

## Comparison of Research Trends in Blended Learning in Korea and China

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Abstract:Blended Learning is one of the most popular methods in education for encouraging active learning and improving student learning effectiveness, and it is regarded as one of the most effective methods for universities to attract students. Based on the cultural dimension theory, this paper examined blended learning research trends in both South Korea and China, which are culturally similar but also differ. The research methods include keyword analysis and visualization. Academic papers on blended learning indexed by WoS, KISS, and CNKI from 1990 to June 2022 were collected and analyzed. According to the findings, since the outbreak of COVID-19, the common research topic of blended learning has been subdivided by forming clusters in various research fields. Korea and China exhibit similarities to global research trends while exhibiting differences based on cultural background. The cultural dimension theory-based analysis reveals a common pattern that is especially long-term oriented. The findings can suggest significant implications for designing what role national culture plays in forming patterns of education and research and for developing blended learning with effective impacts in a multicultural educational environment.

Keywords: Blended Learning; Cultural Dimensions Theory; Keyword Analysis; Visualization; KH Coder

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#### 1. Introduction

Blended Learning (BL), as a method to promote active learning and enhance learning effectiveness, has been widely applied in the field of education and is seen as an effective way for universities to attract learners. Although Blended Learning has existed for more than a decade, there are still many challenges: most Blended Learning research has been conducted in developed countries, and cooperation is needed to promote Blended Learning in developing countries [1-2]. The peak of research related to basic education appeared in 2020. This may be due to the COVID-19 pandemic forcing many institutions around the world to adapt to the needs of learners [3]. As many institutions encourage the implementation of basic education, there is growing interest in research on best practices in basic education [4].

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Broadly speaking, the concept of BL can be a combination of various technologies/media and traditional face-to-face classroom activities. The changes brought about by online learning are affecting our schools and how they operate <sup>[5]</sup>. E-learning, also known as Internet-based learning, makes learning methods more portable and flexible <sup>[6]</sup>, which is especially important in modern higher education. The number of university students worldwide adopting e-learning is constantly increasing. In an increasingly international world, students from different countries are studying the same courses. In addition, if educational institutions fail to address multicultural issues in capacity-building courses in order to attract new students, their reputation may also be adversely affected <sup>[7]</sup>.

Whenever a new technology emerges, there is huge potential for educational exploration and application. Among them, BL is one of the most commonly used methods for interdisciplinary research, and the research topics are also very wide [8]. Technological advancements have driven the development of various teaching methods and educational platforms, but a new educational model is especially needed during pandemics like COVID-19. For example, during a pandemic, it is necessary to try innovative methods that are more attractive to students than traditional teaching methods [9].

Compared with the traditional educator-centered approach, the new technology-based teaching method is learner-centered. Technology-based personalized learning, digital and demographic data can be used to design personalized learning programs <sup>[10]</sup>. In the learner-centered teaching method, learners are responsible for their own learning as partners in designing learning paths, while educators become co-creators of course content <sup>[11]</sup>. Understanding the learner's cultural background and course content can make communication smoother and maximize training effectiveness.

Innovation capability is a social process of reconfiguring knowledge that exists in different entities [12]. Hans de Wit once pointed out that "we are in a transitional period where localization and globalization are increasingly connected." Information technology, competition, and standardization will become key factors in the transformation of higher education. Transnational strategic cooperation among universities in scientific research, teaching, and knowledge transfer will become the future trend of education development. It is worth noting that competition and cooperation with private institutions, especially in areas such as professional learning, lifelong learning, distance learning, and the application of new technologies, are increasingly becoming the forefront of higher education development [13]. At the same time, Generation Z tends to be pragmatic when choosing a university [14]. Partnerships, networks, and collaborations between academic institutions and between universities and businesses are becoming increasingly important to occupy a place on the international stage. In today's information age, cross-border and borderless education is becoming increasingly important. The internationalization of higher education, in the sense of emphasizing intercultural interaction rather than cultural homogenization, plays an important role in balancing the potential risks of multicultural education [13].

Looking at the literature, it can be found that in the West, British scholars have moved from the "ivory tower" to the "market" through research on university education cooperation models. American scholars focus on international exchanges between universities and businesses worldwide as well as international competition in transnational education. Canada has conducted in-depth research on international education, internationalization process settlement, and strategies to promote the mobility of international students [15]. On the other hand, research on Asian countries is basically lacking.

Therefore, this study investigated the research patterns of basic law in Korea and China through keyword analysis and visualization methods. The significance of this study lies in identifying the underlying reasons

for new learning models and knowledge innovation across different cultural backgrounds, and proposing directions for effective basic education research in the future. It can also provide reference for countries or regions that lack basic education capabilities to implement basic education and promote cross-border cooperation [4].

#### 2. Literature review and research questions

#### 2.1 Blended learning (BL): what is it?

The term blended learning is increasingly used in both academic and business circles <sup>[16]</sup>. It is a concept that was first introduced in the field of corporate training to complement the advantages of traditional face-to-face classroom learning and online learning, and later introduced into primary and secondary education <sup>[18]</sup>. In 2003, the American Society for Training and Development (ASTD) identified "online learning" (BL) as one of the top ten trends in knowledge dissemination <sup>[17]</sup>. Initially defined as a simple fusion of online and offline elements, it is now widely used to integrate learning tasks and experiences, optimizing the learning environment by utilizing various learning methods, strategies, tools, and technologies based on learning content or objectives. In other words, it is defined as combining the medium of knowledge transmission and pedagogy through the integration of Computer-Assisted Instruction (CMI) courses and offline courses <sup>[18]</sup>.

Improving pedagogy, facilitating knowledge acquisition, learner interaction, personal presence, cost-effectiveness, and ease of modifying learning content are the main reasons for using basic pedagogy [19]. Optimal learning effects can be achieved through the integration of physical or technological spaces, as well as the fusion of various learning elements and teaching and learning [20]. The learning experience can be deployed online or on-site, depending on the relative advantages and disadvantages of each mode. In BL courses, teachers have the opportunity to create a brand-new learning environment for students, which can positively impact learning efficiency, convenience, and performance. Nowadays, much of learning can be moved online to increase the flexibility of learners' schedules and reach learners beyond traditional classrooms using social networks. To continuously achieve this goal, educators need to go beyond a mere "digital transformation" and strive for transformational integration by consciously redesigning courses [21].

# 2.2. Cultural dimensions theory and research trends in blended learning: culture as a dimension of a group

Culture is the collective thinking program that distinguishes members of one group or society from another <sup>[22]</sup>. Culture exists essentially in people's minds, but as a product of social institutions and tangible assets, the materialization of culture paradoxically reinforces people's psychological programming. Without a deep understanding of people's values, beliefs, and expressions, society becomes difficult to manage, and its cultural background becomes greatly limited <sup>[23]</sup>. The evolution of ideology, social systems, and history has shaped the unique cultures of many countries. Education is deeply influenced by culture because it is the primary means and way of human thinking programming. Although countries around the world emphasize the importance of education, social and cultural differences have led to different goals, content, methods, and results <sup>[24]</sup>.

Hofstede defined four basic elements of human society that are common to the cultural systems of various countries. They are power distance (PDI), which relates to different solutions to the basic problem of human inequality; uncertainty avoidance (UAI), which relates to the level of stress in uncertain future societies; masculinity and femininity (MAS), which relates to the distribution of social gender values and the division

of emotional roles; and individualism and collectivism (IDV), which relates to the degree of collective integration of individuals. Each country has specific answers <sup>[22]</sup>. Later, he added long-term orientation and short-term orientation (LTO) <sup>[23, 25]</sup>, which refers to the satisfaction of basic human needs, and control, indulgence, and restraint (IVR) <sup>[23]</sup>, which focuses on effort, for a total of six dimensions <sup>[26]</sup>. Among them, long-term orientation is one of the most important dimensions. It is closely related to educational achievement and has greater predictive value compared to other dimensions because it can be used to estimate geographical and cultural differences between the East and West of the world <sup>[27]</sup>.

Ng et al. reported that information technology has greatly changed the way universities teach and has conducted various model-based studies, such as the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Technology Acceptance Model (TAM). However, there is little literature on Hofstede's cultural dimensions antecedents of information technology usage intentions and behaviors in learning environments [7].

Johannes C. Cronjé investigated how much Hofstede's static and quantitative research supports dynamic and qualitative interpretations, leading to a series of shifts from individualism to collectivism, which are mutually amplified in terms of power distance and uncertainty avoidance. They concluded that there are three factors for adapting to different cultures: reducing uncertainty in communication, establishing common meanings, and using appropriate technology. They also believed that more research is needed to explore cultural commonalities because emphasizing commonalities is more beneficial than overcoming differences [28].

The purpose of creating a constructivist learning environment is to allow students to create. Clear instructions can lead to non-creative work. In the absence of clear instructions, it is necessary to establish cross-cultural trust relationships, which require a lot of corrective and encouraging feedback. Considering the value of multicultural experiences, the uncertainty of communication can be reduced by sharing meanings using the best technology. For example, language barriers make dissertations a challenging form of assessment, but digital technology with multimedia capabilities will be a richer and more useful integration tool than text [28].

### 3. Research methods and analysis process

This study analyses global research trends and research patterns formed in Korea and China by using keyword analysis and visualisation techniques to analyse BL's officially published academic articles in academic journals from 1990 to 2022. First, in order to understand the cultural differences between the two countries, we refer to the data generated byhttps://www.hofstede-insights.com, which is based on Hofstede's theory of cultural dimensions.

First of all, the power distance index (out of 100) is relatively lower in Korea (60) than in China (80), indicating that Korean society is a relatively democratic culture. Individualism-Collectivism scores are lower in Korea (18) and China (20) because East Asian cultures value group goals over individual goals, cooperation, and teamwork. The difference between South Korea (39 points) and China (66 points) on the masculinity-femininity index shows that South Korea values empathy over competition. The large difference in the uncertainty index is due to the fact that South Korea (85) seeks a stable society and life rather than change, emphasising clear planning and execution. China (30), on the other hand, may be influenced by its exploratory environment as it has deepened its market economy since the 1980s, starting with the reform and opening-up policy. Due to the influence of the Yugai school of thought, both China and South Korea, which

respect tradition and value maintaining relationships, have high long-term orientation scores, with South Korea reaching a perfect score (100) compared to China (87). The Self-Control-Indulgence Index is lower in South Korea (29) and China (24), indicating a cultural tendency to respect social rules and restrain one's motivation.

Next, we analysed BL-related research published in representative databases of each country to find out the detailed differences between the two countries. We set the following research questions:

Research question 1. What are the main keywords that appear in academic research related to BL?

Research question 2. What are the main keywords of BL-related academic research in Korea and China, and what are the research patterns?

#### 3.1. Publication status of WoS, KISS, and CNKI

First, we collected data published in WoS (Web Of Science), which is considered to be an 'international-level academic journal', to understand the global BL research trends. This is a fee-based network database that allows users to search the citation index databases SCIE (Science Citation Index Expanded), A&HCI (Art & Humanities Citation Index), and SSCI (Social Sciences Citation Index) provided by Clarivate Analytics (formerly Thomson Reuters IP & Science) in the United States [30]. WoS may include articles published by researchers in Korea and China, but it is used as a reference for comparison with global research trends. In addition, this study collected and analysed research data published in KISS and CNKI, two representative academic research information databases in Korea and China, to observe the patterns of BL research in Korea and China.

KISS (Korean Studies Information Service System) was selected because BL is a field of education. KISS is an integrated search service that provides full-text and bibliographic information of Korean academic journals and provides a total of 3,000 types of academic information (e-Journals, Proceedings, e-Books) in all subject areas published by more than 1,400 institutions.

CNKI (China National Knowledge Infrastructure) is China's digital information and knowledge infrastructure.

Knowledge Infrastructure (CNKI) is an academic information platform established and operated by Tsinghua University and Tsinghua East, an IT and telecommunications company, since June 1999 with the support of the government to build a digital information system in China [31].

As of 19 June 2022, the WoS, KISS, and CNKI academic databases collected 14,241, 550, and 1,685 academic articles, respectively, that were searched by the keyword 'blended learning' and published in order of relevance.

#### 3.2. Analytical tools and research methods

Among the BL-related articles retrieved from WoS, KISS, and CNKI academic databases, 12,161, 426, and 1,585 articles were finally purified after excluding duplicates and non-scholarly articles, respectively, and were subjected to co-occurrence analysis, keyword analysis, and visualisation using KH Coder. KH Coder is an open-source software programme developed for quantitative content analysis or text mining. It can be used to analyse keyword frequency. Each keyword cluster is scored and generally the higher the score, the higher the confidence [32]. One of the advantages of KH Coder is that it supports multilingual versions. In this study, we used this programme to compensate for the font breakage caused by multilingualism.

The specific research process is as follows. The frequency of BL-related papers published in WoS, KISS, and CNKI from 1990 to June 2022 showed that the total number of BL papers published in both Korea and

China was about 15 from 1990 to 2002, but increased to more than 20 from 2004 and 2005, and the amount of research has been increasing rapidly since 2020 during the COVID-19 pandemic. We then conducted keyword analysis and visualisation analysis to analyse BL patterns in Korea and China. KH Coder's co-occurrence feature connects closely related words with lines and groups words that define search criteria. A network of words closely related to a particular keyword can be drawn [32].

Co-occurrence networks have recently been used in various fields as a way to analyse trends in a discipline. It shows not only the association between words but also the association between words and titles. With KH Coder, you can set the value of Jaccard, Euclid, Cosine coefficient, etc. according to the number of keywords or mass data analysis. Word clusters can easily reveal the structure of subgroups [32]. Cluster analysis, where words that are close to each other are classified into the same cluster, is a structured concept that can be used to develop conceptual structures, and is also mentioned in Trochim's concept mapping. It provides an important structure for understanding the problem and allows for a rational representation of shapes and contours [33].

The visualisation shows that the larger the node, the higher the frequency of the word, and if the link between two words is thicker than other words, it means that the probability of co-occurrence is higher. In addition, the word-word network diagram provided by KH coder allows you to set the colour coding of words (nodes), indicating the role of each centrality in social network analysis. The circles representing the nodes reflect the centrality in ascending order from light blue to white to pink [32].

#### 4. Analysis results

Firstly, **Table 1** lists the top 25 keywords from various academic databases to identify similarities and differences in general. The keyword "BL" and education-related research topics (such as learning, teaching, classroom, and students) occupy prominent positions on the list. The main similarity is that there is a generally similar interest in language education research, and research related to design is also active. Among the papers listed in WoS, there are many studies related to cooperation, social issues, environmental improvement, and virtual reality. Korean scholars' research mainly focuses on improving students' abilities and learning outcomes through problem-based learning. In China, the development of courses and systems that incorporate new technologies such as the internet and algorithms is the focus.

**Table 1.** Frequency comparison of the top 25 words in WoS, KISS, and CNKI

Rank	WoS (Web of Science)		KISS (South Korea)		CNKI (China)	
1	learning	12528	learning	754	learning	1578
2	blended	5476	blended	493	blended	1168
3	education	4640	education	292	teaching	830
4	online	1492	online/e-learning/remote/cyber	264	model	367
5	teaching	1490	learning	240	education	356
6	e-learning	1540	lecture/class	142	internet	242
7	technology	1176	professor	132	algorithm	180
8	student	1170	Korean	66	Courses	155
9	design	876	model/mock-up	65	university	154

**Table 1 (Continued)** 

Rank	WoS (Web of Science)		KISS (South Korea)		CNKI (China)	
10	higher	841	English	57	Technology	134
11	classroom	611	problem	53	design	123
12	system	610	multidisciplinary/design	51	neurology	122
13	flip	607	languages	49	English	112
14	training	602	self	44	class	110
15	model	601	course	36	teacher	99
16	teacher	595	student	35	depth	77
17	collaborative	591	competency	34	mooc	77
18	distance	573	Web	33	systems	71
19	management	570	co-operation	33	strategy	69
20	language	569	contents	32	analysing	68
21	social	522	flipped	32	flip	64
22	course	516	PBL	32	Research	63
23	virtual	505	analytics	31	information	60
24	development	484	offline	29	platform	59
25	environment	462	effective	28	smart	57

The frequent occurrence of keywords related to BL applications in KISS and CNKI indicates a long-term orientation towards exploring the applicability of BL beyond academic research in both countries. Apart from the common reasons for curriculum setting in formal systems, a tendency to avoid uncertainty can also be inferred. Additionally, while WoS has many studies on the environment and experience, KISS and CNKI seem to have relatively few. This may be due to the long-term orientation and restraint of the two countries in respecting and adhering to traditions, rather than a tendency to actively improve the environment and experience. However, with the rapid development of science and technology and the demand for new types of talent, curricula and educational experiences must constantly be challenged and explored.

Among the common keywords in WoS, KISS, and CNKI, besides design, CNKI has more research related to technology, models, and systems, while keywords such as problem-solving, content, analysis, and effectiveness in KISS reflect a feminine cultural characteristic, emphasizing the value of consideration over male competition.

The surge in publications from CNKI since 2015 aligns with the fact that China has experienced various forms of online teaching over the past seven years. We found that flexibility in uncertain environments, rather than avoidance, is consistent with low uncertainty avoidance in risk-taking.

Subsequently, we conducted a co-occurrence analysis of paper topics and publication years using KH Coder. For WoS, we set the FilterEdge to a cosine value of up to 240 and the bubble flot to 2,000 units, ranging from 2,000 to 8,000, to achieve visualization. Then, we only included keywords belonging to nouns in KISS and CNKI and set other keywords to the same value. Due to space limitations, we cannot display all visualization results but only the necessary ones. The analysis shows that, firstly, general keywords such as students, education, and learning appeared in WoS in 2015, followed by BL-related research in 2018 and 2021.

After the COVID-19 pandemic broke out in 2019, the pandemic and learning methods began to form a distinct cluster: health, technology, digital, motivation, self-regulation, and culture. Starting in 2020, online learning, literacy, practice, and curriculum, as well as online, education evaluation, platform, healthcare, organization, computer, transition, policy, self-regulation, change, and video began to show a more refined research trend from 2021-2022.

KISS first recorded research related to BL in 1984, and it was said to be used in foreign language education. The study found that in 2004 and 2011, there was a large proportion of research on teaching methods using BL, especially in the field of engineering education in 2011. From 2009 to 2010, there was an increase in the number of studies related to improving learning skills, especially language skills. Among them, English education has the most research (30 out of 550 studies), but the number of studies has decreased since 2015. On the other hand, from 2017 to 2020, research in the field of Korean education began to emerge. This can be attributed to the popularity of Korean culture and content exports. Around 2010, basic education research in universities was common, but since the outbreak of COVID-19 in 2020, basic education-related research has no longer been conducted in universities but has been actively carried out in primary schools. Based on this, it can be inferred that strategies, design, and system construction before the outbreak of COVID-19 can be stabilized in a short period, laying a solid foundation for response measures and a solid foundation during the pandemic through various studies related to network infrastructure. Additionally, the basic law research carried out since 2019, focusing on society, teachers, abilities, and competencies, demonstrates a strong long-term orientation towards preparing for the future.

The study found that 2016-2019 was the most important period for CNKI to conduct BL-related research, followed by 2004-2006. Due to COVID-19, it was discussed along with online education in 2020. In addition, research based on algorithms, systems, neural networks, functions, and reasoning began in the late 1990s and early 2000s. MOOCs and micro-courses, which received attention simultaneously in 2014, are also important discoveries. Among them, learning, teaching, networking with neural networks, reasoning, and bold lines are closely related. This is another manifestation of long-term orientation, which can be said to be in line with the payment for knowledge content (knowledge consumption) that began in 2016.

#### 5. Conclusion and limitations

Since the COVID-19 pandemic, there has been an increase in research on BL around the world and a growing demand for new educational paradigms. BL is considered to be one of the most popular methods to promote active learning and enhance student learning. The impact of the emergence of monetisation of knowledge content and the improvement of marketised education services on the existing education system is expected to be a change that cannot be ignored. To this end, it is necessary to prepare for new challenges by continuously identifying global trends from a multifaceted perspective.

Social network analysis is a highly effective method for observing cross-national relationships [34], and this study utilised keyword analysis and visualisation techniques in network analysis.

This study analysed the key thematic words and semantic network structures that appeared in academic papers from the beginning of BL to the recent corona period. In the process, it examined the discourse produced by Korean and Chinese researchers on BL from a comparative cultural perspective. Although it was not possible to strictly apply cultural dimension theory to interpret the results, the study was able to find important implications. As summarised in the literature review, there are clear cultural differences between

China and Korea along the dimensions of uncertainty avoidance, masculinity orientation, and power distance. The findings show that the prevalence of themes focusing on the use, effects, and examples of BL in Korean papers indicates a tendency towards uncertainty avoidance. On the other hand, the frequent occurrence of models, practices, algorithms, and knowledge consumption in Chinese papers may be due to cultural factors such as male orientation. As Korean researchers in the field of BL have concerns and expectations about the success of BL as a new technique, they tend to conduct a lot of research and analysis on the learning effects and best practices of BL classes. In particular, through the know-how and experience gained based on COVID-19, it is expected that in the future, more effective educational environment improvement, system construction, programme development, and soft aspects such as educational ideology and methods will be improved [9]. On the other hand, China has a stronger centralised system than Korea, so there may be some confusion or concern about the change from analogue to digital learning environment, but there is more interest in practical models and technologies to overcome the problems. The recent expansion of non-face-toface learning due to the coronavirus requires a new paradigm for education. Korea and China have historically had similar cultures, but their social development since modern times has been different. Based on the results of this paper, the changes in teaching methods and knowledge consumption in China and Korea after the introduction of BL are compared through academic publications. It is necessary for education and policy makers in both countries to reflect the results of this study in the overall improvement of BL, and to approach it from a comparative cultural perspective in the process of implementing full-scale AI-based BL.

In terms of the selection of databases, one of the limitations of this study is that it did not cross-search various databases such as Google Scholar, Microsoft Academic Search, DBPIA, and Web of Science, so it will be supplemented in future studies.

In addition, this study can observe the overall trend of the two countries' research based on keyword analysis, but there may be some individual differences. In the future, more intuitive visualisation tools can provide rich research implications, and by collecting and analysing more samples from countries with diverse cultural backgrounds, it is meaningful to identify overall research trends and suggest more effective academic research directions.

#### Disclosure statement

The authors declare no conflict of interest.

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