2016). CiteSpace is an information visualization analysis software that can effectively help scholars discover the current research status, trends, and related hot topics and visualize them (Chen, 2006). It was developed by Professor Chang Chaomei from the College of Computer and Information at Drexel University, based on the principles of bibliometric analysis to analyze key words in literature and explore and mine the dynamic process of scientific research, explaining the trends of scientific development (Jie & Chaomei, 2016).

The data for this study was obtained from Web of Science (WOS). WOS was chosen as the search engine because it is one of the most recognized multidisciplinary data platforms in the world (Limaymanta et al., 2021), providing access to a vast amount of academic research literature across various research fields (Mongeon & Paul-Hus, 2016). The WOS Core Collection - Citation Database offers the unique feature of citation counts, which allows for the determination of the relative importance of articles within a large pool by using objective measures of influence (Dzikowski, 2018, p. 283). The combination of WoS and CiteSpace has been widely used in many influential review articles (Junjia et al., 2023). Additionally, one of the tools employed in this study is CiteSpace, which was originally designed for the visualization of literature in the WOS database (Yan & Zhiping, 2023). Therefore, this study uses the WoS database as the search source and the retrieved results are used for bibliometric analysis.

Researchers conducted a search in the WOS core database using "blended teaching" or "blended learning" as the search terms, combined with "motivation" or "learning motivation". They selected Article and Review literature from the search results. The data collection date was May 20, 2025, with a time span from 2014 to 2024. After carefully checking the titles, abstracts, and literature types of each paper, irrelevant papers and duplicate data were removed, resulting in a total of 346 valid papers. These papers were exported in batches in "plain text file" format. Then, CiteSpace (version 6.4.R1) was used to convert the exported data. The Time Slicing was set from 2014.01 to 2024.12, with Years Per Slice set to 1 year, and the threshold was selected as g-index. The g-index is an author-level metric based on citation distribution, which can reduce the bias of highly cited papers. The determining factor k of the g-index was set to the recommended value of 25 to give equal credibility to highly cited and less cited papers (Deng et al., 2023). Subsequently, Reference, Keywords, etc. were selected in sequence for visual analysis of the knowledge map.

Basic Data Analysis

This section conducts an analysis of the development in the number of publications and a co-citation analysis of the literature based on the exported data, in order to understand the overall trend in the development of publication volume and research focus on LM in BT environments.

The Analysis of the Development in the Number of Publications

Using an Excel spreadsheet, we have compiled the number of publications on LM in BT environments over the past two decades and created a development chart for the number of publications.

As shown in Figure 1. From 2014 to 2016, there were relatively few publications on LM in BT environments, totaling 25 articles with an average of 8 articles per year. This period was mainly characterized by the initial exploration and development of the field. Between 2017 and 2020, the number of publications increased steadily, totaling 89 articles with an average of 22 articles per year. From 2021 to 2024, the number of publications grew rapidly, from 43 articles in 2021 to a peak of 71 articles in 2024.

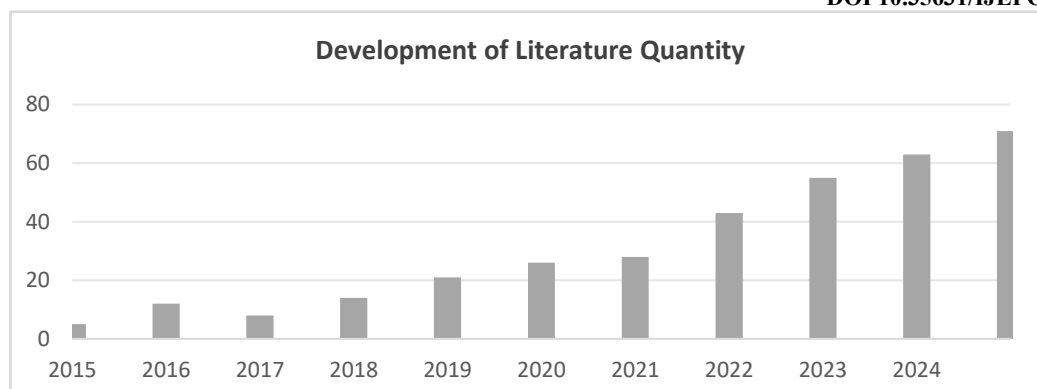


Figure 1. Development Of Literature Quantity

Source: Author's own illustration

Co-citation Analysis of Literature

Co-citation refers to the phenomenon where two or more pieces of literature are simultaneously cited by one or more subsequent pieces of literature (Shen, et al., 2023). Through citation co-citation analysis, we can better reveal the knowledge structure of the research field and understand the research focus of the field (Hjørland, 2013). This study uses 322 core journal articles retrieved from the WOS database as a sample, and employs CiteSpace to analyze the co-citation data sample, generating a co-cited literature network map (Figure 2), which contains 412 nodes, 693 links, and a network density of 0.0082. The size of the nodes reflects the frequency of citation of the literature; the larger the node, the higher the frequency of its appearance, indicating that the corresponding literature holds a significant position in the research on LM in BT environments (Jian, Jin & Wu, 2023).

CiteSpace, v. 6.4.R1 (64-bit) Advanced
November 20, 2024, 8:06:09 PM CST
WoS: D:\wos\data
Timespan: 2014-2024 (Slice Length=1)
Selection Criteria: g-index (k=20), LRF=2.5, L/N=10, LBY=5, e=1.0
Network: N=412, E=693 (Density=0.0082)
Largest 1 CCs: 321 (77%)
Nodes Labeled: 1.0%
Pruning: Pathfinder
Excluded:

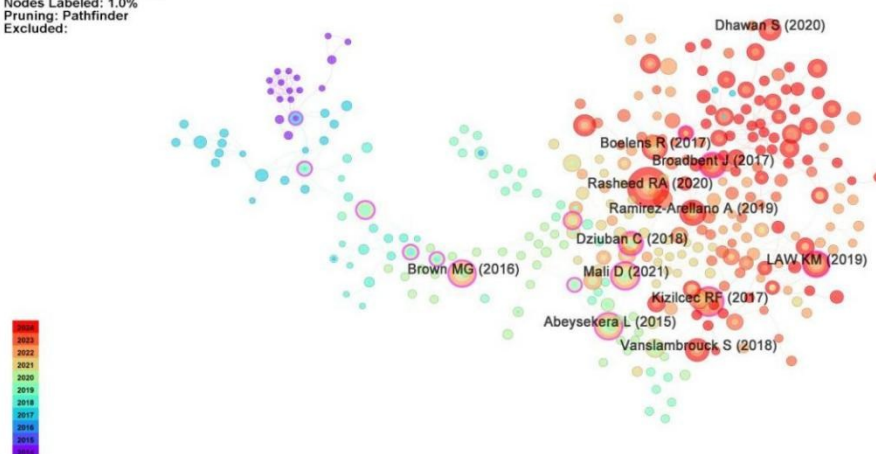


Figure 2. Co-Citation Map of Literature

Source: Author's own illustration

Table 1 lists the top 10 most frequently cited literature. Among them, numerous scholars have investigated the factors influencing LM. Rasheed et al. (2020) argues that students lack motivation in the online portion, feeling alienated and isolated, which poses a significant challenge in BT environments. He further suggests that students' motivation and enthusiasm largely depend on the technical facilities and services provided by their institutions.

Vanslambrouck et al. (2018) analyzes the motivational characteristics of student engagement in BT, asserting that the balance between cost and value affects students' decisions to persist. Mali and Lim (2021) believes that students had higher motivation to learn before Covid-19 because they valued the interaction between instructors and classmates. Brown (2016) contends that teachers' attitudes have a significant impact on students' motivation. Additionally, scholars have studied the relationships between LM and factors such as actions, academic performance, and self-regulated learning in BT environments. Ramirez-Arellano et al. (2019) analyzes the connections among students' motivation, cognitive-metacognitive strategies, behaviors, and academic performance. Law et al. (2019) believes that LM plays a crucial role in improving enrollment rates but does not directly affect academic performance in BT environments. Broadbent (2017) and Kizilcec et al. (2017) examine the relationship between LM and self-regulated learning, finding that students with high levels of motivation also demonstrate high levels of self-regulated learning. Numerous studies also delve into BT designs and strategies related to LM. Abeysekera and Dawson (2015) investigates the relationship between LM and flipped classrooms, suggesting that the flipped teaching method may enhance LM and help manage cognitive load. Boelens et al. (2017) proposes a framework addressing four key challenges in designing BT and emphasizes the importance of motivating students when establishing an emotional learning atmosphere. To some extent, the above literature reflects the research focuses regarding student motivation in BT environments from 2014 to 2024.

Table 1: Top 10 Most Frequently Cited Articles

Cited Counts	Year	Author	Title
22	2020	Rasheed, R. A., Kamsin, A., & Abdullah, N. A.	Challenges in the online component of blended learning: A systematic review
16	2017	Kizilcec, R. F., Pérez-Sanagustín, M., Maldonado, J. J.	Self-regulated learning strategies predict learner behavior and goal attainment in Massive Open Online Courses
12	2021	Mali, D., & Lim, H.	How do students perceive face-to-face/blended learning as a result of the Covid-19 pandemic?
12	2015	Abeysekera, L., & Dawson, P.	Motivation and cognitive load in the flipped classroom: definition, rationale and a call for research
9	2019	Law, K. M., Geng, S., & Li, T.	Student enrollment, motivation and learning performance in a blended learning environment: The mediating effects of social, teaching, and cognitive presence
9	2019	Ramirez-Arellano, A., Bory-Reyes, J., & Hernández-Simón, L. M.	Emotions, motivation, cognitive-metacognitive strategies, and behavior as predictors of learning performance in blended learning
7	2016	Brown, M. G.	Blended instructional practice: A review of the empirical literature on instructors' adoption and use of online tools in face-to-face teaching

6	2017	Boelens, R., De Wever, B., & Voet, M.	Four key challenges to the design of blended learning: A systematic literature review
6	2017	Broadbent, J.	Comparing online and blended learner's self-regulated learning strategies and academic performance
5	2018	Vanslambrouck, S., Zhu, C., Lombaerts, K., Philipsen, B., & Tondeur, J.	Students' motivation and subjective task value of participating in online and blended learning environments

Analysis of Research Hotspots and Trends

Analysis of Research Hotspots

Keyword co-occurrence analysis can be used to track the hot topics and evolving research frontiers in a specific research field (Yang, Shao & Wu, 2019). This study utilizes CiteSpace software to create a keyword co-occurrence network map for research on BT (as shown in Figure 3), which contains 426 nodes, 811 links, and a density of 0.009. The size of the nodes reflects the frequency of the keywords; the larger the node, the higher the frequency of the keyword's appearance. Table 2 lists the top 20 high-frequency keywords in BT research from 2014 to 2024. In addition to the frequency of the keywords, Table 2 also shows the centrality of the nodes representing the keywords within the co-word network. “Centrality” is another important metric for evaluating the value of keywords and is often combined with frequency to identify hot keywords in a particular research area (Chen & Zhao, 2024).

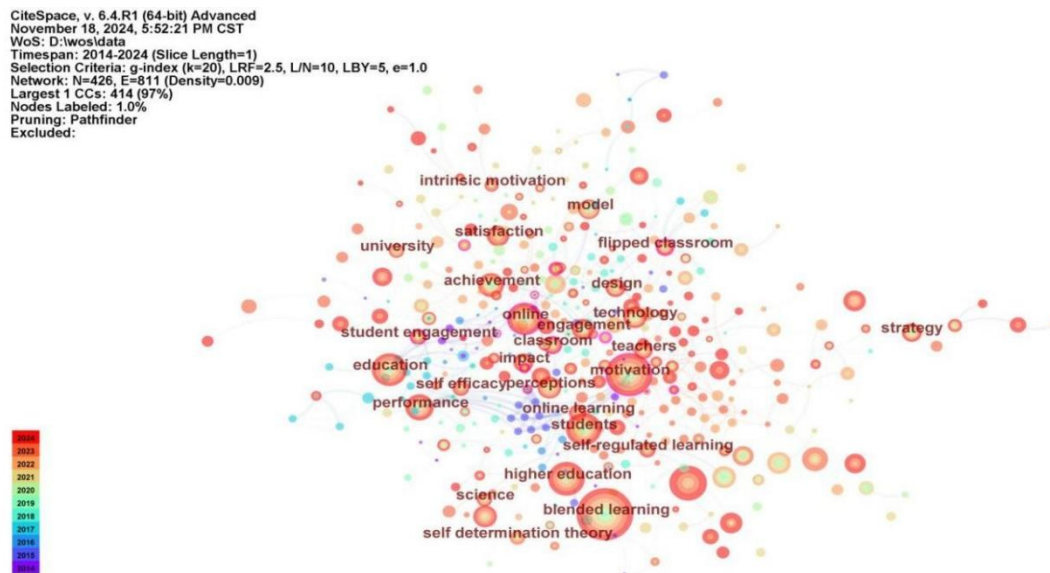


Figure 3. Keyword Co-Occurrence Network Map

Source: Author's own illustration

Table 2. Top 20 High-Frequency Keywords

No.	Count	Centrality	Year	Keyword
1	114	0.03	2015	online
2	113	0.07	2014	performance
3	75	0.11	2015	achievement
4	72	0.05	2016	technology
5	58	0.12	2014	model
6	57	0.02	2019	satisfaction
7	57	0.01	2015	impact
8	56	0.03	2018	perceptions
9	55	0.01	2016	engagement
10	50	0.03	2018	design
11	47	0.02	2017	flipped classroom
12	45	0.02	2018	strategy
13	44	0	2018	online learning
14	43	0.09	2014	classroom
15	35	0.01	2018	teachers
16	31	0.04	2015	self-efficacy
17	28	0.01	2019	science
18	27	0.02	2019	self-regulated learning
19	26	0.05	2020	university
20	25	0.12	2017	student engagement

Due to the search topic of "blended teaching", "blended learning", and "learning motivation", similar keywords were excluded. As shown in Figure 3 and Table 2, the research hotspots on LM in the BT environment are mainly concentrated on the following three aspects: the study of teaching design and teaching strategies related to LM in BT (keywords include model, design, strategy, flipped classroom, self-regulated learning, etc.); the study of students' behavioral intentions in blended learning environments (keywords include satisfaction, engagement, motivation, self-efficacy, etc.); and the study of the practical application of LM in BT environments (keywords include technology, achievement, virtual reality, etc.). Among them, the three most frequent keywords are online, performance, and achievement, with frequencies of 114, 113, and 75, respectively. In addition, keyword centrality can also be used to analyze the document hotspots. The higher the centrality, the more important the keyword is in the co-occurrence network (Small, 1986). According to the above table, the keywords with higher centrality, model and student engagement with a centrality of 0.12, and achievement with a centrality of 0.11, are the higher-hotspot keywords.

CiteSpace, v. 6.4.R1 (64-bit) Advanced
November 18, 2024, 5:52:21 PM CST
WoS: D:\wos\data
Timespan: 2014-2024 (Slice Length=1)
Selection Criteria: g-index (k=20), LRF=2.5, L/N=10, LBY=5, e=1.0
Network: N=426, E=811 (Density=0.009)
Nodes Labeled: 1.0%
Pruning: Pathfinder
Modularity Q=0.7345
Weighted Mean Silhouette S=0.8669
Harmonic Mean(Q, S)=0.7952
Excluded:

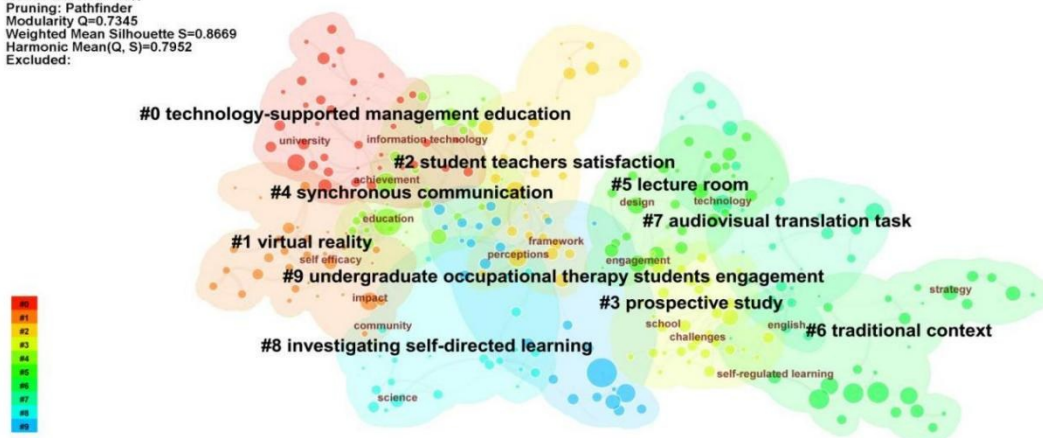


Figure 4. Keyword clustering map

Source: Author's own illustration

By further utilizing Citespace to generate a keyword clustering map (as shown in Figure 4), we explore the research hotspots related to LM in a BT environment. The clustering effectiveness is generally evaluated using two indicators: the clustering modularity value (Q) and the clustering average silhouette value (S). A Q value ≥ 0.3 indicates a significant clustering structure, while an S value ≥ 0.7 suggests satisfactory clustering results. In the keyword clustering map related to research on LM in a BT environment, the Q value is 0.7345 and the S value is 0.8669, indicating that the clustering effect is significant and the results are good. The top 10 keyword themes in the clusters are as follows: technology-supported management education, virtual reality, student teachers' satisfaction, prospective study, synchronous communication, lecture room, traditional context, audiovisual translation task, investigating self-directed learning, and undergraduate occupational therapy students' engagement. These themes reveal the diverse focus areas of the relevant field.

Analysis of Research Trend

To visually demonstrate the research trends on LM in a BT environment, this paper utilizes the CiteSpace software to generate a timezone map of hot keywords based on the keyword co-occurrence network, as shown in Figure 5. Combining with the publication volume graph from 2014 to 2024 presented in Figure 1, it can be observed that during the initial development stage of the related field from 2014 to 2016, the main keywords included "blended learning," "academic motivation," "self-determination," "impact," and "attitudes." During this phase, the academic community began to focus on students' attitudes towards blended learning (Ja'ashan, 2015; Almasaeid, 2014) and the relationship between their behavioral intentions and BT (Seo, Woo, & Ha, 2015; Isıguzel, 2014). Many scholars also studied the characteristics and influencing factors of LM through the self-determination theory (Butz & Stupnisky, 2016; Nikou & Economides, 2014). From 2017 to 2020, the number of publications in the related field increased steadily, with keywords such as "learning motivation," "satisfaction," "engagement," "intention," and "achievement." It is evident that during these years, a significant number of scholars started paying attention to students' needs and the relationship

between their behavioral intentions, learning performance, and achievements (Vo, Zhu & Diep, 2017; Rafiola, et al., 2020). At the same time, there were also many studies on BT strategies and designs (Ramirez-Arellano, et al., 2019; Ibrahim & Nat, 2019; Zainuddin, 2018), with keywords including "design," "strategy," "framework," "flipped classroom," and "collaborative learning." From 2021 to 2024, research in the related field grew rapidly and showed diversified development. BT was perceived as facing many challenges at this period (Ashraf, 2022), necessitating enhancements and innovations to improve LM (Yangari & Inga, 2021; Mustadi, Annisa & Mursidi, 2021). Keywords during this period mainly included "challenge," "innovation," "improving classroom teaching," and "professional development." Consequently, some new teaching modes and strategies were studied during this time, with game-based learning receiving considerable attention (Farooq, et al., 2022; Jayalath & Esichaikul, 2022), as evidenced by keywords such as "games," "gamification," and "social media." Additionally, many scholars focused on research on LM in a BT environment within specific disciplines, particularly in the fields of medical education and linguistics (Calderón, et al., 2021; Kang & Kim, 2021; Peng & Fu, 2021). Keywords in this regard included "physical education," "medical education," "language," and "English."

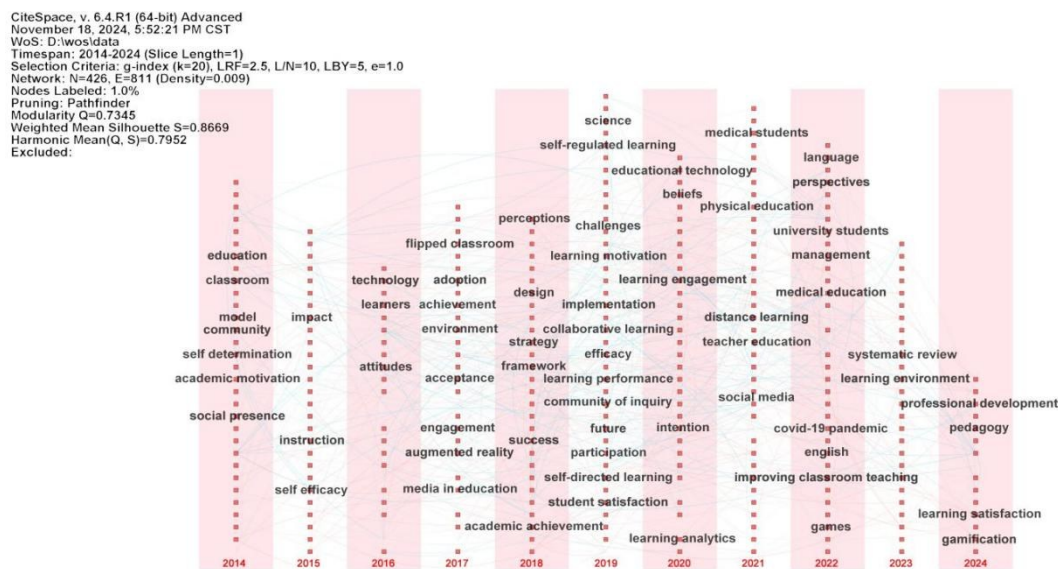


Figure 4. Timezone Map of Hot Keywords

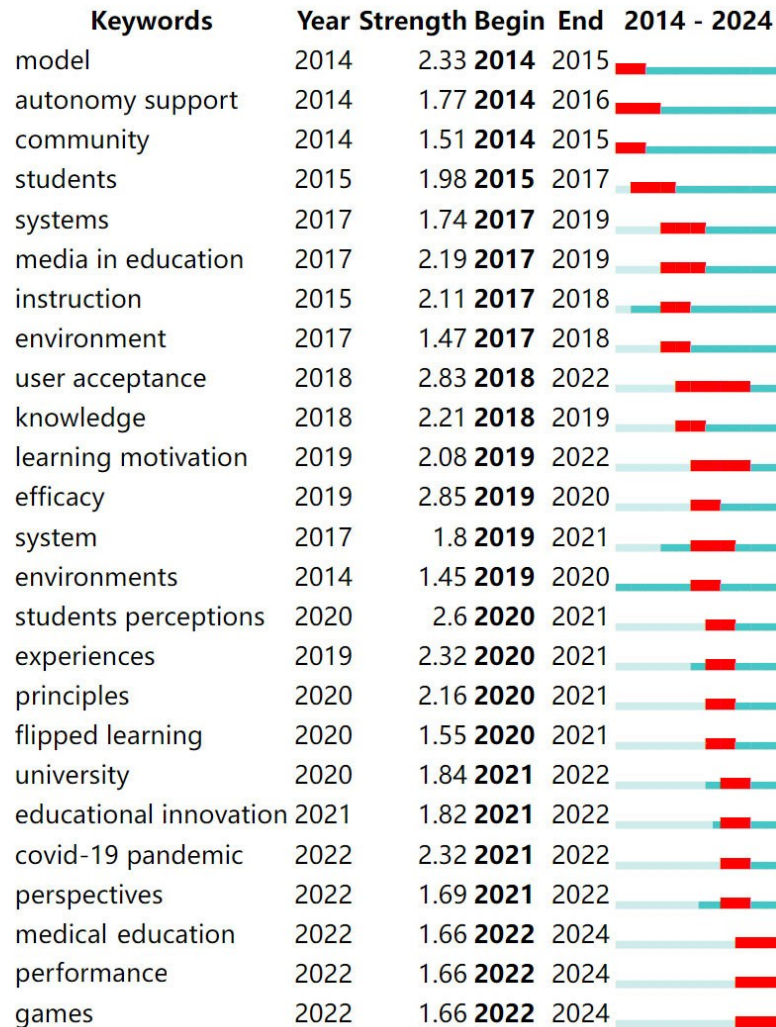
Source: Author's own illustration

Analysis of Research Frontier

Burst words are terms that appear frequently or are used more often within a relatively short period of time. It can identify sudden citation increases in an article when it happens (Chen, 2020). Keyword burst analysis can reflect the frontiers (Zhang, et al., 2023) and emerging trends (Zhou, Li & Ma, 2021) of a research field. In this study, 25 keywords with high citation burst strengths were extracted from WOS journal articles, representing the latest frontiers in our research field. As shown in Figure 6, the time intervals are indicated by blue, and citation bursts are indicated by red (Zhang & Xiao, 2023). "Efficacy," "user acceptance," and "students' perceptions" are the three keywords with the highest intensity values. Among them, the word

with the longest burst duration is "user acceptance," spanning from 2018 to 2022, indicating that it received considerable attention during this period.

In recent years (2022-2024), keywords such as "performance," "medical education," and "games" have gained significant popularity, suggesting that more scholars have been focusing on the connections and interactions between LM and learning performance in a BT environment. This also reflects the increasing research in engineering fields in recent years. At the same time, a group of scholars have emerged to study the application of game-based learning in related fields. Among them, the three most cited articles corresponding to these three keywords are Law (2019), Lozano-Lozano et al. (2020), and Vera-Monroy et al. (2024). Law argues that LM plays a crucial role in enhancing enrollment rates but does not directly affect learning performance in a BT environment. Lozano-Lozano et al. (2020) examined the short-term impact of BT methods on the knowledge, motivation, emotional state, and satisfaction of undergraduate students in health science courses. They found that, compared to traditional teaching, blended teaching methods led to significant improvements in motivation, emotional state, and satisfaction. Vera-Monroy et al. (2024) assessed the implementation of game-based learning strategies by students and analyzed their impact on academic performance. The study showed that, compared to traditional courses, games significantly improved performance, promoted creativity, engagement, and positivity, and were recognized by students as an innovative learning approach.

Top 25 Keywords with the Strongest Citation Bursts**Figure 5. Top 25 Keywords with the Strongest Citation Bursts**

Source: Author's own illustration

Discussion

The objective of this study is to explore the research focuses, hotspots, trends, and frontiers in the field of LM within a BT environment. To achieve this, the researchers employed CiteSpace to conduct a co-citation analysis of literature from 2014 to 2024, revealing that the research focuses in this field mainly encompass three aspects. Firstly, the influencing factors of LM have been studied, showing that teacher-student interaction, teachers' attitudes, the balance between cost and value, and the technical infrastructure and services provided by institutions all affect students' levels of LM. Secondly, the relationship between LM and factors such as action, learning performance, and self-regulated learning has been examined. The academic community generally agrees that LM has a positive impact on self-regulated learning, but there are differing views on its impact on learning performance. Thirdly, BT designs and strategies for enhancing LM have been explored, including the influence of BT strategies on LM and ways to boost LM in blended classrooms.

Through co-occurrence analysis of the keywords in the literature, the research hotspots in related fields have been summarized into three main areas. Firstly, there is research on BT design and strategies that affect LM. It is recognized that higher student motivation depends on good teaching design and appropriate teaching strategies (Filgona, et al., 2020). Therefore, numerous scholars have proposed different BT designs or strategy models to enhance LM, while others have studied existing teaching models (such as flipped classrooms) to test their impact on LM. Secondly, there is research on students' behavioral intentions in a BT environment. Behavioral intentions mainly refer to users' attitudes, acceptance, and satisfaction towards BT. Many studies have explored frameworks for enhancing LM by investigating the relationship between behavioral intentions and LM in a BT environment. Thirdly, there is research on the practical application of LM in a BT environment, mainly including studies on LM in BT environments in higher education, research on the influencing factors of LM, and research on the impact of LM on learning performance and achievement.

By analyzing the time zones and burst terms of the keywords in the literature, the development trends and frontiers in related fields can be deduced. Combined with the development of the number of publications, the research trend has evolved from the initial development of related literature, through steady growth, to rapid growth, showing diversified development. A large number of scholars have focused on enhancing LM, innovating BT strategies, and studying LM in BT environments of specific disciplines. The research frontiers include aspects such as "performance," "medical education," and "games." We have found that there is increasing emphasis on the important role of students' LM in a BT environment. Innovating teaching models to enhance student motivation and, consequently, improve the effectiveness of BT is a significant trend in the current field of LM within a BT environment.

Conclusion

From 2014 to 2024, The academic community has extensively explored learning motivation in hybrid teaching environments. However, a systematic overview of the current research landscape is still lacking. This study employed bibliometric analysis and CiteSpace software to reveal the evolution and development trends of this field over the past decade, aiming to provide references for future research. In this study, researchers extracted and evaluated 346 documents related to this field from the WOS database and summarized the research overview of related fields through analysis. The following are the implications of this study:

Practical implication: By identifying the research hotspots and emerging trends of learning motivation in the blended teaching environment, This study helps educators gain a clearer understanding of which teaching strategies and designs can effectively stimulate students' learning motivation. The research-revealed blended teaching design strategies, students' behavioral intentions, and the practical application effects of motivation provide specific practical guidance and valuable reference cases for educators in designing and optimizing blended teaching courses, which is conducive to enhancing teaching effectiveness.

Theoretical implication: Using the quantitative analysis function of Citespace, this study analyzed the research focuses, hotspots, development trends, and frontiers in the field of LM in a BT environment. This not only helps the academic community to more deeply understand the field but also provides a solid theoretical foundation and research directions for subsequent research. Additionally, the identification of research frontiers provides the academic

community with new research perspectives and ideas, contributing to theoretical innovation and development in this field.

Methodological implication: This study adopted the CiteSpace literature visualization analysis tool in terms of methodology, conducting a comprehensive and in-depth analysis of research on LM in a BT environment through various methods such as literature co-citation analysis, keyword analysis, burst detection analysis, and keyword clustering and time zone analysis. This diversified analytical approach provides methodological insights and references for subsequent research.

Although this study provides a reference for observing and understanding the panorama and future directions of the field related to LM in a BT environment, it also has certain limitations, offering opportunities for future work. Firstly, this study only obtained data from the core database of WOS, which may not cover all relevant literature, potentially leading to incomplete analysis results. Future research could expand its scope by incorporating other databases such as Scopus or ERIC, thereby providing a broader perspective. Secondly, although using CiteSpace for bibliometric analysis is considered scientific and objective, the interpretation of the results may carry a certain degree of subjectivity.

Ethical Considerations

This bibliometric study analyzed publicly available scientific literature data and did not involve any direct interaction with human or animal subjects. Therefore, formal ethical approval was not required for this research.

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