

Trends in Informal Learning Research in Japan and Overseas: A Quantitative Text Analysis Approach

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Abstract

This paper reviews studies on informal learning inside and outside of Japan. In the review process, we analyzed a total of 194 Japanese language articles and 3,000 English language articles from Web of Science, CiNii and J-STAGE during the period from 1970 to 2025. Initially, we identified the 150 most frequent words by applying word segmentation (tokenization) to English titles and abstracts and morphological analysis to their Japanese counterparts. We then employed co-occurrence network analysis using KH Coder to capture the overall thematic landscape of the literature. By further integrating five-year periods as exogenous variables, we delineated chronological shifts in research trends of informal language learning research in Japan and international journals. As a result, we found that “learn,” “student,” “teacher” and “science” are some of the common words. While the international literature focuses on workplace, corporate and organizational themes, Japanese research appears to concentrate on how learners utilize various resources, such as social media and online communities, to supplement formal language education. This study concludes insights into the evolving trends of informal learning studies.

Keywords

Informal learning; non formal education; international journals; text analysis; word co-occurrence network analysis

1. Introduction

The pervasive nature of learning outside of structured institutional settings has led to a resurgence of scholarly interest in the domain of informal learning. Given that a majority of critical knowledge acquisition occurs through daily experience, understanding and leveraging these processes is increasingly viewed as a crucial necessity for both personal and professional development. According to Coombs and Ahmed (1974), informal learning is “[t]he truly lifelong process whereby every individual acquires and accumulates knowledge, skills, attitudes and insights from daily experiences at home, at work, at play; from the development of a person’s own potential, and from the stimulation and opportunities in his/her environment (p. 8). They also define that non formal learning is “any organized educational activity outside the established formal system—whether operating separately or as an important feature of some broader activity—that is intended to serve identifiable learning clienteles and learning objectives (p. 8)”. Moreover, according to OECE (2011), informal learning typically refers to learning that occurs outside formal or non-formal education systems, often through daily activities, experiences, or interactions, without structured objectives or certification. Globally, research on informal learning highlights its complementary nature to formal education. Informal learning activities, often facilitated by technology, provide opportunities for learners to engage with the target language in authentic, meaningful ways. This can lead to increased learner autonomy, a key skill that allows individuals to take charge of their own learning throughout their lives. Studies have shown that engagement with informal learning resources, such as watching movies or TV shows, listening to music, or interacting with native speakers online, can improve various aspects of language proficiency, including vocabulary, oral fluency, and even pragmatic competence (e.g., Zadorozhnyy & Lee, 2023). Furthermore, more and more youngsters tend to use social network services (SNSs) in order not only to communicate and interact with their friends, but also follow some famous influencers and learn foreign languages/cultures/customs in a fun manner. Therefore, this research will shed light on the importance of informal learning/

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education and the personalization of learning, as informal activities are often chosen based on learners' personal interests.

Kusyk et al. (2025) synthesizes research on informal second language (L2) learning published between 2000 and 2020, highlighting major trends and thematic developments. The analysis reveals a growing emphasis on technology-mediated learning, including social media, mobile applications, and online communities, as key facilitators of informal L2 acquisition. Studies increasingly focus on learner autonomy, motivation, and authentic interaction, reflecting a shift toward personalized and experiential approaches. Overall, the review underscores the complementary role of informal learning in enhancing formal language education and promoting lifelong learning.

Building on these global perspectives, it is essential to consider how informal learning manifests in specific cultural and educational contexts such as Japan. According to Li (2020), in Japan, research on informal foreign language learning is particularly significant due to the country's relatively monolingual and monocultural environment. While formal education in foreign languages (especially English) has been a priority, traditional classroom settings may not provide sufficient opportunities for practical, real-world application. Research in this area examines how Japanese learners use resources such as mobile apps, social media, and online communities to supplement their formal studies.

Despite the growing significance of informal language learning research in Japan, a comprehensive and systematic overview of the existing studies remains elusive. To address this gap, this paper employs quantitative text analysis techniques—focusing on the actual content of the text. Quantitative text analysis provides substantial utility for researchers exploring new academic domains, enabling a rapid, objective, and holistic understanding of existing scholarly trends. In this regard, Higuchi (2017) highlights two key merits: 1) the mechanical quantification of terms can yield novel and unforeseen insights; 2) the approach significantly improves the reliability of the analysis.

2. Theoretical Background

Our study aims to provide a quantitative text analysis of the studies on informal learning and non formal learning in Web of Science (WoS), CiNii and J-STAGE. This analysis was adopted mainly because it offers visual representations of the relations existing between the main concepts. This visualization through networks enables researchers to identify the relations between key concepts (Heersmink, van den Hoven, van Eck, & van den Berg, 2011). According to Wallace and Fleet (2012), such analysis makes the relations more obvious and understandable, promoting new insights. Through co-occurrence network analysis, the formation and distribution of scientific information become clearer. Moreover, quantitative text analysis is defined as a method that organizes or analyzes text-type data using quantitative analytical techniques to conduct content analysis (Higuchi, 2006, p. 15). This approach decomposes texts into words or phrases, quantifies frequencies and co-occurrences, and implements traditional qualitative content analysis with high reproducibility (Higuchi, 2014). Higuchi (2014) systematizes it as a two-step approach: Step 1 extracts statistical patterns, and Step 2 adds qualitative interpretation (p. 78). Therefore, this method, quantitative text analysis, revealing the background and the existing state of research, points the possible trends to develop in the future (Vogel & Masal, 2015).

KH Coder is a quantitative text analysis with text mining software capable of processing Japanese-language data. By importing title and abstract data exported from WoS in CSV format, the tool enables a streamlined workflow—ranging from morphological analysis to co-occurrence networking and correspondence analysis—making it highly suitable for bibliometric studies. While the direct application of KH Coder to WoS titles and abstracts remains limited in existing literature, its utility has been extensively demonstrated in similar academic text analyses. For instance, Hirose (2017) applied the software to diverse text corpora, including mass media, government documents, and social survey responses, utilizing techniques such as co-occurrence networking, multi-dimensional scaling (MDS), and cluster analysis. Hirose (2017) emphasized that while KH Coder has been employed in over 1,500 applied studies, the

integration of researcher creativity is essential for deriving meaningful sociological insights.

Furthermore, Nakamura (2025) focused on academic paper texts, including titles and abstracts, providing a comprehensive guide for interpreting frequency, co-occurrence, and correspondence analysis results generated via KH Coder. This study proposed a framework for evaluating results based on reproducibility and interpretative validity during the manuscript preparation phase, concluding that such a framework serves as a valuable guide for both authors and peer reviewers.

While KH Coder is widely used in Japan, cocitation and citation analyses are some of the most commonly used methods to discover intellectual structure of a field (Bichteler & Eaton, 1980) outside of Japan. For instance, in the field of operation management, Pilkington and Meredith (2009) were able to use cocitation analysis to reveal how the field evolved between 1980 and 2006. In addition to cocitation analysis and citation analysis of impact, keyword analysis is another important method. While cocitation analysis is a superior technique to visualize the intellectual structure of a discipline (Bichteler & Eaton, 1980), this technique does not provide much information about key topics in a discipline. This issue can be addressed by keyword analysis. As its name implies, keyword analysis uses keywords to identify important topics and concepts in a field. Based on frequency count information, it is possible to reveal prominent topics and important changes over a period. To illustrate the value of keyword analysis, it is helpful to use Lei and Liu (2019) as an example. They extracted keywords from the articles published in *System* during the last 40 years. By comparing the frequency of keywords in different periods, these researchers were able to identify some significant changes to the key topics in and the research focus of *System*, which are difficult, if not impossible, to be uncovered by citation or cocitation analysis.

Different keyword analysis was employed in our study to detect prominent topics in the field of informal learning. A common method for identifying keywords involves collecting author-supplied keywords (e.g., Chiu & Ho, 2007; Courtial, 1994; Law & Whittaker, 1992); however, while authors possess deep knowledge of their own work, they may provide only a limited set of keywords. Consequently, significant topics risk being overlooked when relying solely on author-supplied data (e.g., Lei & Liu, 2019a, 2019b). To address this limitation, previous studies have extracted highly frequent words and phrases directly from abstracts. Although this approach generates additional keywords, it retains a degree of subjectivity regarding the criteria for word and phrase inclusion. In contrast to these conventional methods, we adopted a streamlined workflow beginning with morphological analysis, followed by a systematic analysis of high-frequency words. By processing the raw text data in this manner, we ensured a more data-driven and objective interpretation of the corpus, thereby minimizing researcher bias in the keyword selection process.

While a quantitative text analysis has proven its utility in mapping disciplinary trends within major international fields, this methodology has been notably underutilized to survey the landscape of educational research in Japan. Specifically, a systematic review of major Japanese academic repositories, including CiNii and J-STAGE, confirms a critical lack of studies dedicated to analyzing informal learning publications. Consequently, this study aims to bridge this national research deficit by conducting a quantitative investigation into Japanese scholarly output. Our core objectives are to diagnose the current state of domestic knowledge, identify unique Japanese research characteristics, provide actionable, data-driven insights that can directly inform and enhance pedagogical practice within the Japanese education system.

3. Research Questions

As mentioned previously, researchers have carried out an extensive study on quantitative text analysis related to linguistics or a branch of linguistics and achieved outstanding results such as White (2004) and Wang and Zhang (2019), demonstrating the significant potential for future research. Despite the popularity of informal learning, our knowledge regarding its general development over the last few decades has so far remained somewhat limited, as no

previous study has performed a quantitative text analysis in informal learning. As such, we cannot evaluate its impact or judge the areas where it exerts the most effect, the kind of knowledge that is particularly needed considering its interdisciplinary nature. In reality, quantitative methods provide new perspectives on the knowledge status and trends in a certain field. Therefore, this research undertakes a quantitative text analysis to map the chronological development of informal learning. More specifically, this study aims to tackle the following three research questions.

- 1) How does the distribution and network structure of key terms in the title and abstract sections of informal learning, non formal learning, informal education and non formal education research vary across the three databases: WoS, CiNii, and J-STAGE?
- 2) What is the chronological development of informal learning from 1970 to 2025?
- 3) What are the primary co-occurrence networks of key terms and how do these networks correlate with exogenous variable such as periods (1970-1974, 1975-1979, etc.) and regional contexts (i.e., Japan and non-Japanese contexts)?

In this context, with the aims to provide a guide for new studies, to identify the trends in the field and to compare the existing research on the topic, these research questions were examined through a co-occurrence network analysis.

4. Methodological Approach

4.1 Material and Method

WoS, Scopus, and Google Scholar are the three major online data resources for a quantitative text analysis. WoS is a subscription-based, curated citation database managed by Clarivate. It indexes scholarly literature from a select collection of high-impact, peer-reviewed journals, books, and conference proceedings across various disciplines. Its primary purpose is to provide researchers with a trusted source for literature discovery, quantitative text analysis, and research evaluation. WoS is one of the best-known and most widely used library resources (Roemer & Borchardt, 2015). WoS and Scopus are large multidisciplinary abstract and citation databases of scholarly literature, curated, and subscription-based databases that offer a higher degree of data quality and reliability. They are the preferred tools for conducting systematic literature reviews, performing in-depth quantitative analysis, and evaluating research impact for tenure or promotion purposes. While their coverage is more limited, it is also more focused on high-quality, peer-reviewed academic literature. For this research, we use WoS rather than Scopus and Google Scholar because while Google Scholar and Scopus provide extensive coverage, WoS is the superior choice for title analysis due to its rigorous indexing standards and high-quality metadata. Its consistent record structure ensures greater accuracy and reliability when performing longitudinal linguistic or thematic evaluations of research titles. The precision minimizes noise and ensures that the results of the title-based mapping are both reproducible and statistically sound.

J-STAGE is an electronic journal platform dedicated to disseminating and distributing Japanese scientific and technological information. As many academic societies publish their papers on J-STAGE, it is an excellent resource for identifying the latest research trends and trending topics within a specific field. The platform contains papers from a wide array of fields, including medicine, engineering, agriculture, and the humanities, facilitating cross-disciplinary comparative analysis. It allows for the systematic collection of full texts, abstracts, and keywords from published papers, providing a comprehensive dataset for analysis. Whereas CiNii is a database that offers cross-sectional search capabilities for Japanese academic papers, university bulletins, and doctoral dissertations. Beyond academic papers, it includes information on university library holdings and research projects, providing access to a wider range of literature than J-STAGE. The platform enables the tracking of citation relationships between papers, which is useful for identifying influential works and understanding the impact of specific research on the broader academic community. It

contains numerous papers published in the past, making it well-suited for a diachronic analysis of how specific concepts or research themes have evolved over time.

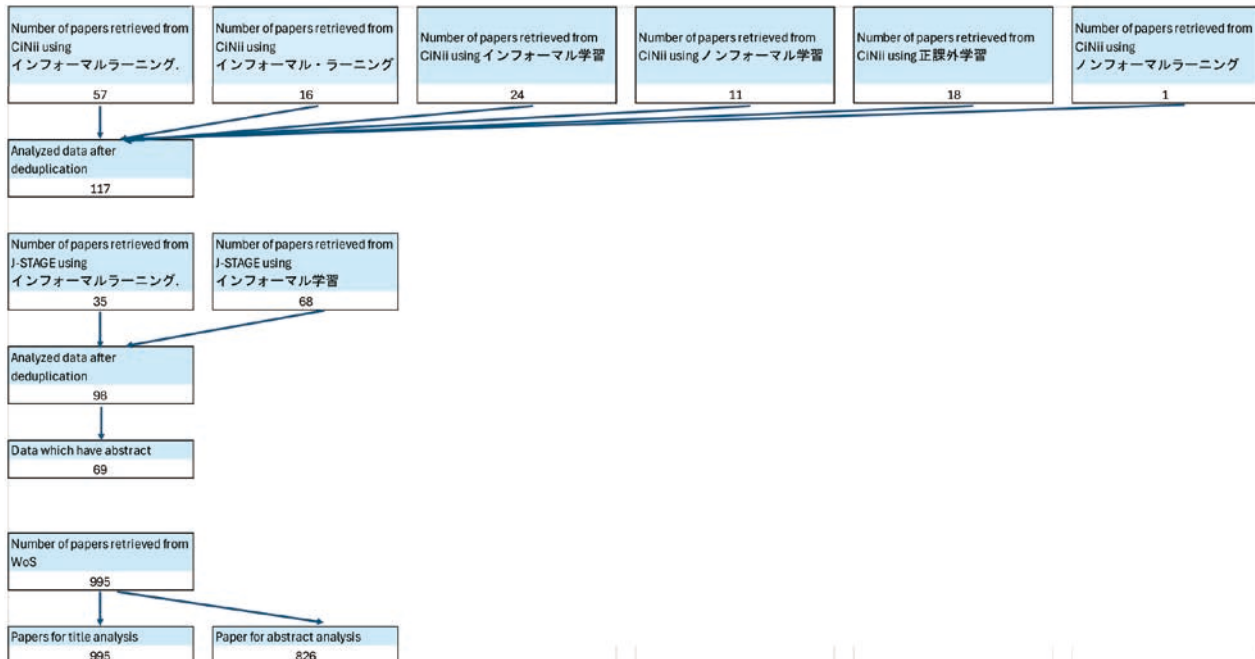
Three databases, WoS, CiNii and J-STAGE, were used in the present study to compare. Thomson Reuter's WoS was chosen as the main database as it is the most comprehensive one covering the majority of refereed journal in social sciences, arts, and humanities (Steinhardt et al. 2017; Darvish & Tonta 2016). We focused on English language journal articles in the database. Generally speaking, these three databases have been quite useful for researchers to learn about the progress being made in various subjects and the latest hot topics (Kuang et al. 2016). In order to compare English articles with Japanese ones, we also used CiNii. Having said so, CiNii does not provide full-text of abstract, but only title sections, we decided to utilize J-STAGE as well to investigate abstract sections. By leveraging these three platforms, researchers can conduct quantitative text analysis from multiple perspectives, allowing for a detailed examination of research trends in a specific field or a historical tracking of the evolution of a particular concept.

Within the scope of this study, the studies on informal learning were examined through WoS, CiNii and J-STAGE databases from 1970 to 2025, although we are also interested in informal language learning but it was too narrow for this study. The search term was intentionally broadened to "informal learning" instead of "informal language learning". This decision was made because limiting the search query to the latter resulted in an insufficient retrieval of relevant literature on language education within the broader field of informal learning. By employing the wider term, we aimed to first delineate the scope and characteristics of "informal learning" as a concept, thereby ensuring a more comprehensive capture of related studies that might otherwise be overlooked. The keywords (informal learning OR non formal learning OR informal education OR non formal education) were entered to the "topic" sections and 3,000 studies in WoS, 117 studies in CiNii and 77 studies in J-STAGE were reached (August 14, 2025). The categories for educational research, education scientific disciplines, language linguistics, linguistics and psychology educational were filtered. In 3,000 articles of WoS, there were 36,977 words encountered in title sections, however we chose 22,870 words for this study after eliminating non-content words such as a, the, on, with, etc.. Although we found 515,750 words in abstract sections, we utilized only 294,214 words for this study after filtering prepositions, articles, personal pronouns, etc.. As Table 1 describes, in 117 CiNii's papers, we analyzed 7,099 words in title sections. Furthermore, for J-STAGE, title sections were not analyzed, however 1,076 words in abstract sections were analyzed. The file was uploaded to KH Coder program. Study selection process of this research is presented in Figure 1.

Table 1

The analyzed databases in this study

	WoS	CiNii	J-STAGE
The number of articles	3,000	117	69
The number of words in title sections	22,870 (36,977)	7,099 (16,123)	N/A
The number of words in abstract sections	294,214 (515,750)	N/A	1,076 (1,961)

Figure 1.*The process of this study*

4.2 Search Strategy

Standard procedures include: 1) corpus building and preprocessing (morphological analysis, stop-word removal), 2) document-feature matrix (DFM) construction, and 3) multivariate analysis (correspondence analysis, clustering) (Higuchi, 2014, pp. 80-85). KH Coder integrates these for Japanese/multilingual texts, enabling co-occurrence networks and visualization. Higuchi (2014) demonstrates this on *Anne of Green Gables* to extract word co-occurrence structures (p. 82). Internationally, R's *quanteda* or Python's *Gensim* support TF-IDF and topic models (Yamamoto & Otani, 2017).

For paper titles and abstracts, Antunes et al. (2024) analyzed Scopus-extracted sensory marketing abstracts with KH Coder, identifying keyword co-occurrences and topic clusters to pinpoint research frontiers (p. 5). Similarly, Phuong et al. (2023) examined STEM education titles/abstracts for temporal shifts and theme networks, quantitatively mapping research dynamics (p. 3). Our study adopts this approach using domain data.

4.3 Data Analysis Procedures

The data analysis procedure was conducted by two researchers. In this study, we utilized KH Coder that is a versatile and user-friendly software for quantitative content analysis and text mining. It is designed to assist researchers in uncovering patterns and insights from large textual datasets. The software combines statistical analysis with a focus on qualitative interpretation, making it a valuable tool for a wide range of academic disciplines, including sociology, psychology, and communication studies. KH Coder employs several key methodologies to analyze text. Its primary function is to perform co-occurrence network analysis, which maps the relationships between words in a document. By identifying which words frequently appear together, researchers can visualize the core themes and underlying structures of a text. This feature is particularly useful for understanding the semantic context and relational dynamics of concepts. Another fundamental capability is quantitative content analysis, which involves counting the frequency of words and phrases. This allows for the creation of word lists, frequency tables, and other statistical summaries that provide a quantitative overview of the text's content. The software also offers clustering and correspondence analysis, which help in categorizing documents and identifying salient relationships between words and document attributes. These features

are instrumental for segmenting large corpora and discerning nuanced patterns that might be difficult to identify through manual reading alone.

According to Sakushima (2022), the title is the author's most intentional and minimal content-indicating label. Due to its conciseness and high density of information, title analysis is argued to be a more efficient and sensitive tool for capturing research trends in bibliometrics compared to analyzing keywords or entire body of text. In terms of the duration of the analysis, the selection of the 5-year time span instead of 10-year periods is a commitment to analytical precision that prioritizes the timely detection of evolutionary and revolutionary shifts over the observation of slower, macro-level changes.

5. Results

In this section, the result of title analysis would be presented first, followed by abstract analysis. The reason to present the results in this order is that one main focus of the current study is to identify trends in the field, which can be revealed by changes in interest toward prominent topics in informal learning.

5.1 The most-used words in the title sections in Web of Science

Table 2 indicates the top 150 most-used words in the title sections in WoS from our search. As can be seen, when we searched for informal learning, non formal learning, informal education and non formal education, learn (f=338), student (f=317), teacher (f=213) appeared, followed by science (f=189), and study (f=171).

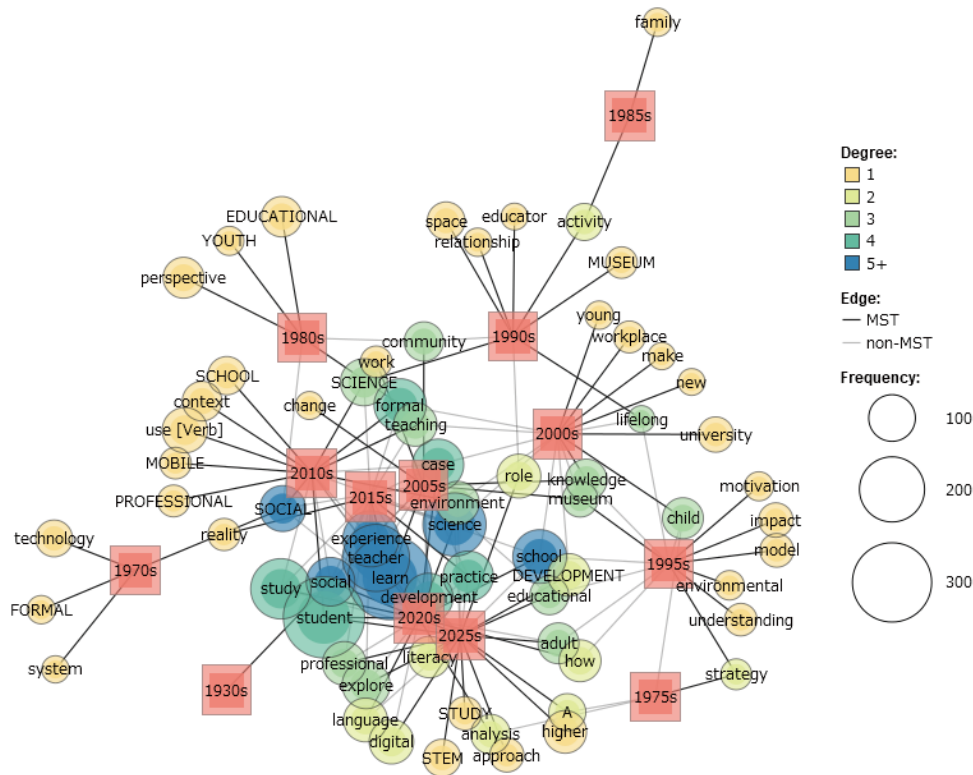
Table 2

Top 50 most-used words in the title sections in Web of Science

Words	Numbers of occurrences	Words	Numbers of occurrences	Words	Numbers of occurrences	Words	Numbers of occurrences	Words	Numbers of occurrences
learn	338	development	110	teaching	86	EDUCATIONAL	74	STEM	63
student	317	social	109	environment	84	analysis	71	A	62
teacher	213	explore	106	DEVELOPMENT	83	context	71	activity	62
science	189	SCIENCE	102	higher	83	music	71	technology	61
study	171	SOCIAL	97	how	80	TEACHERS	71	skill	60
experience	147	use	94	knowledge	78	community	70	use	60
school	135	digital	91	literacy	78	educational	68	youth	59
formal	127	language	88	adult	76	SCHOOL	66	museum	57
case	122	role	88	child	76	space	64	DIGITAL	56
practice	117	professional	87	perspective	76			ONLINE	56
								university	56

Figure 3.

Network map of the most-used word in title sections by period



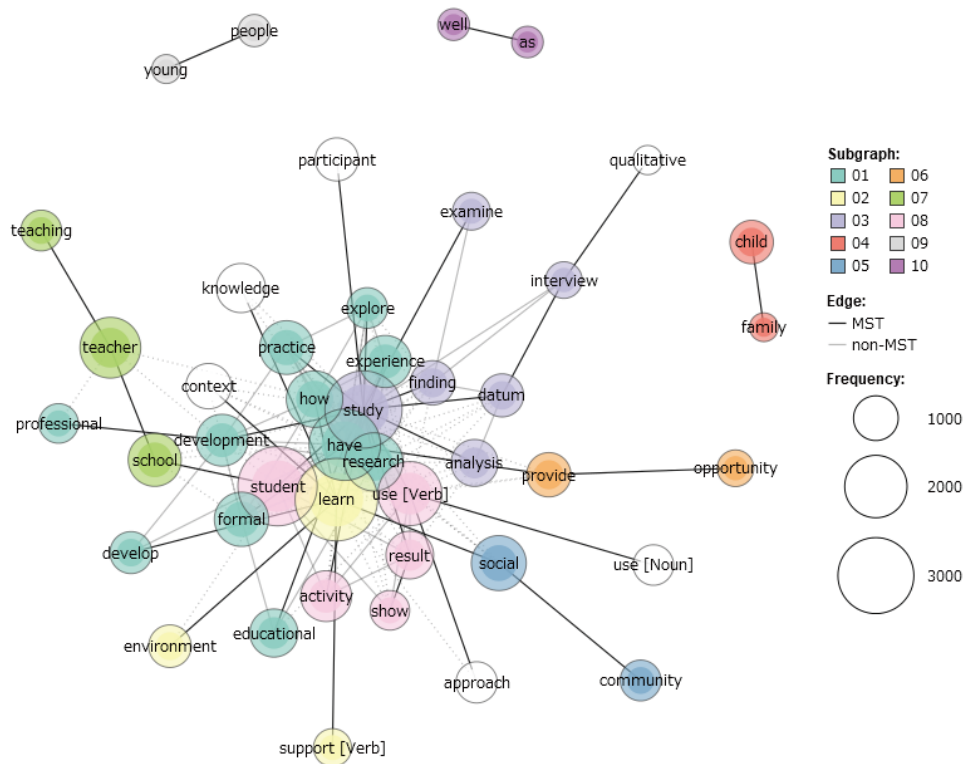
5.2 The most-used words in the abstract sections in Web of Science

Next, we analyzed the abstract sections in WoS. This text analysis conducts a co-occurrence network to analyze the interconnections among lexical items. We put the same words, informal learning, non formal learning, informal education and non formal education. Table 3 illustrates the top 150 most-used in abstract sections in WoS. For example, *learn* appeared 3,559 times, *student* (f=3,286), *study* (f=3,109), *have* (f=2,649), etc.

Table 3

Top 50 most-used words in abstract sections in Web of Science

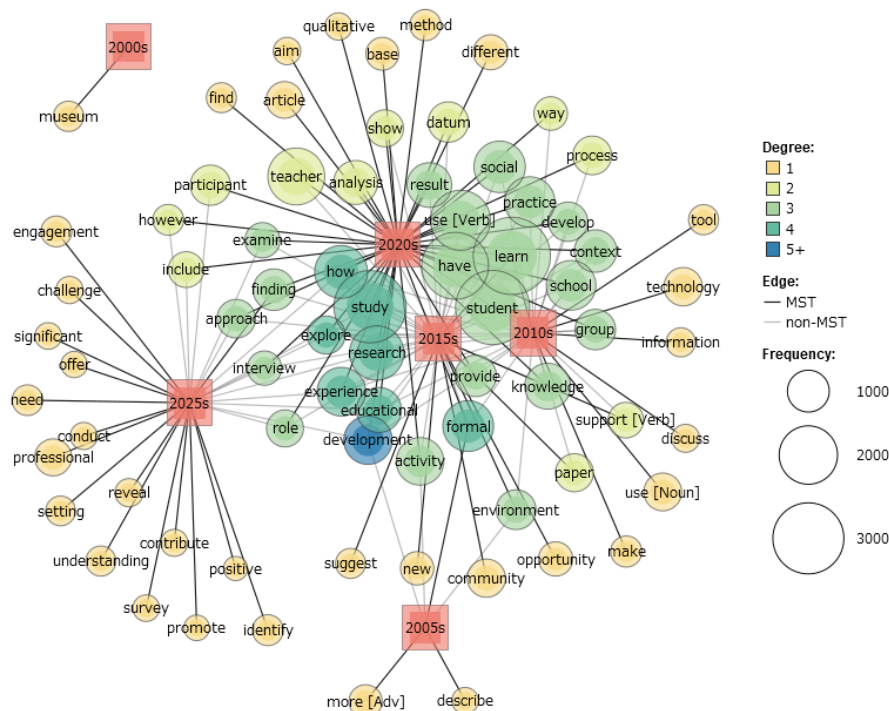
Words	Number of occurrences	Words	Number of occurrences	Words	Number of occurrences	Words	Number of occurrences	Words	Number of occurrences
learn	3559	formal	1501	context	1029	approach	843	role	771
student	3286	practice	1470	finding	987	skill	839	article	757
study	3109	school	1430	provide	982	technology	833	language	751
have	2649	experience	1377	child	944	community	827	digital	732
use	2112	development	1362	group	937	learner	825	program	725
teacher	1898	activity	1308	datum	927	teaching	823	include	718
research	1726	knowledge	1217	participant	923	explore	819	support	711
how	1631	educational	1167	environment	902	paper	819	examine	699
social	1542	result	1147	develop	877	use	809	design	694
science	1530	analysis	1108	process	850	professional	773		
						show	773		

Figure 4.*Network map of the most-used word in abstract sections in Web of Science*

Using these top common words, we created a network map (Figure 4). A review of the overall co-occurrence network diagram, which does not consider publication dates, reveals the fundamental structure of international informal learning research. While learning is the central hub, workplace holds an exceptionally strong centrality, indicating that the primary setting for this research is the workplace. The network branches out from the term workplace, forming several thematic clusters. A strong connection exists among terms such as *organization*, *employee*, *development*, *performance*, and *management*, demonstrating that the research is motivated by a managerial perspective, aiming for organizational performance improvement and human resource development. Another cluster, including *social*, *knowledge*, *practice*, and *community*, suggests that social learning theories, such as the Community of Practice, are a key theoretical foundation in this field. Terms related to higher education, for instance, *higher education*, *student*, and *teacher*, are on the periphery of the network, confirming they are not central to the research. This indicates that international informal learning research is closely linked to management and organizational behavior studies, with its primary objective being the improvement of organizational performance through employee learning in the workplace.

Figure 5.

Network map of the most-used word in abstract sections by period



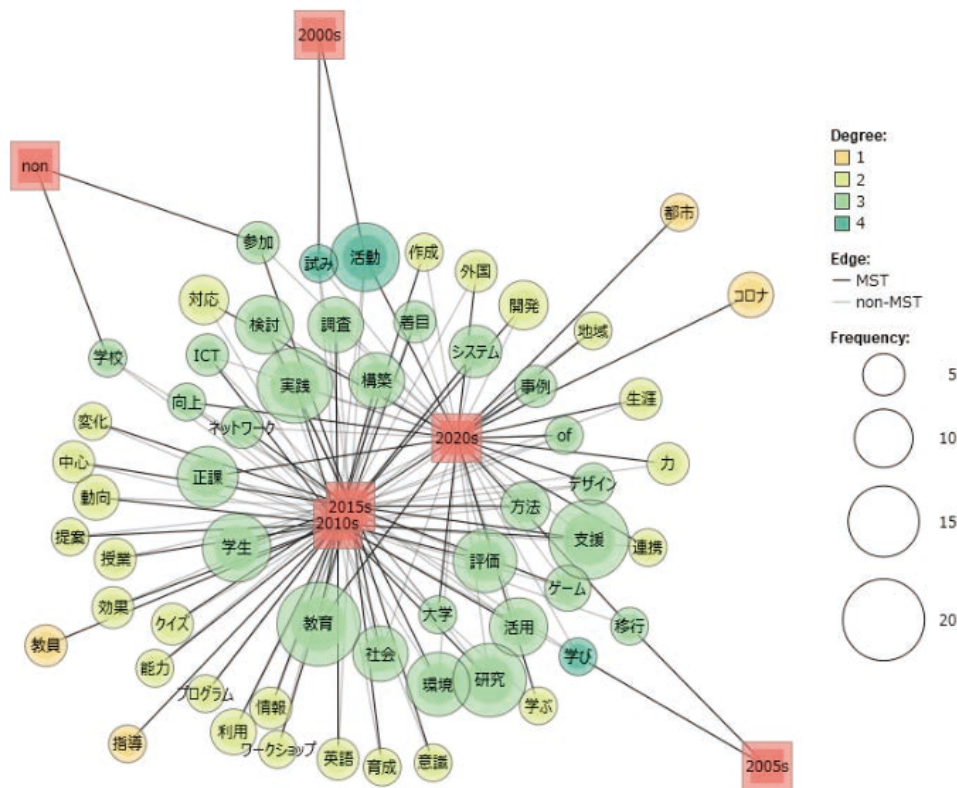
“Degree” of Figure 5 refers to the number of direct connections a node (i.e., a word) has with other nodes in the co-occurrence network. A higher degree indicates that the word co-occurs with many other words and thus plays a more central role in the network. The time-series co-occurrence network, which is color-coded by publication year, illustrates the chronological evolution of research themes. Only top 150 words were analyzed. In the early period (2000s to early 2010s), the network was centered on terms, for example, *knowledge*, *organization*, and *management*, suggesting that the research began within the context of knowledge management. The middle period (late 2010s) saw an increased focus on words related to relationships and processes, such as *social*, *network*, *identity*, and *feedback*, indicating a shift from managing knowledge as a thing to a more human-centric interest in social connections and the formation of identity through learning. In recent years (2020s onwards), new terms have emerged, particularly *digital*, *online*, *technology*, and *mobile*, which reflect the global trend of digitalizing learning environments. Additionally, the appearance of terms such as *health* and *well-being* shows a broadening of interest to include a more holistic perspective on employee health and happiness beyond mere productivity. This progression shows a clear developmental trajectory: starting with knowledge management, deepening into the social and relational aspects of learning, and then expanding to incorporate digital technology and employee well-being, all within the consistent setting of the workplace.

5.3 The most-used words in the title sections in CiNii

After analyzing WoS, we also carried out the same search strategy in CiNii and J-STAGE. First of all, to examine trends in informal learning research, a co-occurrence analysis was conducted using selected keywords retrieved from CiNii, a comprehensive academic database in Japan. We utilized keywords, such as インフォーマルラーニング、インフォーマル・ラーニング、ノンフォーマルラーニング、インフォーマル学習、ノンフォーマル学習、正課外学習. Table 4 describes the top 150 most-used words in the title sections. 教育 education (f=21), 支援 support (f=19), インフォーマル informal (f=17), 実践 practical (f=17) are the most common words which appeared in CiNii. 研究 research (f=16), 学生 student (f=14), 活動 activity (f=14) are also popular and appear with selected keywords such as informal learning.

Figure 7.

Network map of the most-used word in title sections by period



Based on the co-occurrence network analysis of Japanese academic papers in CiNii, the discourse on informal learning in Japan is highly multifaceted, encompassing a wide range of contexts. The overall network diagram (Figure 6) reveals that the field is fundamentally structured around core concepts such as “learning (学び),” “education (教育),” “support (支援),” and “research (研究).” The research can be categorized into at least three prominent clusters: one centered on “corporate,” “workplace,” and “human resource development,” another on “university” and “practice,” and a third on “community,” “society,” and “lifelong learning.” This structural balance suggests that the field is interdisciplinary, with its primary pillars resting on corporate training, university education, and community-based lifelong learning.

An examination of the network by publication year (Figure 7) elucidates a clear chronological shift in research trends. Only top 150 words were analyzed. In the initial to middle periods (2005-2014), studies primarily focused on foundational concepts within each of these contexts, exploring the basic positioning of informal learning. The subsequent period (2015-2019) saw a shift toward more specific methodologies and actions, with terms such as “practice,” “collaboration,” and “reflection” becoming more prominent, particularly within the university education cluster. This indicates a progression from theoretical conceptualization to the practical implementation and evaluation of learning processes. Most recently, since 2020, the field has undergone a clear thematic transformation, with new terminology such as “online,” “COVID,” and “technology” entering the network, reflecting the influence of contemporary societal changes. Concurrently, a heightened focus on individual agency and career development is evident through the increasing co-occurrence of terms like “self,” “proactive,” and “career.” The observed trends indicate a clear shift in the research landscape, characterized by an extensive integration of COVID-related implications.

5.4 The most-used words in the abstract sections in J-STAGE

Since we are not able to access to full-text of abstract in CiNii, we decided to research on the abstracts of J-STAGE. Table 5 is the top 150 most-used words in the abstract sections in J-STAGE. Slightly similar to title sections of CiNii, 教育 education (f=180), 研究 research (f=135), 活動 activity (f=96), 結果 result (f=59), 参加 participate (f=56), 行う carry out (f=51), 支援 support (f=49), 実践 practical (f=44) are the most common words which are associated with informal learning.

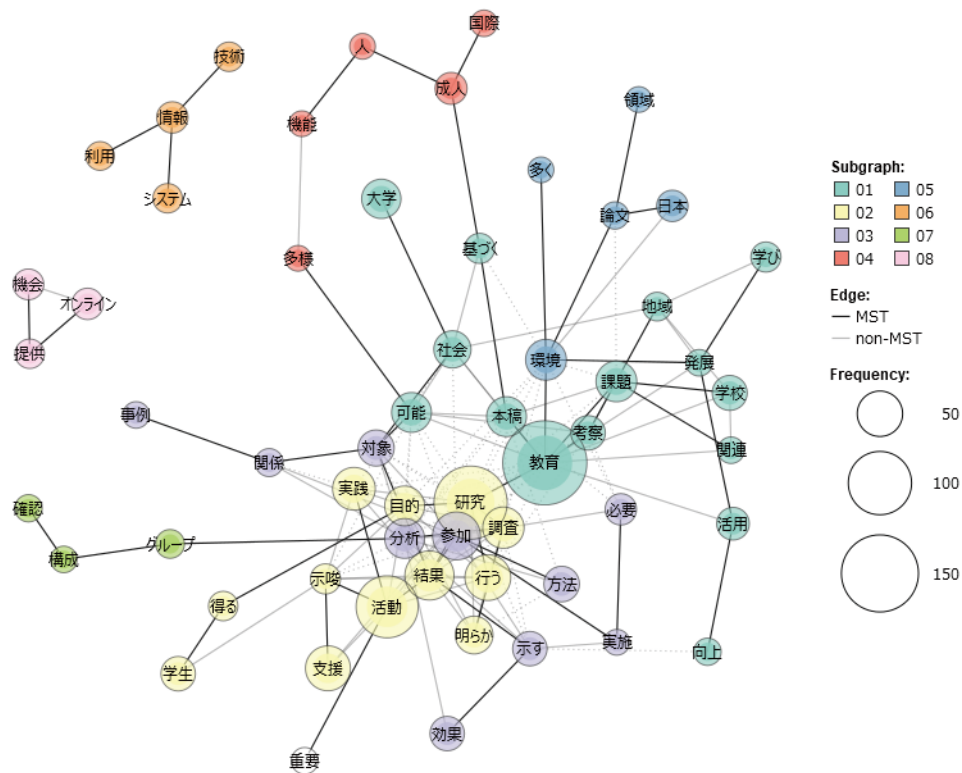
Table 5

Top 55 most-used words in the abstract sections in J-STAGE

抽出語	出現回数	抽出語	出現回数	抽出語	出現回数	抽出語	出現回数	抽出語	出現回数
教育	180	可能	38	方法	30	成人	24	システム	20
研究	135	分析	38	学校	29	オンライン	23	開発	20
活動	96	本稿	38	イン	28	情報	23	技術	20
結果	59	目的	38	学生	28	日本	23	提供	20
参加	56	大学	37	効果	28	必要	23	得る	20
行う	51	明らか	34	考察	28	機会	22	グループ	19
支援	49	社会	33	示す	28	学び	21	地域	19
実践	44	対象	31	科学	25	基づく	21	利用	19
調査	41	評価	31	活用	25	示唆	21	関係	18
課題	40			検討	25			確認	17
環境	40			授業	25			興味	17
								経験	17
								向上	17
								視点	17
								論文	17

Figure 8.

Network map of the most-used word in abstract sections in J-STAGE



We analyzed two co-occurrence network figures to elucidate the evolving landscape of informal learning research in Japan. These figures visualize the frequency and strength of word associations found in academic paper titles, with thicker lines indicating stronger co-occurrence and central positioning denoting higher connectivity. Figure 8, which aggregates data across all publication years, reveals that informal learning is explored through a diverse array of thematic clusters. Central concepts such as *learning*, *education*, *support*, and *research* suggest that the field is not limited to descriptive inquiry but is deeply concerned with pedagogical implications and the facilitation of learning processes.

Surrounding these core concepts are several distinct clusters representing subdomains within informal learning research. One cluster, focused on higher education, includes terms like *university*, *students*, and *practice*, indicating active investigation into student-driven learning beyond formal curricula. Another cluster emphasizes *community*, *society*, and *participation*, reflecting research on lifelong learning and social education in regional contexts. A third group, featuring *children*, *science*, and *experience*, points to experiential learning in museums and science centers. Lastly, terms such as *skills*, *knowledge*, and *career* form a cluster related to workplace learning and professional development.

Figure 9.

Network map of the most-used word in abstract sections by period

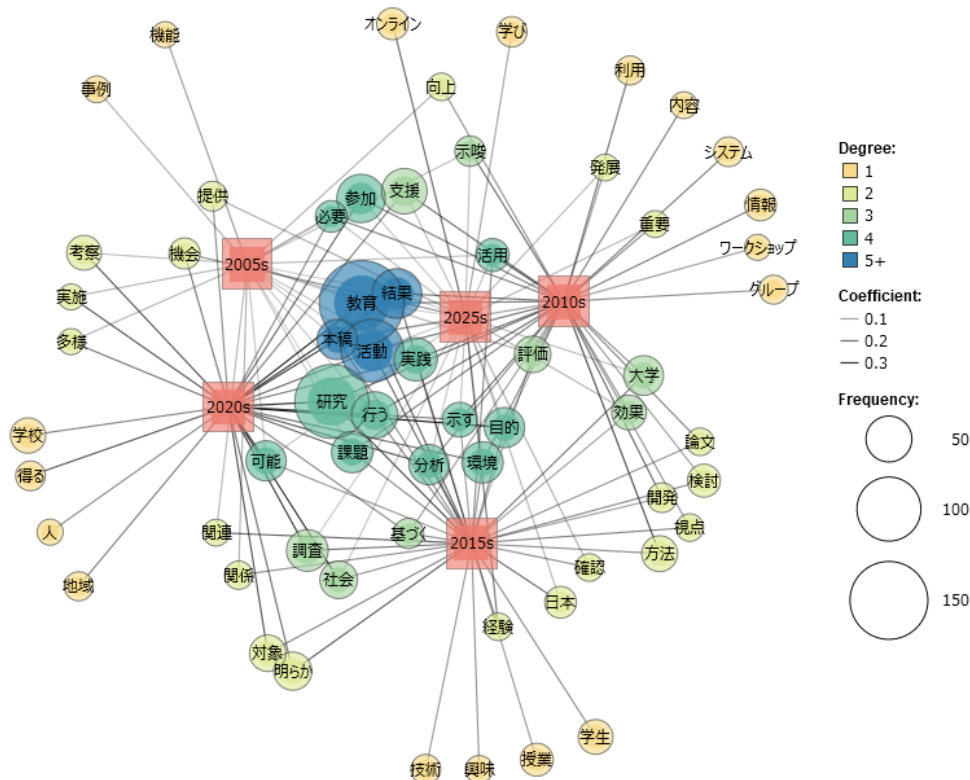


Figure 9, which color-codes terms by publication year, reveals a clear chronological progression in research focus. Only top 150 words were analyzed. In the early 2000s to mid-2010s, dominant terms such as *lifelong learning*, *society*, and *museum* reflect a macro-level emphasis on public education and social learning infrastructures. By the late 2010s, the emergence of terms like *university*, *practice*, and *collaboration* indicates a shift toward practical implementation and evaluation within educational institutions. The frequent appearance of *partnership* during this period suggests growing interest in multi-stakeholder collaboration for learning support. In the 2020s, the network

introduces new, prominent terms such as *online*, *experience*, *career*, *technology*, and *self*, signaling a transition toward more individualized and technologically mediated learning paradigms.

6. Discussion

In this study, 3,194 studies on informal learning in 3 databases were analyzed through a quantitative text technique. To address RQ 1, which examines how the distribution and network structure of key terms vary across the three databases (WoS, CiNii, and J-STAGE), Table 6 was created.

Table 6

Answers for RQ 1

Feature	CiNii (Japan) Research Network	WoS (International) Research Network
Overall Research Approach	Multicontextual and interdisciplinary	Remarkably specialized and unified
Primary Focus Contexts	Wide range of settings, traversing different contexts	Concentrates almost exclusively on the workplace (organizational context)
Distinct Research Clusters	Features multiple distinct clusters: 1. Corporate/Workplace Group (e.g., <i>career</i> , <i>human resource development</i>) 2. Higher Education Group (e.g., <i>university</i> , <i>student</i> , <i>class</i>) 3. Social/Lifelong Learning Group (e.g., <i>community</i> , <i>society</i> , <i>lifelong</i>)	Unified by a single dominant hub: The Workplace (employee, organization, performance, management)

The most-used word in title sections in WoS (3,000 articles) was “learn” ($f=338$). The most-used words in the abstracts of the studies were also examined. The results showed that its word was also “learn” ($f=3,559$) in the abstracts. These results show that the studies mostly focused on the “learning” on something or somewhere.

In terms of title sections, a comparative analysis of co-occurrence network diagrams from CiNii (Japan) and WoS (international) reveals a significant difference in the focus of informal learning research. While Japanese research is characterized by its multi-contextual approach, encompassing a wide range of settings such as *universities*, *corporations*, and *communities*, international research is remarkably specialized, concentrating almost exclusively on the workplace. The Japanese network features multiple distinct clusters, including a corporate/workplace group (e.g., *career*, *human resource development*), a higher education group (e.g., *university*, *student*, *class*), and a social/lifelong learning group (e.g., *community*, *society*, *lifelong*). This demonstrates that Japanese research is interdisciplinary and approaches the subject from multiple perspectives, traversing different contexts like *companies*, *universities*, and *communities*. In contrast, the international network is unified by the dominant hub of workplace, with virtually all research themes revolving around it. Key concepts such as “employee”, “organization”, “performance” and “management” are strongly linked to the workplace, indicating that the primary goal of this research is to enhance organizational productivity and human resource development.

Regarding RQ 2, which explores the chronological development of informal learning from 1970 to 2025, this fundamental difference in context is also reflected in the evolution of research trends. As Table 7 illustrates, Japanese research has seen a dynamic shift in focus over time, moving from foundational concepts in various contexts in the early period to more specific methodologies in higher education during the mid-period, and finally to modern, micro-level perspectives on “technology,” “individual careers” and “self-directed learning” in recent years. This progression demonstrates a historical shift in the subject of research from learning in society as a whole to practices within organizations and universities, and ultimately to “individual careers” and “technology”.

Table 7

Japanese Research Trend Progression

Time Period	Core Focus	Context	Underlying Logic
Early Period	Foundational Concepts	Various Contexts (Societal Learning)	Research emphasis was on learning in society as a whole
Mid-Period	Specific Methodologies	Higher Education (Universities/Organizations)	Shift toward practices within organizations and universities
Recent Years	Modern, Micro-Level Perspectives	Technology, Individual Careers, Self-Directed Learning	Focus on individual agency and technological integration

Conversely, Table 8 shows that international research has maintained the “workplace” as its consistent core, with the discourse deepening and expanding over time. It began in the early 2000s as part of “knowledge management”, shifted to the social and relational aspects of learning in the late 2010s, and has recently expanded to include “digital technology” and “employee well-being,” highlighting a more human-centric approach. In essence, the academic backgrounds of each region are clearly reflected in their research trends: Japanese research, with its roots in education and sociology, targets diverse settings, while international research, grounded in business and organizational theory, specializes in solving workplace issues. This reflects several contemporary trends: the integration of digital tools in informal learning environments, increased attention to personal learning experiences and career trajectories, and a rising interest in self-regulated learning. These developments suggest that the field is increasingly responsive to societal transformations such as digitalization and the diversification of work and life paths.

Table 8

International Research Trend Progression

Time Period	Core Focus	Context	Underlying Logic
Early 2000s	“Knowledge Management”	Workplace	Focus on organizational efficiency
Late 2010s	Social and Relational Aspects of Learning	Workplace	Deeper exploration of human interaction in the workplace
Recent Years	“Digital Technology” and “Employee Well-Being”	Workplace	Expansion to a more human-centric approach and technological tools

In terms of RQ 3, this study utilized co-occurrence network analysis to explore how key term networks correlate with exogenous variables like temporal periods and regional contexts, specifically focusing on the evolution of informal learning research in Japan. The findings reveal that the field has developed across multiple domains—ranging from higher education and regional collaboration to science education and workplace learning—highlighting its inherently interdisciplinary nature. Over time, the research focus has shifted from macro-level concerns such as lifelong learning and public education toward more localized and personalized learning contexts. The temporal progression of thematic clusters suggests a growing responsiveness to social and technological change. Earlier research emphasized community-based learning and institutional collaboration, while more recent studies have explored the integration of digital technologies, the role of individual learning experiences, and the significance of career development. The emergence of terms such as “online,” “experience,” and “self” reflects increasing scholarly interest in self-regulated learning and the personalization of informal learning pathways. These trends indicate that informal learning research is entering a new phase—one that aligns closely with the challenges of the digital transformation era and the demands of lifelong career development in the “100-year life” paradigm.

7. Limitations

Although this study has provided valuable insights into our understanding of informal learning research, it has some limitations, especially in terms of methodology. The current corpus only includes publications indexed in WoS, CiNii and J-STAGE and excludes the fugitive literature, theses, and proceeding. The current items in the corpus may have also been cited by other publications that are not included there. Other researchers can utilize other types of publications and other online databases to provide more comprehensive insights into the topic.

Furthermore, future research should consider how informal learning environments can be designed to support autonomous, sustainable learning across diverse life stages and professional trajectories. In doing so, the field can contribute meaningfully to the reimagining of education in a rapidly changing society.

8. Conclusion

This study employed a quantitative text analysis approach to examine the evolving trends in informal learning research in both Japan and internationally. The findings reveal a distinct and divergent trajectory between the two academic contexts. Internationally, the research on informal learning is profoundly and consistently centered on the “workplace.” The analysis of international journals indicates that the field’s central focus has been on organizational performance, human resource development, and management, with a clear historical progression from knowledge management to social learning processes and, most recently, the integration of “digital technology” and “employee well-being.” This trajectory highlights the practical and professional orientation of informal learning research in the global context.

In contrast, it is suggested that research in Japan is positioned within a different, more language-specific context, driven by the nation’s relatively monolingual and monocultural environment. While the international literature focuses on corporate and organizational themes, Japanese research appears to concentrate on how learners utilize various resources, such as social media and online communities, to supplement formal language education. This indicates a primary concern with addressing a pedagogical gap—providing real-world application opportunities that traditional classroom settings may lack. Thus, the present study underscores a fundamental divergence in research focus: while international studies treat informal learning as a tool for professional development, Japanese scholarship views it as a critical supplement to language acquisition. For this reason, in the light of the advantages of developing technology, as Aksoy and Dimililer (2017) suggested, there should be growing emphasis on research testing the effectiveness of informal learning environments supported by different technologies on foreign language education.

Finally, our results also indicate that quantitative text analysis can be a useful method for understanding trends in informal learning, as it can generate and compare large numbers of quantitative data to help reveal developmental patterns. It is also crucial to note, however, that to obtain a complete understanding of trends, we ought to examine various types of data, including most highly discussed topics, most highly cited publications and authors, and so on. As Lei and Liu (2019a) conclude, one type of data alone may not be adequate.

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