

Trends and Effectiveness of Mandarin Language Learning Methods in Elementary Schools: A Systematic Review of Empirical Literature

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Abstrak

Studi ini bertujuan untuk mensintesis temuan empiris tentang pendekatan pembelajaran bahasa Mandarin di tingkat sekolah dasar melalui metode Tinjauan Literatur Sistematis (SLR). Artikel dianalisis dari basis data Scopus dan Google Scholar menggunakan alat Publish or Perish, dengan tanggal publikasi dibatasi antara tahun 2014 dan 2025. Sebanyak 57 artikel yang memenuhi kriteria inklusi dianalisis secara tematik dan deskriptif. Hasil studi mengungkapkan penggunaan dominan lima pendekatan utama: gamifikasi, teknologi digital, pendekatan komunikatif, pembelajaran kolaboratif, dan integrasi budaya. Studi ini mengungkapkan bahwa pendekatan gamifikasi dan teknologi digital secara signifikan meningkatkan motivasi, keterlibatan, dan prestasi belajar siswa. Pada saat yang sama, metode komunikatif, kolaboratif, dan berbasis budaya membantu siswa belajar bagaimana memaknai, berinteraksi dengan orang lain, dan memahami budaya lain. Analisis juga menunjukkan bahwa keberhasilan implementasi bergantung pada kesesuaian pendekatan dengan karakteristik siswa dan kesiapan guru. Studi ini menekankan pentingnya mengembangkan model pengajaran bahasa Mandarin yang adaptif, multimodal, dan kontekstual di tingkat pendidikan dasar.

Kata kunci: Teknologi pendidikan, studi empiris, motivasi belajar, pendekatan pedagogis, tinjauan pustaka sistematis.

Abstract

This study aims to synthesize empirical findings on Mandarin language learning approaches at the elementary school level through the Systematic Literature Review (SLR) method. Articles were analyzed from the Scopus and Google Scholar databases using the Publish or Perish tool, with publication dates limited to between 2014 and 2025. A total of 57 articles that met the inclusion criteria were analyzed thematically and descriptively. The study's results revealed the predominant use of five main approaches: gamification, digital technology, the communicative approach, collaborative learning, and cultural integration. The study revealed that gamification and digital technology approaches significantly boosted student motivation, engagement, and learning achievement. At the same time, communicative, collaborative, and culture-based methods helped students learn how to make meaning, interact with others, and understand other cultures. The analysis also indicated that the success of implementation depended on the suitability of the approach to student characteristics and teacher readiness. This study emphasizes the importance of developing adaptive, multimodal, and contextual Chinese teaching models at the elementary education level.

Keywords: educational technology, empirical studies, learning motivation, pedagogical approaches, systematic literature review.

1. INTRODUCTION

Mandarin Chinese has increasingly assumed a strategic role within the global education system, including in Indonesia. Its prominence is evidenced by the expanding global community of Mandarin users and by national policies in various countries that actively promote foreign language acquisition (M. Wang, 2024; X. Wang & Pamintuan, 2025). At the

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elementary education level, Mandarin instruction capitalizes on the sensitive period of language development typically between the ages of 6 and 12 to establish foundational foreign language competencies that can support long-term linguistic proficiency (Chandra & Deli, 2023).

Despite its strategic importance, Mandarin presents distinctive pedagogical challenges. Its tonal phonological system and logographic writing structure require cognitive processing that differs significantly from alphabetic languages, often creating difficulties for young learners (Hao & Li, 2023). These challenges become more pronounced when instructional practices lack contextualization and participatory engagement, thereby limiting meaningful comprehension and active language use (Vrcelj et al., 2023).

A substantial body of research has explored innovative pedagogical interventions to address these complexities. Approaches such as gamification (Chandra & Deli, 2023), AI-supported digital learning technologies (Fissore et al., 2023), communicative language teaching (M. Wang, 2024), collaborative learning models (Song, 2022), and culturally integrated instruction (Hao & Li, 2023) have demonstrated positive impacts on learner motivation, engagement, and academic achievement. These strategies contribute to more dynamic and interactive learning environments, enhancing student participation and learning outcomes (Vrcelj et al., 2023).

However, the existing literature remains fragmented. Many studies are context-specific, methodologically isolated, and confined to localized case investigations, with limited comparative analysis across instructional approaches (Fissore et al., 2023). To date, there has been no comprehensive and systematic synthesis mapping prevailing trends and evaluating the relative effectiveness of Mandarin instructional strategies at the elementary level. This absence of integrative evidence presents a significant challenge for educators and policymakers seeking evidence-based guidance (X. Wang & Pamintuan, 2025).

In response to this gap, the present study undertakes a Systematic Literature Review (SLR) guided by the PRISMA protocol to identify, evaluate, and synthesize empirical studies published between 2014 and 2025 concerning Mandarin instruction in elementary schools (Fissore et al., 2023). The review is structured around three central research questions: (1) Which instructional approaches are most frequently implemented? (2) Which approaches demonstrate the strongest empirical support for effectiveness (Kufarimani & Chitanana, 2025)? (3) What contextual, pedagogical, and institutional factors influence their successful implementation (Hao & Li, 2023)?

Distinct from prior research, this article contributes a comprehensive thematic mapping of 57 empirical studies. The synthesis classifies instructional approaches, evaluates documented effectiveness, and identifies enabling factors that support successful implementation (Fissore et al., 2023). Through this integrative analysis, the study aims to provide an evidence-based reference framework for the development of adaptive, multimodal, and context-sensitive Mandarin instructional strategies. Such strategies may strategically integrate technological innovation, learner-centered pedagogies, and cultural contextualization to enhance the overall quality and sustainability of Mandarin education at the elementary level (Song, 2022).

2. METHOD

This study employed a Systematic Literature Review (SLR) methodology, adhering to the PRISMA protocol to ensure a transparent, replicable, and rigorous article selection process. Data were retrieved using the Publish or Perish software from the Scopus and

Google Scholar databases, applying the search terms: “Mandarin language learning” AND “elementary school” OR “early childhood” AND “method” OR “strategy” OR “approach.” The search was restricted to peer-reviewed articles published in English between 2014 and 2025.

The inclusion criteria focused on empirical studies that explicitly addressed instructional methods, strategies, or approaches for teaching Mandarin at the elementary school level or equivalent early childhood settings, with full-text availability. Studies that were non-empirical, irrelevant, or concentrated on secondary and higher education were systematically excluded.

From an initial pool of 120 identified articles, 57 met the eligibility criteria and were subjected to in-depth analysis. The screening process followed the four stages of the PRISMA framework identification, screening, eligibility assessment, and final inclusion (Haddaway et al., 2022). A detailed overview of the article selection process is presented in Figure 1, illustrating the systematic refinement from the initial search results to the final dataset for analysis.

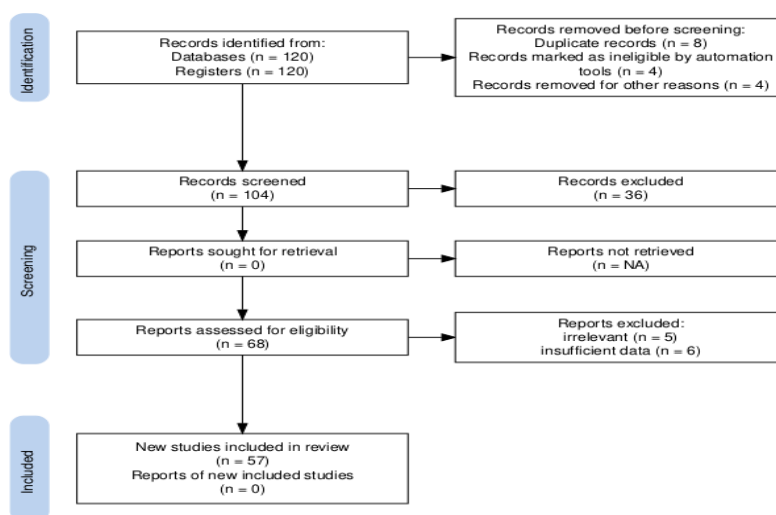


Figure 1. *Flowchart of Article Selection Based on the PRISMA Protocol*

Data analysis was conducted using a combination of descriptive and thematic techniques. Each article was systematically examined to extract information on the instructional approach employed, reported learning outcomes, contextual implementation settings, and factors that either facilitated or hindered effectiveness. The coding process was performed manually, allowing the classification of studies into predominant categories, including gamification, communicative approaches, collaborative learning, cultural integration, and digital technology-enhanced instruction.

Subsequently, the categorized data were synthesized to identify recurring patterns and emergent themes across the studies. This thematic aggregation enabled a comprehensive understanding of the relative effectiveness of various Mandarin learning strategies at the elementary school level, as well as the contextual and pedagogical factors that influence their successful implementation.

3. RESULT AND DISCUSSION

The analysis of the selected studies revealed five primary approaches employed in Mandarin language instruction at the elementary school level: gamification, the communicative approach, collaborative learning, cultural integration, and the utilization of digital technologies. In addition to these core categories, several studies employed methods that did not align directly with the five main approaches; these were grouped under the “other” category.

To provide a quantitative overview of the prevalence of each instructional approach, Table 1 presents the number of studies representing each category. This summary serves as a foundation for identifying dominant trends in elementary Mandarin pedagogy and highlights areas that warrant further investigation in future research.

Table 1. *Number of Articles Based on Mandarin Language Learning Approach Categories*

No	Author(s)	Learning Method Used	Category
1	Eyal & Hayak (2024)	Fun game-based teaching in class (Thailand context)	Gamification
2	Santika et al. (2023)	Combination of games with flashcard media and PowerPoint presentations	Gamification
3	Kai Yen et al. (2020)	Gamification approach in Mandarin teaching (Malaysia study)	Gamification
4	Peng & Rafael González (2014)	Comparison of game-based learning vs. traditional methods in Mandarin class (Thailand)	Gamification
5	Ng, M.P., Alias, N. & DeWitt (2021)	Gamification using ClassDojo app in Mandarin learning	Gamification
6	Aripradono & Febrian (2024)	"Learn & Fun Chinese Class" program based on gamification	Gamification
7	Rasti-Behbahani (2021)	Storytelling and role-play-based learning techniques	Gamification
8	Sutrisno & Azlinda (2023)	Educational digital games for basic Mandarin vocabulary training	Gamification
9	Chua & Soon (2021)	Communicative Language Teaching (CLT) approach	Communicative
10	Wen et al. (2021)	Enhancing speaking skills through real-task simulations	Communicative
11	Robby Anto & Ginting (2024)	Collaborative teaching method (group learning)	Collaborative
12	Cahnmann-Taylor et al. (2021)	Project-based collaborative learning	Collaborative
13	Liu (2022)	Intercultural education approach through migrant literature	Cultural Integration
14	Hong et al. (2024)	Integration of intercultural activities for foreign students	Cultural Integration
15	Gkoutsioukosta & Apostolidou (2023)	Innovative cross-cultural teaching model	Cultural Integration
16	Zhan (2024)	Cross-cultural communication-based Mandarin teaching model	Cultural Integration
17	Septika et al. (2023)	Development of local content-based teaching modules	Cultural Integration

18	Aprianti et al. (2024)	Contextual and cultural experience approach	Cultural Integration
19	Low (2021)	Virtual Reality (VR) technology to enhance engagement	Digital Technology
20	H. C. Chen & Han (2020)	Online Mandarin pronunciation learning platform	Digital Technology
21	Pai et al. (2021)	Adaptive intelligent tutoring systems	Digital Technology
22	Zhao et al. (2020)	AI-based Mandarin speech synthesis (Tacotron2)	Digital Technology
23	Chan (2021)	Integrated formative assessment in blended learning	Digital Technology
24	X. Chen (2021)	AI-based teaching optimization system (data mining)	Digital Technology
25	J. Wang & Ondago (2021)	Computer-assisted vocabulary assessment system	Digital Technology
26	Z. Wang & Wu (2021)	AI-based automatic pronunciation evaluation	Digital Technology
27	Kang & Kang (2022)	Deep learning-based Mandarin teaching model	Digital Technology
28	Mustika Susilo et al. (2023)	Pondy Chinese Voice Scoring Widget (AI pronunciation assessment)	Digital Technology
29	Zhou & Geng (2025)	Intelligent tutoring system for elementary learners	Digital Technology
30	Lei & Zhu (2025)	AI-based classification of Mandarin teaching resources	Digital Technology
31	Zhang (2025)	Interactive distance learning framework	Digital Technology
32	G. Cheng et al. (2021)	Interactive AR-based media for vocabulary enhancement	Digital Technology
33	Li & Peng (2022)	Flipped classroom strategy	Digital Technology
34	Kadaruddin et al. (2025)	Adaptive AI-based mobile apps	Digital Technology
35	Jureynolds et al. (2021)	Chatbot interaction in Mandarin learning	Digital Technology
36	S. Chen et al. (2022)	Microlearning through video	Digital Technology
37	Syahputri (2025)	Adaptive learning with big data support	Digital Technology
38	Hung & Chang (2023)	Early school engagement and long-term academic achievement	Others
39	Albashtawi et al. (2020)	CALLA in Mandarin reading instruction	Others
40	Xia et al. (2020)	Parental engagement and student motivation	Others
41	Koh et al. (2021)	Instrumental vs. integrative motivation in Mandarin learning	Others
42	Wu (2020)	Analysis of average utterance length (oral proficiency indicator)	Others
43	Hung & Chang (2023)	Evaluation of reading comprehension of Mandarin dialogue texts	Others

44	Adji (2020)	Review of fundamental Mandarin learning methods	Others
45	Gong et al. (2020)	Bibliometric review of Mandarin as second/foreign language research	Others
46	Tu (2021)	Development of learning strategies for Mandarin as a foreign language	Others
47	G. Yang et al. (2021)	Literacy vs. communicative strategies in immersion programs	Others
48	Nel & Krog (2021)	Supporting and inhibiting factors in Mandarin acquisition	Others
49	S. Chen et al. (2022)	Impact of early bilingual education on Mandarin achievement	Others
50	LAM et al. (2023)	Analysis of subjective and objective needs in Mandarin proficiency courses	Others
51	Qiu et al. (2024)	Mapping innovative learning strategies in elementary schools	Others
52	Biebricher (2023)	Mandarin teaching outside major subject: challenges and strategies	Others
53	Pamintuan (2024)	Implementation of Pedagogical Content Knowledge (PCK)	Others
54	Bonacina-Pugh & Zhang (2025)	Team teaching with native Mandarin-speaking teachers	Others
55	A. Albashtawi & Awabdeh (2023)	Use of TPACK model in Mandarin classrooms	Others
56	Lianisyah et al. (2025)	Strengthening metacognitive strategies in elementary students	Others
57	L. Yang et al. (2024)	Experiential learning approach in Mandarin teaching	Others

To complement the quantitative summary presented in Table 1, a bar chart was constructed to visualize the distribution of studies across the identified categories of Mandarin language learning approaches at the elementary school level. This graphical representation allows for a clearer comparison of the relative prevalence of each approach. Gamification emerges as the most frequently investigated method, followed by the “other” category and digital technology–enhanced approaches. In contrast, the communicative, collaborative, and culturally integrated approaches appear to have received comparatively less attention in the literature, highlighting potential gaps for future research exploration.

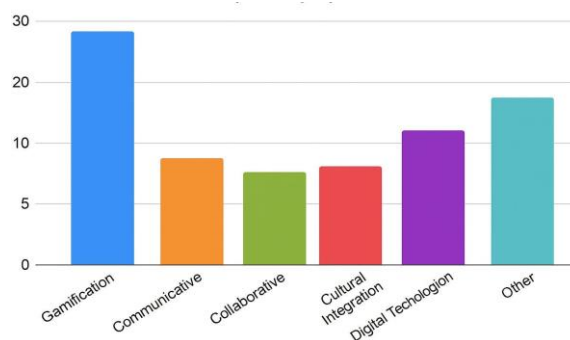


Figure 2. *Number of Articles per Learning Approach Category*

Gamification emerges as the most prominent instructional approach, with eight studies examining the integration of educational games both traditional and digital into Mandarin teaching. These studies consistently demonstrate that game-based elements, such as flashcards, role-playing, online games, and applications like ClassDojo, enhance student motivation, engagement, and learning outcomes (Mora, 2020; Fang, 2022). This evidence underscores the efficacy of experience-based, enjoyable pedagogies in facilitating foreign language acquisition during early childhood, as gamification effectively promotes sustained engagement and academic performance (Fang, 2022).

Digital technology also represents a substantial portion of the literature, with 27 studies reporting its use in Mandarin instruction. Technologies employed include online platforms for pronunciation practice, AI-driven intelligent tutoring systems, virtual reality environments, and adaptive mobile learning applications (Chen et al., 2020; Ni & Cheung, 2022; Shaik et al., 2022). Across these studies, digital tools are reported to enhance interactivity, provide flexible learning pathways, and deliver real-time feedback, accelerating students' language acquisition process (Chen et al., 2020; Ni & Cheung, 2022). These findings align with the learning preferences of digital-native students, who benefit from multimodal and responsive instructional designs (L. Chen et al., 2020).

The communicative approach is reflected in two studies emphasizing authentic speaking practice through task-based simulations and communication-centered pedagogy (Sholeh et al., 2021; Yildiz, 2020). Results indicate notable improvements in students' oral proficiency and positive attitudes toward Mandarin learning when interaction in the target language is increased (Sholeh et al., 2021).

Collaborative learning, analyzed in two studies, incorporates project-based and group-work models to foster joint meaning-making in authentic task contexts (Yildiz, 2020). This approach supports both cognitive and socio-emotional development while enhancing student engagement in the language learning process.

Cultural integration, represented by six studies, highlights the incorporation of Chinese cultural content, cross-cultural activities, and culturally contextualized learning materials (Alnuaim, 2024; Tsarenkova, 2024). These studies demonstrate that fostering intercultural competence strengthens students' understanding of language meaning and promotes contextually appropriate usage (Alnuaim, 2024; Tsarenkova, 2024).

Twelve studies were classified under "other" approaches, including metacognitive strategies, flipped classroom models, bibliometric analyses, experimental learning methods, and pedagogical content knowledge (PCK)-based instruction (Kachhwaha et al., 2025). This diversity indicates that Mandarin teaching at the elementary level remains dynamic, with ongoing experimentation and innovation (Et al., 2021).

Overall, gamification and digital technology emerge as the most frequently implemented and empirically supported approaches in elementary Mandarin instruction (Boudadi & Gutiérrez-Colón, 2020; Shadiev & Wang, 2022). These methods address the inherent challenges of early foreign language learning through engaging, interactive, and learner-centered strategies aligned with 21st-century pedagogical principles (Pardede, 2020; Shadiev & Wang, 2022). Meanwhile, communicative, collaborative, and culturally integrated approaches continue to provide a foundational pedagogical framework, emphasizing meaningful interaction, social engagement, and cultural sensitivity, although their effectiveness shows some variability across contexts (L. Cheng et al., 2022; Shadiev & Wang, 2022). Future research and practice may benefit from integrative approaches that combine gamification with cultural content or digital technology with communicative strategies, thereby enhancing flexibility, engagement, and the sustainability of Mandarin

learning outcomes in elementary education (Alzahrani & Alhalafawy, 2023; Zourmpakis et al., 2023).

4. THE DOMINANT ROLE OF GAMIFICATION AND DIGITAL TECHNOLOGY

A synthesis of 57 reviewed studies indicates that gamification and digital technology constitute the most dominant and effective approaches to Mandarin language learning at the elementary school level. These methods consistently enhance student motivation, engagement, and learning outcomes by providing interactive and enjoyable learning experiences. Furthermore, they serve as effective strategies for addressing the inherent challenges of foreign language acquisition in young learners.

Although less frequently examined in the literature, communicative, collaborative, and culturally integrative approaches also demonstrate notable benefits. These approaches contribute to the development of oral proficiency, foster peer collaboration, and deepen students' understanding of cultural contexts. Their successful implementation, however, depends on alignment with students' developmental characteristics and the readiness of teachers to facilitate meaningful, contextually relevant learning.

Despite the generally positive findings, most studies are limited by local contexts or short-term observations, highlighting the need for more comprehensive and sustainable instructional models. Additionally, the effective deployment of adaptive, multimodal, and technology-enhanced learning requires adequate teacher preparation and supportive infrastructure. Future research that integrates multiple pedagogical approaches while accounting for cultural diversity has the potential to generate valuable insights and inform more effective and inclusive strategies for Mandarin language instruction in elementary education.

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