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Mapping Research Trends in Gamification in Second Language Acquisition: A Bibliometric Analysis

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Abstract

This study presents a bibliometric analysis of research on gamification in Second Language Acquisition (SLA), aiming to map its intellectual structure, thematic developments, and collaborative patterns. Drawing on a dataset of 379 SSCI-indexed journal articles retrieved from the Web of Science database, the study employs VOSviewer to visualize keyword co-occurrence, co-authorship, and co-citation networks of cited references, sources, and authors. The findings reveal seven thematic clusters: digital game-based language learning, vocabulary development, extramural gaming, learner motivation and affective factors, teaching and learning strategies, collaborative learning, and EFL/CALL contexts. Co-authorship analysis indicates that although the field includes a broad range of contributors, sustained collaboration remains concentrated within relatively small research groups. Co-citation analyses highlight the interdisciplinary foundations of the field, integrating perspectives from SLA theory, computer-assisted language learning, educational technology, and motivational psychology. The study contributes to the growing literature by providing a data-driven overview of research trends in gamification within SLA and suggests future directions for research on digital pedagogy, informal learning, and technology-enhanced language education.

Keywords: gamification; game-based learning; digital game-based language learning; second language acquisition; bibliometric analysis

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Introduction

The integration of gamification in to Second Language Acquisition (SLA) has attracted increasing attention from both language instructors and researchers in recent years (Farahani et al., 2024). Gamification is broadly defined as the application of game mechanics and elements such as points, rewards, badges, levels, and quests in non-game contexts to enhance learner motivation and engagement (Deterding et al., 2011). Within SLA, the implementation of gamified instructional strategies has shown promising results in increasing learners' motivation and interaction with the target language (Dubé & Wen, 2022; Farahani et al., 2024). The integration of such game-based elements into language learning environments has also been associated with improved learning outcomes, higher levels of engagement, and reduced foreign language anxiety (Young & Wang, 2014).

Despite the growing popularity of gamification in educational settings, research specifically focusing on its implementation within SLA remains relatively limited. While several literature reviews and meta-analyses have examined the broader use of gamification and game-based learning in education (Acquah & Katz, 2020; Hung et al., 2018; Thompson & von Gillern, 2020; Tsai & Tsai, 2018; Vnucko & Klimova, 2023; Xu et al., 2020), few have systematically analyzed how gamification has been integrated into SLA, or investigated the emerging trends, scholarly impact, and thematic key areas of this growing research area (Farahani et al., 2024). Given the pedagogical implications of gamification in language education, a comprehensive investigation of its current research landscape is essential.

To address this gap, the present study conducts a bibliometric analysis of peer-reviewed journal articles on gamification in SLA, aiming to offer insights for researchers, educators, and curriculum designers. This analysis identifies the most influential publications, prolific authors, and dominant research themes, providing a macro-level view of how gamification has evolved in the field of SLA. The data were retrieved from the Web of Science (WoS) database, specifically targeting SSCI-indexed journal articles to ensure the inclusion of high-quality academic literature. The selected publications were analyzed using VOSviewer software to map the intellectual structure of the field and identify thematic patterns. The central research question guiding this study is as follows:

What are the influential themes, authors, and publications on the integration of gamification in Second Language Acquisition?

In response, this study contributes to the growing body of literature by offering a systematic and data-driven overview of gamification's role in SLA, highlighting scholarly trends and proposing directions for future inquiry. The following sections are organized as follows: the literature review provides a conceptual foundation, including definitions of key terms such as gamification and game-based learning; the method section outlines the data collection and analysis procedures; the findings and discussion section presents key results regarding authorial influence, publication trends, and thematic clusters, accompanied by their pedagogical interpretations. Finally, the conclusion summarizes the study's contributions and proposes directions for future research in the domain of SLA.

Literature Review

The integration of games and game-related concepts into educational contexts dates back to the 1960s. Piaget (1962) argued that games play a vital role in helping children understand and master their environments while also fostering creativity through imaginative play (cited in Martí-Parreño et al., 2016). Subsequent foundational studies by Abt (1970), Malone (1980), Malone and Lepper (1987), and

Loftus (1983) broadened this understanding by framing games as not only entertaining but also cognitively enriching tools for learning (cited in Martí-Parreño et al., 2016). Although the first foundational publication on game-based learning emerged in 2001 with Prensky's work, the formal adoption of the term gamification appeared in scholarly literature around 2008 and gained broader traction after 2010 (Deterding et al., 2011). These early contributions laid the theoretical and practical groundwork for the educational applications of both game-based learning and gamification, which are now increasingly explored, particularly in the domain of Second Language Acquisition (SLA).

Conceptual Framework

Although often used interchangeably, terms such as gamification, game-based learning, and serious games represent distinct pedagogical concepts. Gamification refers to the use of game mechanics such as points, badges, levels, quests, and rewards in non-game contexts to foster learner engagement and motivation (Deterding et al., 2011; Dubé & Wen, 2022; Farahani et al., 2024). In contrast, game-based learning involves designing the instructional process around an actual game or game-like simulation, where gameplay itself becomes the central medium for knowledge acquisition (Culduz, 2023). This approach typically utilizes serious games developed with the explicit purpose of education or training, rather than pure entertainment (Michael & Chen, 2006). While both gamification and serious games can enhance motivation, the latter is directly aimed at achieving specific learning outcomes (Michael & Chen, 2006).

Additionally, the concept of game-enhanced learning refers to the use of commercial off-the-shelf (COTS) digital games originally designed for entertainment purposes within instructional settings (Reinhardt & Sykes, 2012). These games, by incorporating real-life language and cultural references, are particularly effective for vocabulary development and increasing cultural awareness (Vnucko & Klimova, 2023). The distinction between these frameworks is critical for understanding how various forms of game integration function in different educational designs and research contexts.

Gamification in Second Language Acquisition

In the context of SLA, gamification has attracted considerable scholarly attention due to its alignment with core language learning principles. Language learning, more than other subjects, benefits from gamification strategies because they foster immersive experiences and lower learners' affective filters, particularly anxiety (Schöbel et al., 2021;Yang et al., 2024; Young et al., 2012). Although gamification can include both digital and analogue forms, current research demonstrates a clear preference for digital applications, in line with broader educational technology trends (Connolly et al., 2012; Hung et al., 2018).

A significant portion of recent SLA studies has focused on digital games (Acquah & Katz, 2020; Hung et al., 2018; Vnucko & Klimova, 2023; Xu et al., 2020; Yang et al., 2024) . Within this domain, various game genres have been identified. Zou et al. (2021) classified ten types of digital games used in vocabulary instruction, ranging from tutorial and simulation games to 3D virtual worlds and serious games (Zou et al., 2021). Hung et al. (2018) provided a similar typology, noting that immersive and tutorial games are the most commonly adopted in SLA contexts (Hung et al., 2018). These classifications underscore the pedagogical versatility of digital games and their potential for supporting diverse learning objectives.

Empirical findings consistently highlight the educational value of digital game-based learning in SLA. Studies report improved learner motivation, higher engagement, and reduced stress when students engage with digital games (Zou et al., 2021). Moreover, digital games have been shown to positively impact a range of language skills, including vocabulary acquisition, reading, listening, pronunciation, and grammatical competence (Thompson & von Gillern, 2020; Zou et al., 2021).

Previous Reviews and Meta-analyses

In order to systematically evaluate the effectiveness of gamification in SLA, scholars have undertaken both meta-analytical and bibliometric investigations. Tsai and Tsai (2018) conducted a meta-analysis of 26 studies published between 2001 and 2017 and concluded that digital games significantly enhance motivation and vocabulary acquisition in L2 contexts (Tsai & Tsai, 2018). Thompson and von Gillern (2020), through a meta-analysis of 19 studies, similarly found that video game-based learning fosters vocabulary development in English learners and observed that COTS games may be more effective than purpose-built serious games (Thompson & von Gillern, 2020).

Complementing these meta-analytical efforts, bibliometric studies have offered insights into the intellectual landscape of gamification in language learning. Farahani et al. (2024), for instance, analyzed 61 publications indexed in the Scopus database using VOSviewer software. Their findings revealed two dominant research clusters. One of them focused on language acquisition and the other on learner motivation (Farahani et al., 2024). The growing body of publications in this area highlights the increasing scholarly interest in gamification's role within SLA.

These literature reviews, meta-analyses, and bibliometric analyses consistently point to the pedagogical advantages of gamification in SLA. These studies emphasize that the incorporation of game elements can motivate learners, reduce anxiety, and promote proficiency across all four language skills, in addition to supporting vocabulary and cultural competence (Acquah & Katz, 2020; Hung et al., 2018; Schöbel et al., 2021; Tsai & Tsai, 2018; Xu et al., 2020; Zou et al., 2021). Despite these encouraging findings, there remains a need for further research that maps the evolution of the field over time and critically examines how different gamification strategies align with specific instructional outcomes.

Method

Bibliometric analysis identifies patterns of research articles on a given topic and a given time span using both quantitative and statistical analyses (Yang, 2012). It can provide researchers and practitioners with valuable insights on significant researchers, institutions and research categories in a field of study (Martí-Parreño et al., 2016). This study employs bibliometric analysis as a research method to identify research trend of gamification in second language acquisition. It aims to find out influential themes, authors and publications on integration of gamification in second language acquisition.

Data Collection

For this study, data were collected from Web of Science (WoS) database that is an authoritative online resource to explore citation based connections among scholarly publications, making it highly suitable for bibliometric research (Borchardt & Chin Roemer, 2015). The search strategy was developed after reviewing previous bibliometric and systematic studies published on gamification in education and SLA (Farahani et al., 2024; Kartal & Yesilyurt, 2024; Luo, 2022; Martí-Parreño et al., 2016; Schöbel et al.,

2021; Thompson & von Gillern, 2020). This process ensured consistency with established methodologies and improved the reliability of the data collection.

The search was performed with the following terms in all fields on 15th of March 2025: ALL=("game* "OR “gaming” OR “gamify” OR “gamifying” OR “gamified” OR "gamification" OR "game-based")AND ALL=(“foreign language learning” OR “second language learning” OR “foreign language teaching” OR “second language teaching” OR “second language acquisition” OR “EFL” OR “ESL” OR “ELT” OR “L2” OR “TEFL” OR “TESL” OR “second language*” OR “foreign language*” OR “applied linguistics” OR “TESOL” OR “IELTS” OR “TOEFL”).

The initial search resulted in 1.508 articles. These were then filtered by selecting WoS categories to the research subject: Education Educational Research, Linguistics, Language Linguistics and Psychology Educational (Kartal & Yesilyurt, 2024). The selection of these categories reduced the number of articles to 625. The search was refined to articles written in English and it yielded 612 articles. Social Science Citation Indexed (SSCI) journal articles are subject to strict evaluation criteria and have an impact on the field (Li, 2022). Therefore, SSCI Index was selected from WoS Index. This step led to a final refinement of 478 articles. The articles unrelated to language education such as those focusing on mathematics or science were manually removed from the list by the researcher. After this screening process, the final list consisted of 379 relevant articles.

Figure 1 displays the workflow diagram illustrating the process followed during the article selection. The original design of the workflow was inspired by the methodological template offered by Vnucko and Klimova (2023), and it was carefully adopted to fit the scope of the present study (Vnucko & Klimova, 2023).

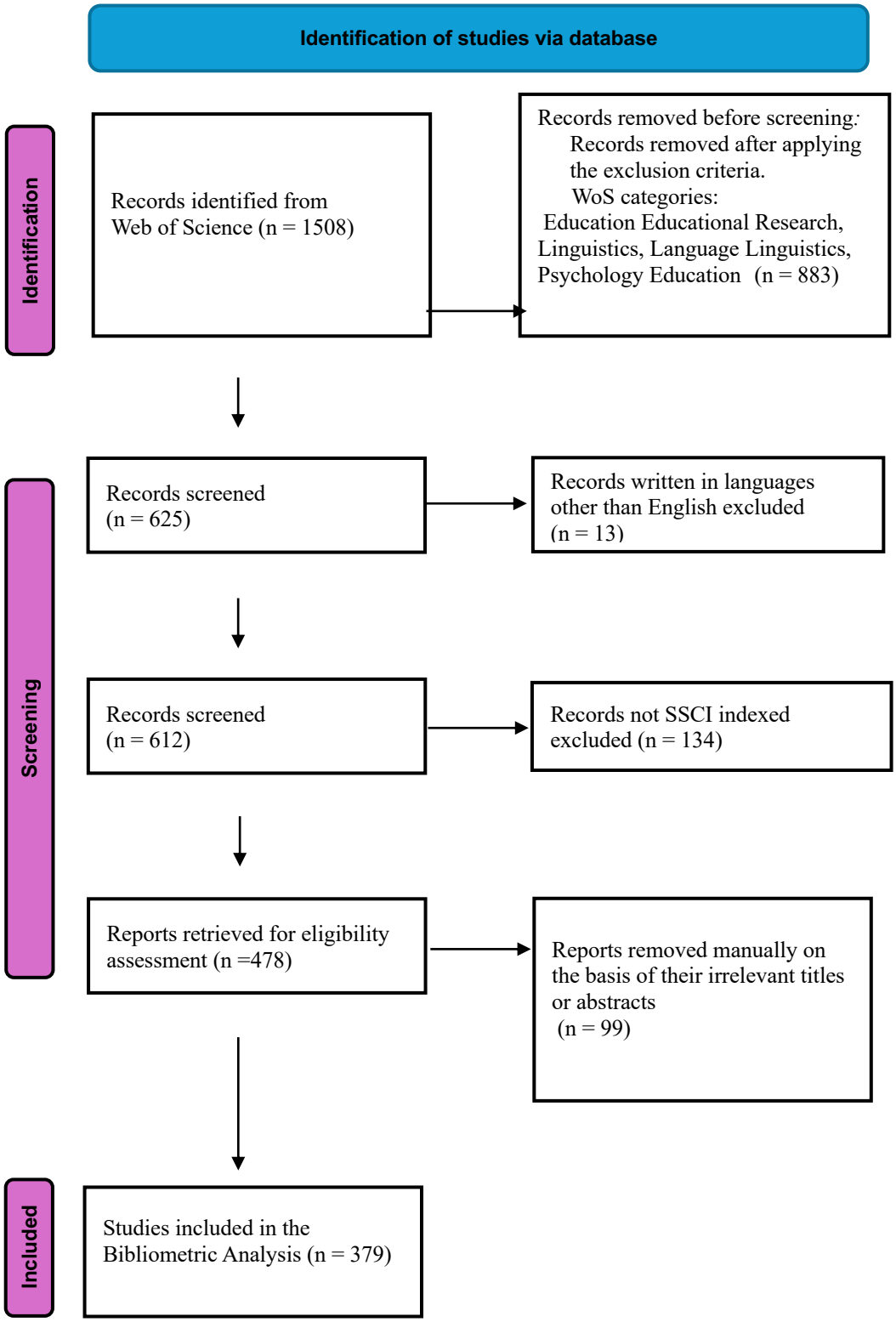


Figure 1. *Prisma flow diagram*

The chronological distribution of the selected articles between 1981 and 15th of March 2025 is indicated in Figure 2. This graphical representation indicates the increasing interest in gamification in SLA within a large time span. The publication figures from 2005 and 2012 show the early emergence of researchers' interest in gamification in the field. The publication trend between 2016 and 2024 exhibits a gradual but constant rise. The year 2024 appears as the most productive year. Since this search was performed on

15th[s] of March 2025, the publication figure of 2025 is not complete. This upward trend with increasing number of publications indicates an enduring interest in gamification and integrating game elements in SLA.

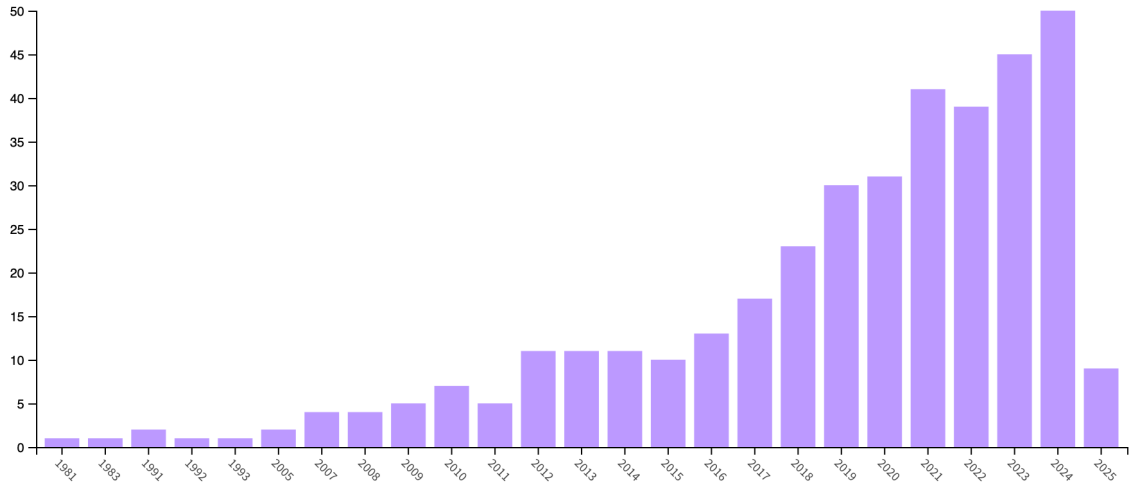


Figure 2. *Distribution of selected articles across years*

Data Analysis

WOSviewer was chosen for the analysis of the selected articles. WOSviewer is an open source bibliometric tool using network data from major online sources like Web of Science, Scopus, and Google Scholar (Farahani et al., 2024). It can be used to indicate the networks of scientific journals, research organizations, researchers, countries and keywords (Van Eck & Waltman, 2023). In this study 379 journal articles retrieved from Web of Science were analyzed on VOSviewer software tool.

The data from WoS were exported with full records and cited references and uploaded on VOSviewer. Data cleaning was performed to prevent coding errors. EFL and English as a foreign language (efl) were replaced by English as a Foreign Language while MALL was replaced by Mobile Assisted Language Learning. Digital game based learning (dgbl) was also combined with digital game-based learning and call and computer-assisted language learning were combined with computer assisted language learning. The keywords sharing some degree of similarity were not unified since they may convey different meanings. For this reason, second language acquisition and second language teaching were not combined. Digital game based learning and digital game based language learning were not combined for the same reason.

Findings and Discussion

The screening and refinement process resulted in the inclusion of a substantial body of literature for analysis in this bibliometric study. Following the application of specific inclusion and exclusion criteria, a final set of 379 articles was identified for detailed examination. The prominence and impact of these scholarly works can be facilitated by examining their citation counts, as presented in Table 1. Citation frequency often reflects the influence of a publication within the academic community and provides insight into the foundational or trending research in the field.

Table 1. *Top Ten Highly Cited Articles and Their Authors*

AUTHORS	TITLE	CITED BY
Sylven & Sundqvist, (2012)	Gaming as extramural English L2 learning and L2 proficiency among young learners	193
Kessler, (2018)	Technology and the future of language teaching	165
Hsu, (2017)	Learning English with augmented reality: Do learning styles matter?	165
Loewen et al., (2019)	Mobile-assisted language learning: A Duolingo case study	157
Hwang et al.,(2017)	Interaction of problem-based gaming and learning anxiety in language students' English listening performance and progressive behavioral patterns	152
Kuppens, (2010)	Incidental foreign language acquisition from media exposure	150
Zou et al., (2021)	Digital game-based learning: where are we and where are we going?	143
De Wilde et al. (2020)	Learning English through out-of-school exposure. Which levels of language proficiency are attained and which types of input are important?	132
de Haan et al. (2010)	The effect of interactivity with a music video game on second language vocabulary recall	132
Sundqvist & Wilkström, (2015)	Out-of-school digital gameplay in-school L2 English vocabulary outcomes	130

Among the most highly cited documents, the earliest contributions date back to 2010 (deHaan et al., 2010; Kuppens, 2010), indicating over a decade of sustained scholarly interest in the integration of game-based approaches in language learning contexts. The timespan of the articles on the list ranges from 2010 to 2021, with Sylvén and Sundqvist (2012) emerging as the most cited work, having received 193 citations (Sylvén & Sundqvist, 2012). A closer look at these influential studies reveals diverse research focuses, such as out-of-school language learning environments (De Wilde et al., 2020; Sundqvist & Wikström, 2015), mobile and augmented reality applications (Hsu, 2017; Loewen et al., 2019), and the role of media and games in incidental vocabulary acquisition. Collectively, these works reflect the evolving nature of the field, and the increasing scholarly attention devoted to gamified and game-based language learning frameworks across various modalities and learner contexts.

Keyword Analysis

In order to identify the most prominent themes within the selected data, a co-occurrence analysis of author keywords was conducted using VOSviewer. Author keywords were chosen for this analysis since they reflect the central concepts emphasized by researchers. In the analysis settings, the minimum number of keyword occurrences was set to 5. This threshold was determined to create a balance between inclusivity and clarity. Setting a lower threshold might have resulted in an overly dense and less interpretable network, while a higher threshold could have excluded relevant but emerging or specialized keywords. Out of a total of 1116 distinct keywords identified across the dataset, 44 met this threshold. These keywords were then visualized through a network map generated by VOSviewer, where clusters were formed based on the strength of co-occurrence links among keywords. The resulting map includes 7 thematic clusters with 171 links and a total link strength of 251 which offers an overview of the thematic structure of the research landscape in gamification and second language acquisition.

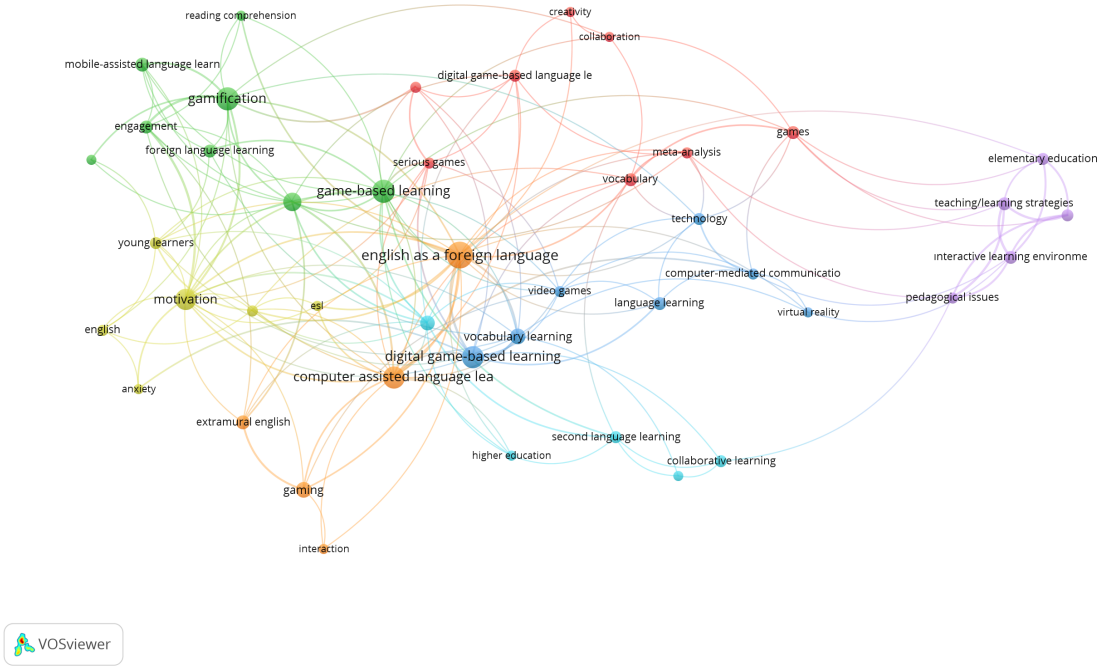


Figure 3. *Co-occurrence of author keywords.*

Figure 3 shows the network visualization of the keywords, highlighting the thematic clusters: digital game-based language learning, game-based learning and gamification in language education, digital game-based learning environments, motivation and affective dimensions of game-based learning, teaching and learning strategies, digital games for collaborative learning, technology enhanced English as a foreign language. These clusters are examined in further detail in the following sections to better understand the key research areas and conceptual linkages within the field.

Cluster 1

The first cluster, displayed in Figure 4, is visualized in red and represented by the keyword "digital game-based language learning", which serves as a central node connecting a range of pedagogical and conceptual terms, including serious games, vocabulary, perception, collaboration, creativity, games, and

meta-analysis. These terms point to a body of research concerned with the design, implementation, and evaluation of digital game-based approaches within language learning environments. Rather than focusing solely on the use of games as motivational tools, this cluster reflects a broader research orientation examining how digital game-based environments contribute to language development, learner experiences, and interactive learning processes. This cluster includes a total link strength of 8, with 8 links among the items in the cluster, indicating a cohesive internal structure that reflects the thematic interrelatedness of game-based practices, learner-centered perspectives, and language learning outcomes.

The presence of vocabulary within this cluster suggests that vocabulary development has remained one of the major learning outcomes investigated in digital game-based language learning research. This emphasis may be associated with the suitability of game environments for repeated exposure, immediate feedback, and interactive practice opportunities, which support learners' engagement with lexical knowledge (Rad & Alipour, 2025; Wu et al., 2025; R. Zhang et al., 2024).

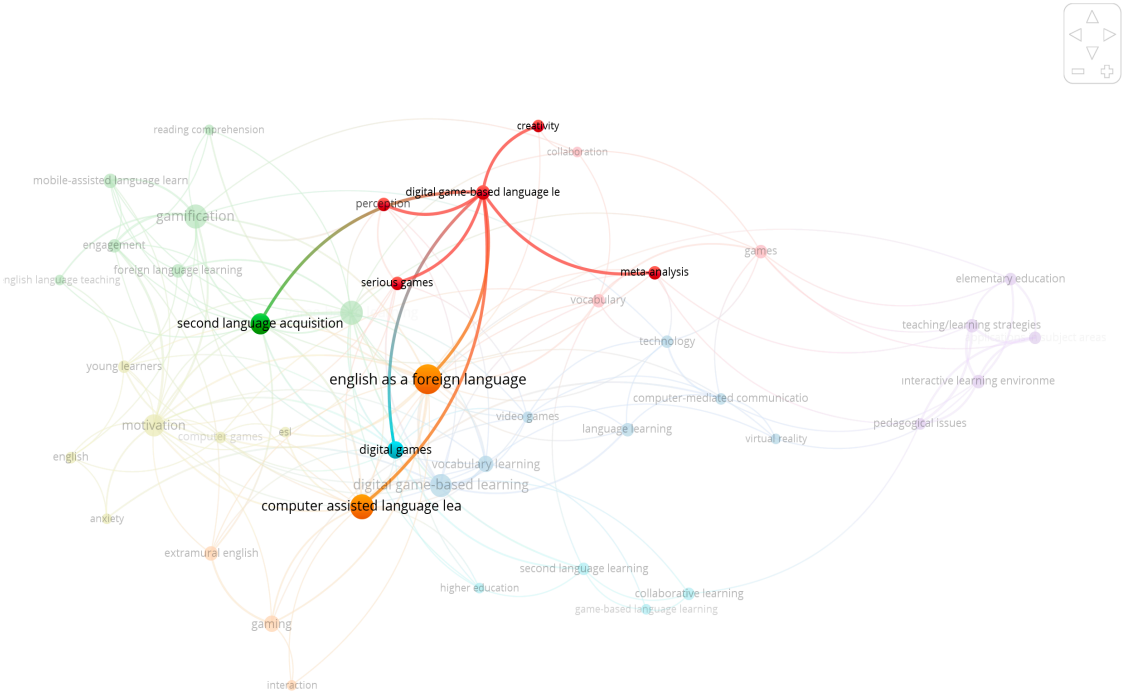


Figure 4. *First cluster: Digital game-based language learning*

Beyond linguistic outcomes, the occurrence of collaboration, creativity, and perception indicates a broader interest in learners' experiences and the pedagogical affordances of digital game-based approaches. These keywords suggest that digital games are increasingly examined not only as tools for language practice but also as interactive environments that promote learner participation, collaborative problem-solving, and creative engagement (Chen & Yeh, 2025; Daliranfirouz et al., 2025) .

The inclusion of meta-analysis, on the other hand, suggests that research on digital game-based language learning has progressed beyond individual empirical investigations toward the synthesis and evaluation of accumulated findings. This indicates the development of a more established research area in which scholars increasingly examine the effectiveness, limitations, and future directions of game-based approaches in language education (Dixon et al., 2022; Tsai & Tsai, 2018). These themes indicate that cluster 1 represents a comprehensive research stream that positions digital game-based language learning as more than a technological intervention, emphasizing its role in supporting linguistic

development, learner engagement, and interactive learning experiences. The connections among vocabulary, serious games, collaboration, creativity, and perception suggest that this research area has evolved from examining game-based tools primarily as instructional aids toward exploring their broader pedagogical potential in creating meaningful and learner-centered language learning environments.

Cluster 2

The second cluster, visualized in green, is mainly represented by the keyword "game-based learning", which serves as a central node connecting a range of concepts related to language learning processes, including game-based learning, engagement, English language teaching, foreign language learning, mobile-assisted language learning, reading comprehension, and second language acquisition. These terms point to a research stream concerned with the integration of gamified approaches into language education, particularly focusing on how game elements can enhance learner engagement, support language development, and enrich technology-mediated learning experiences. This cluster, displayed in Figure 5, includes a total link strength of 25, with 18 links among the items in the cluster, indicating a cohesive structure that reflects the close relationship between gamification practices, learner involvement, and language acquisition processes.

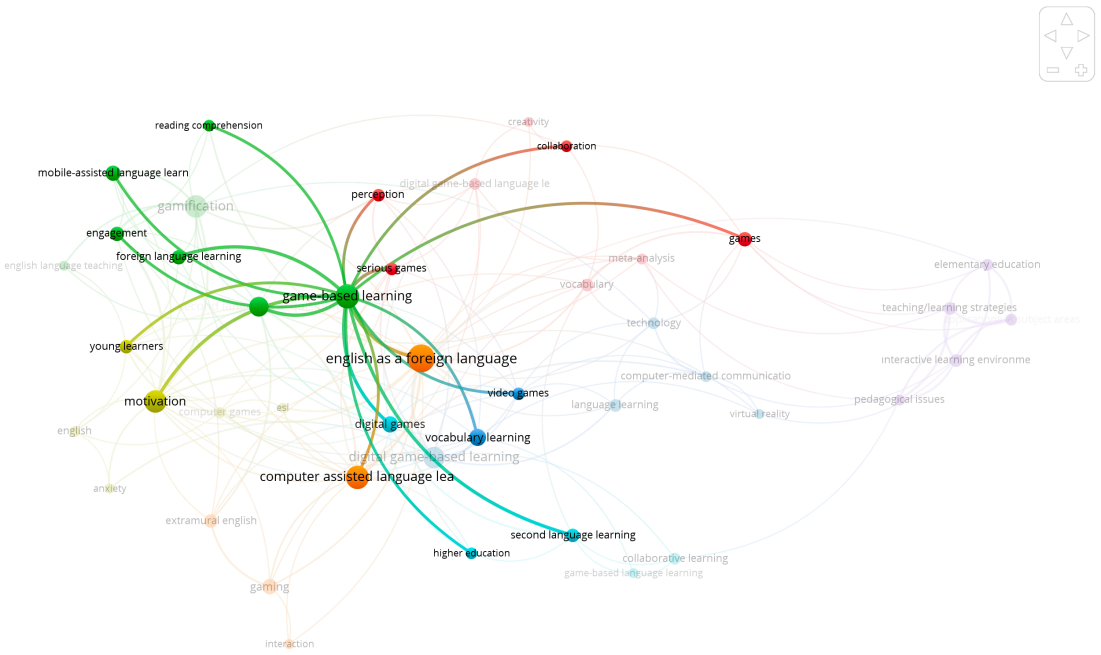


Figure 5. *Second cluster: Game-based learning and gamification in language education*

The prominence of gamification and game-based learning within this cluster suggests that researchers have increasingly explored the use of game elements and game-informed pedagogical approaches to improve language learning experiences. Rather than viewing games merely as supplementary instructional tools, this research direction emphasizes their potential to create engaging, interactive, and learner-centered environments that support active participation and sustained involvement in learning activities (Liat & Hayak, 2025; L. Liu, 2025; Q. Zhang, 2025).

The occurrence of engagement highlights the central role of motivational and affective dimensions in gamified language learning research. The connections between engagement, foreign language learning, and second language acquisition indicate that scholars have focused not only on linguistic achievement but also on learners' psychological involvement and interaction with learning environments (Hwang et

al., 2017). Furthermore, the presence of mobile-assisted language learning and reading comprehension suggests an increasing interest in examining gamification across diverse technological platforms and specific language skills. This indicates that gamified approaches have expanded beyond general language learning contexts toward more targeted applications designed to support particular aspects of language development (Daliranfirouz et al., 2025; Poole et al., 2025). In this sense, Cluster 2 represents a learner-centered research direction in which gamification functions as a bridge between technological innovation and language acquisition. The thematic connections within this cluster indicate a growing emphasis on designing engaging, accessible, and interactive learning experiences that respond to the changing landscape of digital language education.

Cluster 3

The third cluster, visualized in blue, is represented by the keyword "digital game-based learning", which serves as a central node connecting technology-oriented and pedagogical concepts, including computer-mediated communication, language learning, technology, video games, virtual reality, and vocabulary learning. These terms point to a body of research concerned with the integration of digital game-based environments and emerging technologies into language learning contexts. This cluster, shown in Figure 6, includes a total link strength of 22, with 11 links among the items in the cluster, indicating a well-connected structure that reflects the relationship between digital technologies, game-based environments, and language development processes.

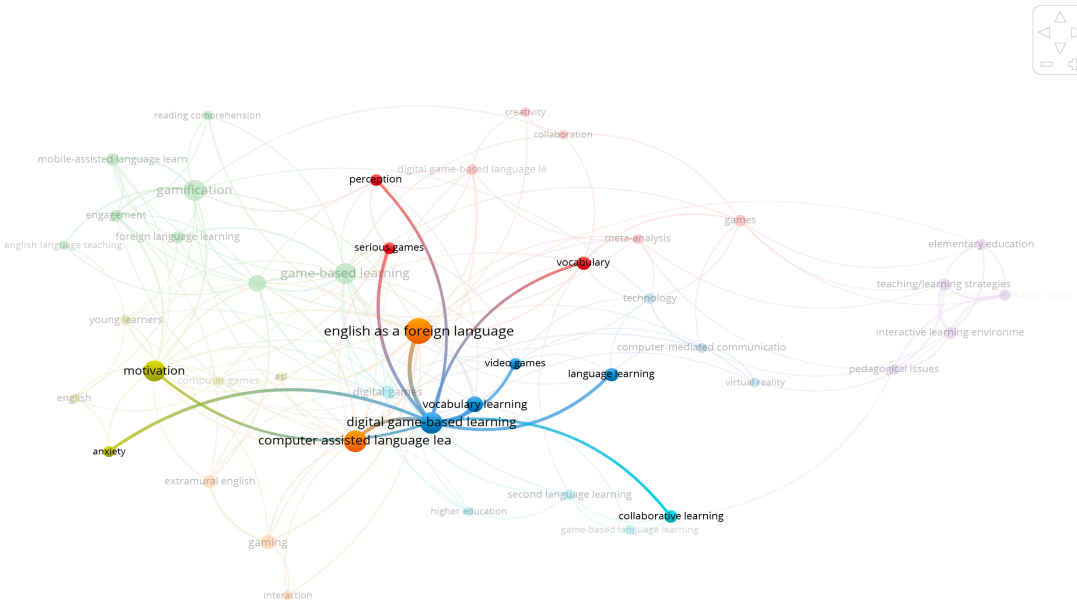


Figure 6. *Third cluster: Digital game-based learning* environments

The strong presence of digital game-based learning within this cluster indicates that digital games have become an important research focus in technology-enhanced language education. The connections between digital game-based learning, technology, and video games suggest that researchers have examined how interactive and technology-supported game environments can provide opportunities for language practice, learner participation, and meaningful learning experiences (deHaan et al., 2010; Sylvén & Sundqvist, 2012; Zou et al., 2021). The inclusion of virtual reality and computer-mediated communication reflects the expansion of digital game-based language learning research toward more immersive and interactive learning environments. These keywords indicate growing scholarly attention to how advanced digital tools can support communication, interaction, and experiential learning in second and foreign language contexts (Hsu, 2017).

Furthermore, the occurrence of vocabulary learning highlights the continued importance of language-specific outcomes within digital game-based learning studies. This suggests that, alongside broader technological developments, researchers have continued to investigate the effectiveness of digital games in supporting specific areas of language development, particularly lexical acquisition and vocabulary improvement (deHaan et al., 2010; Tsai & Tsai, 2018). Therefore, this cluster represents a technology-oriented research stream within digital game-based language learning, emphasizing the role of digital tools, interactive environments, and emerging technologies in supporting language learning processes. The connections among digital game-based learning, virtual reality, video games, computer-mediated communication, and vocabulary learning suggest that this area has evolved toward exploring increasingly diverse and immersive forms of technology-mediated language education.

Cluster 4

The fourth cluster, visualized in yellow, is represented by the keyword "motivation", which serves as the central node connecting learner-related and affective concepts, including anxiety, young learners, English, ESL, and computer games. This cluster reflects a research stream focusing on the psychological and affective dimensions of game-based language learning, particularly emphasizing learners' motivation, emotional experiences, and engagement with game-supported learning environments. The keyword "motivation" demonstrates the strongest position within this cluster, with a total link strength of 28 and 18 links, indicating its central role in connecting learner characteristics and game-based language learning contexts. Figure 7 displays the network visualisation of the cluster.

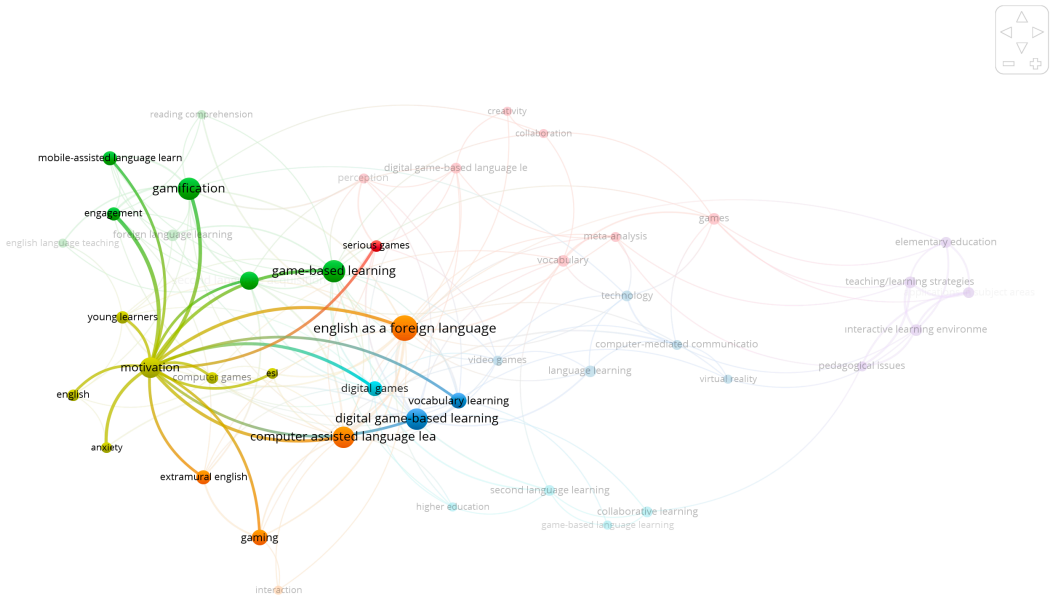


Figure 7. *Fourth cluster: Motivation and affective dimensions of game-based learning*

The prominence of motivation suggests that researchers have paid considerable attention to how game-based approaches are associated with learners' willingness to participate in language learning activities. The connection between motivation, computer games, and English/ESL contexts indicates that studies in this area have explored the potential of games to create enjoyable and meaningful learning experiences that may influence learners' attitudes toward language learning (Hwang & Chang, 2025; X. Liu et al., 2025).

The occurrence of anxiety and young learners further highlights the importance of learner characteristics and affective factors in this research area. These keywords suggest that digital game-based language learning research has expanded beyond language achievement outcomes to examine how learners experience game-based environments emotionally and psychologically, particularly among younger learner populations (Hwang et al., 2017; Yang et al., 2023). Therefore, cluster 4 represents an affective-oriented research direction within game-based language learning, emphasizing the role of motivational and emotional factors in shaping learners' experiences. The relationships among motivation, anxiety, computer games, and young learners indicate that this area of research views game-based approaches not only as instructional tools but also as learning environments that interact with learners' psychological and affective dimensions.

Cluster 5

The fifth cluster is displayed in Figure 8. It is visualized in purple and represented by the keyword "teaching/learning strategies", which serves as the central node connecting concepts related to pedagogical implementation, including interactive learning environments, pedagogical issues, applications in subject areas, and elementary education. This cluster reflects a research stream focusing on how game-based approaches are designed, integrated, and adapted within educational contexts. The central position of teaching/learning strategies, with a total link strength of 17 and 6 links, suggests that researchers have increasingly examined not only the use of digital games themselves but also the instructional approaches and pedagogical considerations involved in their effective implementation.

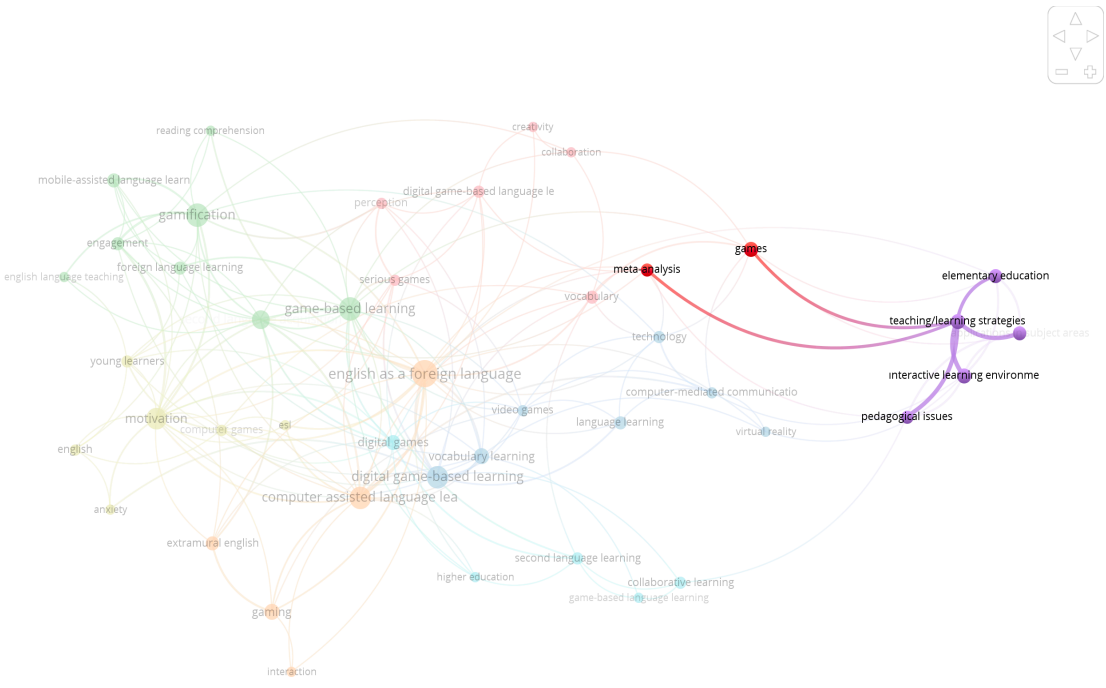


Figure 8. *Fifth cluster: Teaching and learning strategies*

The presence of interactive learning environments indicates an emphasis on the design of learning spaces that encourage learner participation and interaction. Rather than focusing solely on technological features, this research direction highlights the importance of aligning game-based tools with appropriate teaching practices and learning objectives to create meaningful educational experiences (Lee & Ahn, 2025; Liat & Hayak, 2025).

The occurrence of pedagogical issues, applications in subject areas, and elementary education further suggests that digital game-based learning research has expanded toward practical implementation concerns across different educational contexts. These keywords indicate researchers' interest in understanding how game-based approaches can be adapted for specific learning settings, learner groups, and instructional purposes (Liao, 2023; Poole et al., 2025). These keywords represent the pedagogically oriented research direction that emphasizes the integration of digital game-based approaches into teaching and learning processes. The connections among teaching/learning strategies, interactive learning environments, and pedagogical issues suggest that this area of research has moved beyond examining digital games as standalone learning tools toward exploring how they can be effectively embedded within broader instructional frameworks.

Cluster 6

The sixth cluster, represented by the keyword "digital games", highlights a research direction focusing on the role of digital games in collaborative and socially oriented language learning contexts. The central position of digital games, with 12 links and a total link strength of 16, indicates that this concept serves as the main connection among related themes, including collaborative learning, game-based language learning, second language learning, and higher education. This cluster suggests that researchers have explored digital games not only as technological resources but also as learning environments that facilitate interaction, communication, and collaborative learning experiences (Feng & Yang, 2025; Liat & Hayak, 2025).

The occurrence of collaborative learning and second language learning further indicates a growing interest in examining how digital game-based activities support social dimensions of language learning. These connections suggest that researchers have investigated the potential of digital games to create opportunities for learner interaction, cooperation, and shared meaning-making processes within second language learning contexts (Bashiri & Ebadi, 2025; Feng & Yang, 2025).

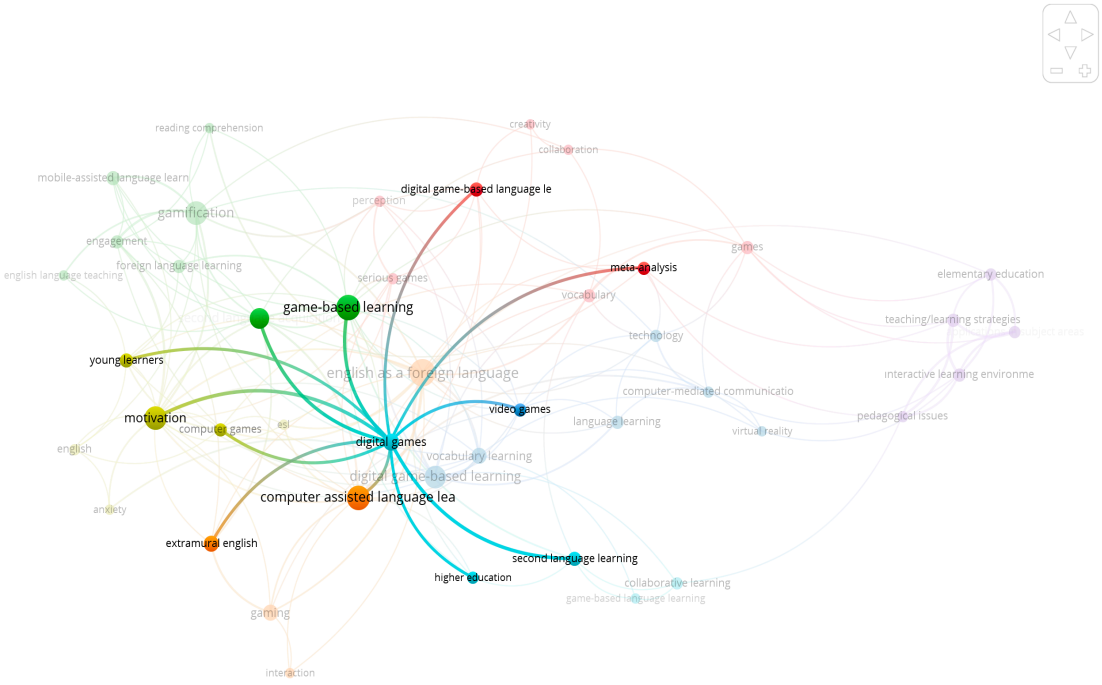


Figure 9. *Sixth cluster: Digital games for collaborative learning*

The presence of higher education suggests that this research area has also extended into adult and university-level learning contexts. This indicates that digital game-based approaches have been examined across different educational levels, with attention given to how game-supported environments can be integrated into formal language learning settings (Bolliger et al., 2015; Mimouni, 2022). Unlike clusters focusing primarily on technological affordances or motivational outcomes, this cluster highlights the social and interactive dimensions of digital game-based learning.

Cluster 7

The seventh cluster, represented by the keyword "English as a foreign language", reflects a research direction focusing on the integration of technology-supported and game-related approaches within EFL learning contexts. The central position of English as a foreign language, with 22 links and a total link strength of 37, indicates its strong connection with related concepts, including computer-assisted language learning, gaming, interaction, and extramural English. This cluster suggests that digital game-based language learning research has been widely situated within EFL contexts, where researchers have explored how technology-mediated and game-supported environments contribute to language learning experiences (Blume, 2020; Lin et al., 2020; Raffone, 2022).

The presence of computer-assisted language learning and interaction highlights the role of digital technologies in creating opportunities for learner engagement and communication. These keywords indicate that researchers have examined how computer-supported and game-enhanced environments facilitate interactive language practice and provide learners with opportunities to engage with the target language beyond traditional instructional approaches (Gao, 2024; Y. Zhang, 2023). Furthermore, the occurrence of extramural English and gaming suggests an increasing interest in language learning experiences that extend beyond formal classroom settings. This reflects a research focus on how learners encounter and use English through game-related activities and informal digital environments, emphasizing the connection between gaming practices and everyday language exposure (Calafato & Clausen, 2024; Sylvén & Sundqvist, 2012; Ulfat, 2025).

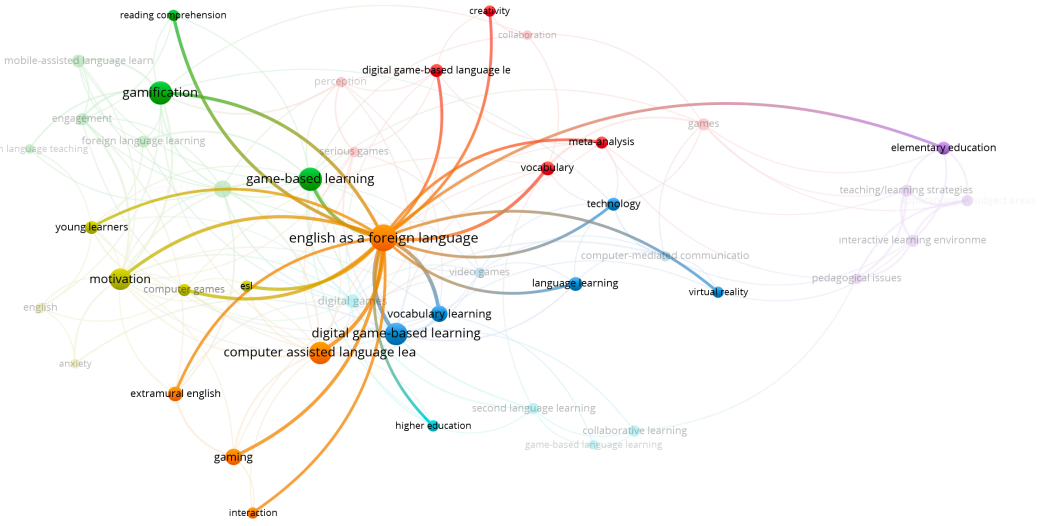


Figure 10. *Seventh Cluster: Technology enhanced English as a foreign language*

This cluster represents a research stream emphasizing the role of technology-enhanced and game-supported practices in EFL learning contexts. The connections among English as a foreign language, computer-assisted language learning, interaction, and extramural English indicate that digital game-based language learning research has expanded from classroom-based applications toward broader technology-mediated language experiences.

Co-authorship Analysis

A co-authorship analysis was conducted using VOSviewer to examine collaboration patterns among researchers in digital game-based language learning research. The unit of analysis was set as authors. The minimum number of documents per author was set to 1, and the minimum number of citations per author was set to 2. These thresholds were selected to capture a broad range of contributors in this specific research area while excluding authors with very limited citation impact. Among the 732 authors identified in the dataset, 702 met these thresholds and were included in the analysis process.

The network visualization, displayed in Figure 11, indicates that Hwang Gwo-Jen occupied a central position within the collaboration network, forming connections with multiple author groups. His position suggests an important bridging role in connecting different research collaborations within the field. Similarly, Zou Di represented another prominent collaboration group, demonstrating strong co-authorship relationships with researchers such as Cheng Gary, Zhang Ruofei, and Xie Haoran. Other clusters reflected smaller collaborative communities, indicating that digital game-based language learning research has developed through several distinct research groups rather than a fully interconnected global collaboration network.

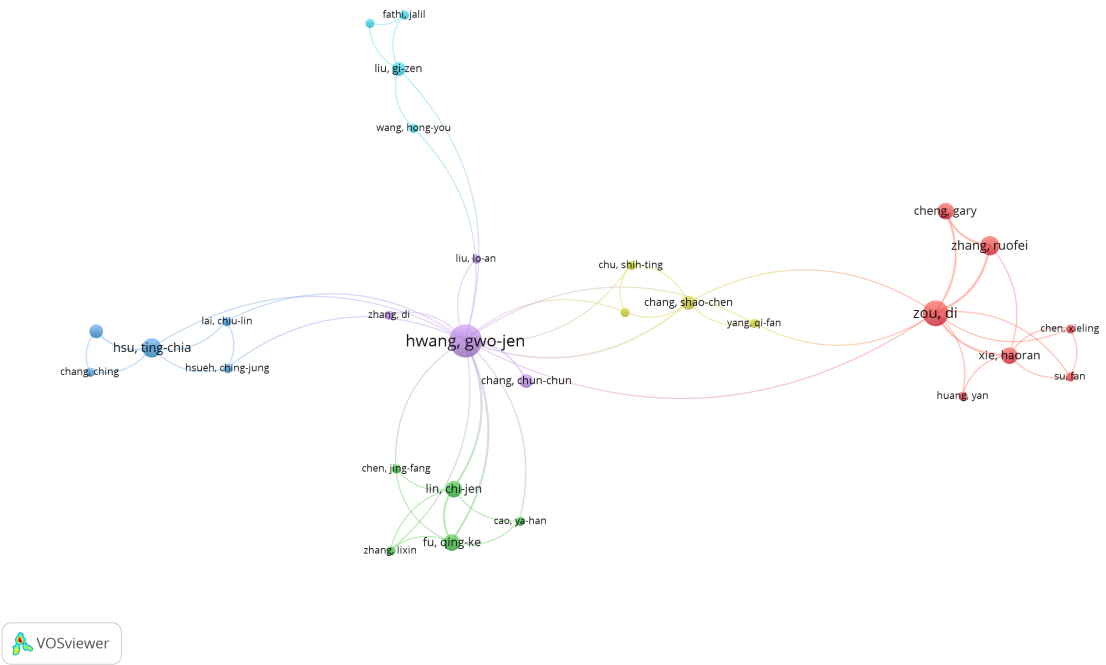


Figure 11. *Network visualization of co-authorship*

The co-authorship structure indicates that while digital game-based language learning has attracted contributions from a wide range of researchers, collaboration remains relatively fragmented. The presence of several independent clusters suggests opportunities for broader cross-group collaboration and the development of more integrated international research networks in future studies.

Co-citations of Cited References

A co-citation analysis of cited references was conducted using VOSviewer to identify the intellectual foundations and influential knowledge structures underlying digital game-based language learning research. The unit of analysis was set as cited references. Considering the large number of references in the dataset, the minimum number of citations of a cited reference was set to 20 to focus on the most frequently cited and interconnected works forming the knowledge base of the field. Among the 15,187 cited references identified in the dataset, 23 references met this threshold and were included in the final co-citation network. The resulting network, displayed in Figure 12, consisted of three clusters, including 234 links and a total link strength of 929. The high level of connectivity among the selected references indicates that the intellectual structure of digital game-based language learning research is built upon a set of closely related foundational studies. The three clusters represent different but interconnected research traditions contributing to the development of the field.

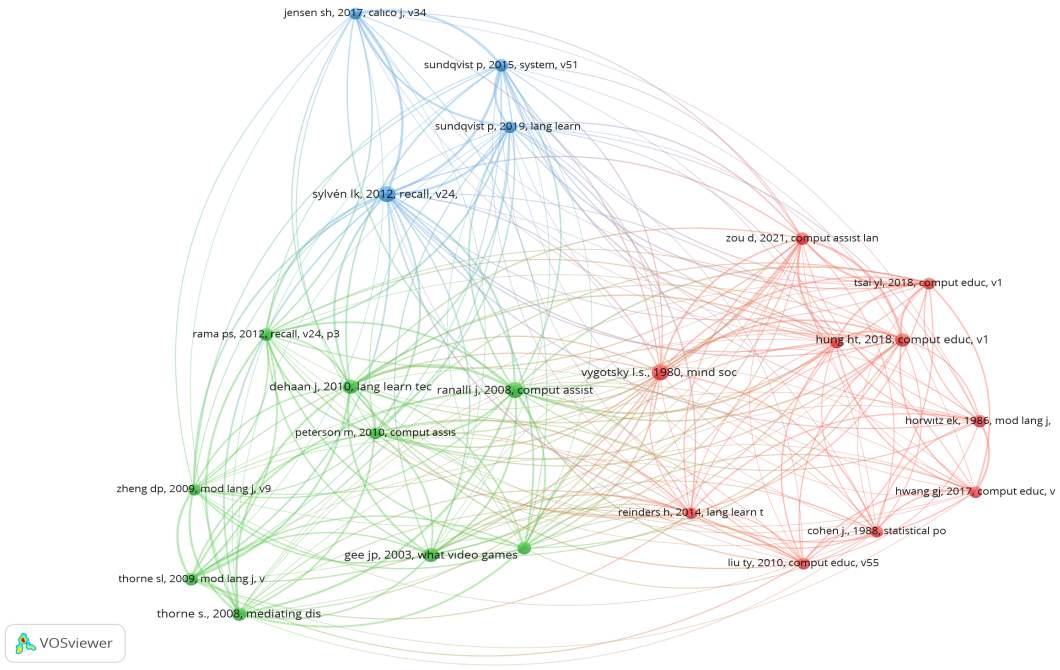


Figure 12. *Network visualization of co-citations of cited reference*

The first cluster mainly reflects theoretical, methodological, and technology-enhanced learning foundations. Frequently co-cited references in this cluster include works such as, Cohen's "Statistical power analysis for the behavioral sciences"(Cohen, 1988), Hwang et al.'s "Interaction of problem-based gaming and learning anxiety in language students' English listening performance and progressive behavioral patterns" (Hwang et al., 2017), Hung et al.'s "A scoping review of research on digital game-based language learning"(Hung et al., 2018) and Zou et al.'s "Digital game-based vocabulary learning: Where are we and where are we going?" (Zou et al., 2021). The presence of these studies suggests that

digital game-based language learning research has been informed by broader educational theories, empirical research methodologies, and developments in technology-supported learning environments.

The second cluster represents the foundations of digital game-based language learning and game-mediated interaction. Key references in this cluster include Gee's "What video games have to teach us about learning and literacy" (Gee, 2003), deHaan et al.'s "The effect of interactivity with a music video game on second language vocabulary recall" (deHaan et al., 2010), Peterson's "Massively multiplayer online role-playing games arenas for second language learning" (Peterson, 2010b), Thorne's "The semiotic ecology and linguistic complexity of an online game world (Thorne et al., 2012) and Rama et al.'s "Affordances for second language learning in world of warcraft" (Rama et al., 2012). These highly connected references indicate that research in this area has been strongly influenced by perspectives emphasizing games as interactive environments where learners can engage in communication, participation, and meaningful language use.

The third cluster highlights research focusing on extramural gaming and informal language learning experiences. References such as Sylven & Sunqvist's "Gaming as extramural English L2 learning and L2 proficiency among young learners" (Sylvén & Sundqvist, 2012), Sundqvist & Wikström's "Out-of-school digital gameplay and in-school L2 English vocabulary outcomes" (Sundqvist & Wikström, 2015), and Jensen's "Gaming as an English Language learning resource among young children in Denmark" (Jensen, 2017) demonstrate the importance of studies examining how digital gaming activities outside formal classrooms contribute to language exposure and learning opportunities. This cluster shows that the intellectual development of the field extends beyond classroom-based applications to include everyday digital gaming practices.

The overall co-citation structure demonstrates that digital game-based language learning research is supported by multiple interconnected knowledge foundations, including educational technology, game-based learning theory, interaction-oriented approaches, and informal language learning perspectives. The strong total link strength among the cited references suggests a relatively coherent intellectual base, despite the diversity of research directions within the field.

Co-citation of Cited Sources

A co-citation analysis of cited sources was conducted using VOSviewer to identify the major publication venues shaping the intellectual structure of digital game-based language learning research. To focus on the core sources contributing to the development of the field, a minimum threshold of 40 citations per source was applied. Of the 7,014 cited sources identified in the dataset, 42 met this threshold and were included in the analysis. The resulting network consisted of three clusters, with 858 links and a total link strength of 866,628, indicating a highly interconnected structure among the major sources contributing to this research area. The clustering pattern suggests that digital game-based language learning has developed through the integration of multiple research traditions, particularly second language acquisition, computer-assisted language learning, and educational technology. Figure 13 displays the network visualisation of co-citation of cited sources.

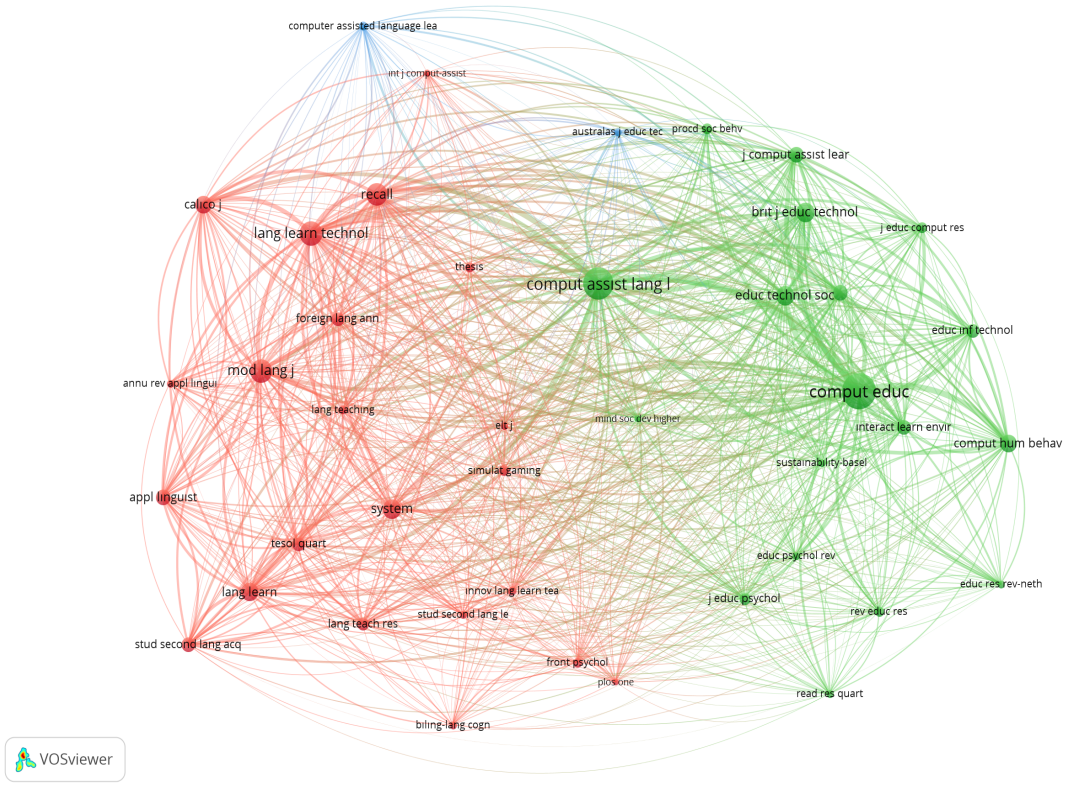


Figure 13. *Co-citation of cited sources.*

The first cluster mainly represents language learning and applied linguistics foundations. Frequently co-cited sources in this cluster include *The Modern Language Journal, Language Learning, Applied Linguistics, Studies in Second Language Acquisition, CALICO Journal,* and *ReCALL*. The presence of these sources indicates that research on digital game-based language learning is strongly grounded in theories and empirical studies related to second language development, interaction, and technology-supported language learning. The second cluster, on the other hand, reflects educational technology and digital learning perspectives. Sources such as *Computers & Education, British Journal of Educational Technology, Educational Technology & Society, and Computers in Human Behavior* demonstrate the influence of broader educational technology research. This cluster highlights the role of digital environments, instructional technologies, learner engagement, and technology-enhanced learning approaches in shaping the field.

The third and smaller cluster, consisting of *Computer Assisted Language Learning* and *Australasian Journal of Educational Technology*, represents a more specialized connection between language learning technologies and educational technology research. Although smaller in size, this cluster highlights the interdisciplinary position of digital game-based language learning at the intersection of CALL and technology-enhanced education. The co-citation structure of cited sources demonstrates that digital game-based language learning is an interdisciplinary field supported by interconnected publication traditions from applied linguistics, computer-assisted language learning, and educational technology.

Co-citation of Cited Authors

To identify the intellectual foundations and influential scholars shaping research on digital game-based language learning, a co-citation analysis of cited authors was conducted using VOSviewer. Co-citation analysis reveals how frequently two authors are cited together and helps identify groups of researchers that share related theoretical and methodological contributions. In this analysis, a minimum citation threshold of 30 citations per author was applied. Among the initial 10,200 cited authors, 42 authors met this threshold and were included in the final visualization map. The resulting network consisted of 42 nodes grouped into five clusters, with 820 links and a total link strength of 112,216, indicating a highly interconnected intellectual structure. The size of each node represents the number of citations received by an author, whereas the links between nodes indicate co-citation relationships. Stronger links demonstrate that two authors are more frequently cited together in the literature. The five clusters represent different but interconnected research traditions contributing to the development of digital game-based language learning. Figure 14 shows the network visualisation of the clusters.

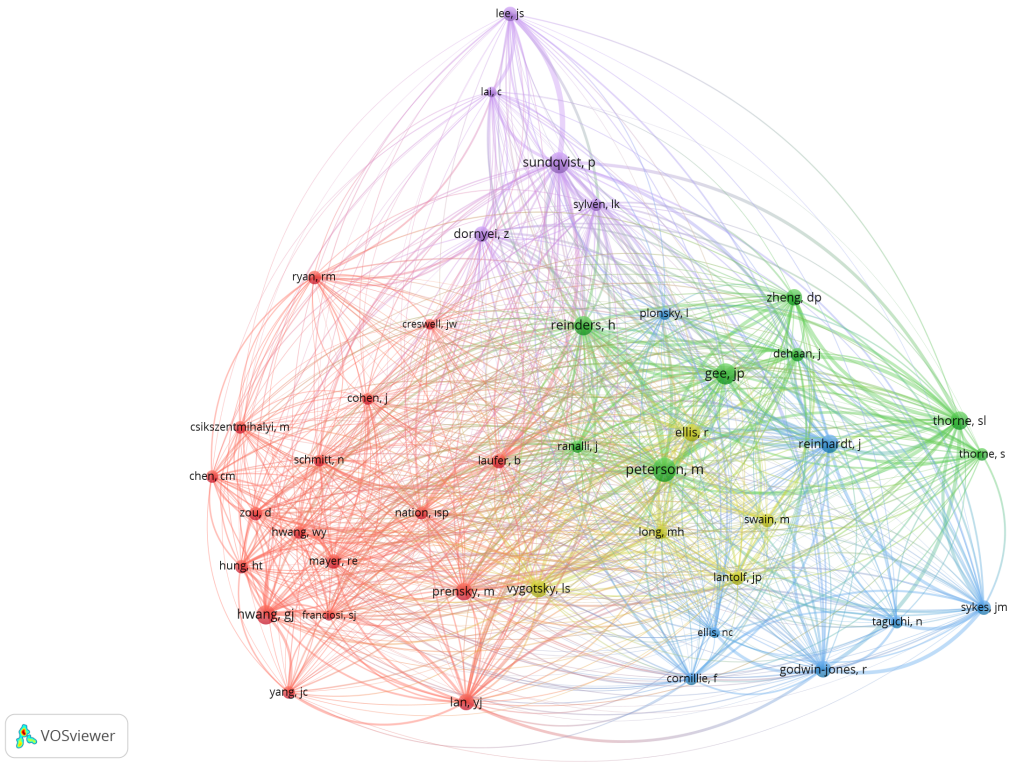


Figure 14. *Co-citation of cited authors*

Cluster 1 represents the largest group in the cited author co-citation network, consisting of 17 authors. This cluster mainly reflects the theoretical foundations of digital learning, educational psychology, and technology-enhanced learning. Influential authors such as Hwang, Hung, Mayer, Ryan, and Csikszentmihalyi appear in this cluster, indicating the importance of learning theories, motivation, engagement, and instructional design principles in digital game-based language learning research. The presence of these authors suggests that this research field has been strongly influenced by broader perspectives from educational technology and psychology.

Eight authors are included in Cluster 2 and it represents research focusing more specifically on game-based language learning and computer-assisted language learning (CALL). Frequently co-cited authors such as Gee, Peterson, Thorne, Reinhardt, and Zheng demonstrate the influence of studies examining digital games, virtual environments, and technology-mediated language learning experiences. For instance, Peterson's meta-analysis, Computerized games and simulations in computer-assisted language learning: A meta-analysis of research (Peterson, 2010a), is regarded as one of the early comprehensive syntheses of research on digital games and simulations in computer-assisted language learning. This cluster highlights the role of games as interactive environments that support language practice, communication, and learner participation.

Cluster 3 consists of seven authors and is mainly associated with second language acquisition (SLA), pragmatics, and empirical language learning research. Authors including Ellis, Sykes, Taguchi, and Plonsky indicate that digital game-based language learning studies are also grounded in established SLA perspectives, particularly those addressing interaction, language development, and research methodology. Cluster 4 contains five authors and reflects sociocultural and interaction-oriented perspectives in language learning. The inclusion of authors such as Vygotsky, Lantolf, Swain, and Long suggests the influence of theories emphasizing social interaction, mediation, collaboration, and communicative processes in understanding language learning within digital environments.

Cluster 5, also consisting of five authors, represents research related to learner motivation, engagement, and informal language learning contexts. Authors such as Dörnyei, Sundqvist, Sylvén, Lai, and Lee demonstrate the importance of motivational factors, learner autonomy, and out-of-class digital experiences in shaping digital game-based language learning research. For example, Gaming as extramural English L2 learning and L2 proficiency among young learners (Sylvén & Sundqvist, 2012) is widely cited for highlighting the association between extramural digital gaming and second language proficiency among young learners. The cited author co-citation network reveals that digital game-based language learning is an interdisciplinary field built upon several interconnected knowledge bases, including educational technology, CALL, SLA theories, sociocultural perspectives, and learner motivation research.

Conclusion

This bibliometric study provided a comprehensive overview of the development and scholarly structure of research on gamification in second language acquisition (SLA). Addressing the need for a systematic understanding of this expanding research area, the study analyzed 379 SSCI-indexed journal articles using bibliometric mapping techniques to identify influential themes, authors, publications, and knowledge structures within the field. The findings revealed that gamification in SLA represents an interdisciplinary research domain shaped by the interaction of educational technology, language pedagogy, learner psychology, and digital learning environments. The co-occurrence analysis of author keywords identified six thematic clusters, highlighting major research directions related to digital game-based learning, learner motivation and engagement, vocabulary development, instructional design, and technology-enhanced language learning. These findings suggest that gamification research has expanded beyond motivational aspects toward broader pedagogical and technological dimensions of language education.

The co-authorship analysis indicated a developing collaborative network, with several influential researchers contributing to the advancement and dissemination of knowledge in the field. Moreover, co-citation analyses of cited references, sources, and authors demonstrated that gamification in SLA is built upon diverse theoretical foundations, including SLA theories, motivational frameworks, educational psychology, and computer-assisted language learning. The prominence of scholars such as Dörnyei, Gee, Ellis, and Sundqvist reflects the interdisciplinary nature of the field and the integration of perspectives from both language learning and digital education research.

Despite its contributions, this study has certain limitations. First, the dataset was limited to SSCI-indexed journal articles retrieved from the Web of Science database; therefore, relevant studies indexed in other databases or published in different formats may not have been included. Second, although bibliometric indicators provide valuable insights into publication patterns and scholarly influence, citation-based analyses do not necessarily reflect the pedagogical effectiveness or practical quality of individual studies. Future research could extend these findings by incorporating multiple databases and combining bibliometric approaches with qualitative content analyses to examine the instructional characteristics of gamified language learning practices in greater depth. Further studies may also explore how emerging technologies and changing learner needs influence the future development of gamification in SLA. This study contributes to the literature by mapping the conceptual, intellectual, and collaborative structures of gamification research in SLA. By identifying major research trends and influential contributions, it provides a foundation for future investigations and supports a deeper understanding of the evolving role of gamification in language education.

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