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Original Research Article

A Systematic Review of Cognitive Styles and Implicit Cultural Attitudes: Effects on Chinese Learners' English Writing Proficiency

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Abstract

A recent decade of research (2013–2023) marked by significant advancements in implicit attitude measurement and the emergence of generative AI on the impact of individual differences, specifically field-dependent/independent cognitive styles and implicit cultural attitudes, on the English writing proficiency of Chinese learners. Despite the complexity of second language writing, which is widely acknowledged in SLA research, the interplay between these specific cognitive and attitudinal factors remains underexplored among Chinese ESL/EFL learners remains underexplored. Following the PRISMA guidelines, this research analyzed 32 studies from four major international academic databases (ERIC, BEI, ERC, and Web of Science). The findings reveal that field-independent learners often benefit more from structured, formulaic writing instruction, whereas field-dependent learners thrive in supportive, context-rich environments. Implicit attitudes were found to significantly influence motivation and engagement with the target language culture, thereby affecting the perceived authenticity of written expression. The review also identifies a predominant use of quasi-experimental designs in existing research. We conclude by discussing pedagogical implications for differentiated writing instruction and suggesting future research directions to further disentangle these complex relationships. This review concluded by discussing pedagogical implications for differentiated writing instruction and suggesting future research directions to further disentangle these complex relationships. This study emphasizes the need for studies that integrate both cognitive and attitudinal variables.

Keywords Implicit Attitude | Conitive Style | English Writing Performance | Individual Difference

Bilişsel Stiller ve Örtük Kültürel Tutumlara İlişkin Sistematik Bir Derleme: Çinli Öğrencilerin İngilizce Yazma Yeterliliğine Etkileri

Özet

Son on yılda (2013–2023) gerçekleştirilen araştırmalar, örtük tutum ölçümünde kaydedilen önemli ilerlemeler ve üretken yapay zekânın ortaya çıkışıyla birlikte, bireysel farklılıkların -özellikle alan bağımlı/bağımsız bilişsel stiller ve örtük kültürel tutumların- Çinli öğrencilerin İngilizce yazma yeterliği üzerindeki etkisine odaklanmıştır. İkinci dil edinimi araştırmalarında ikinci dilde yazmanın karmaşıklığı yaygın olarak kabul edilmesine rağmen, bu belirli bilişsel ve tutumsal faktörler arasındaki etkileşim, Çinli İngilizce öğrenenler arasında hâlâ yeterince araştırılmamıştır. PRISMA rehber ilkeleri doğrultusunda, dört büyük uluslararası akademik veri tabanından (ERIC, BEI, ERC ve Web of Science) 32 çalışmayı analiz ettik. Bulgular, alan bağımsız öğrenenlerin genellikle yapılandırılmış, formüle dayalı yazma öğretiminden daha fazla yararlandığını, alan bağımlı öğrenenlerin ise destekleyici, bağlam açısından zengin ortamlarda daha başarılı olduğunu ortaya koymaktadır. Örtük tutumların, hedef dil kültürüyle etkileşimi ve motivasyonu önemli ölçüde etkilediği, dolayısıyla yazılı anlatımın algılanan özgünlüğünü de etkilediği bulunmuştur. Bu inceleme ayrıca mevcut araştırmalarda ağırlıklı olarak yarı deneysel desenlerin kullanıldığını tespit etmiştir. Farklılaştırılmış yazma öğretimi için pedagojik çıkarımları tartışarak ve bu karmaşık ilişkileri daha da çözümlemek için gelecek araştırma yönelimleri önererek sonuçlandırıyoruz. Özellikle hem bilişsel hem de tutumsal değişkenleri bütünleştiren çalışmalara olan ihtiyacı vurguluyoruz.

Anahtar Kelimeler Örtük Tutum | Bilişsel Stil | İngilizce Yazma Becerisi | Bireysel Farklılık

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Introduction

The acquisition of advanced writing proficiency in English as a Second or Foreign Language (ESL/EFL) presents a significant challenge, influenced by a complex interplay of cognitive, attitudinal, and contextual factors. This systematic reviewaims to critically examine the existing research on how implicit attitudes and cognitive styles, key constructs within information processing theory, shape English writing proficiency in ESL and EFL contexts.

More specifically, understanding these individual differences between imlicit attitudes, cognitive styles, and information processing is crucial, as variations in language proficiency levels, cultural backgrounds, and learning environments may shape the distinct information processing strategies utilized by learners.

Theoretical Foundation: Information Processing and Cultural Influence on Writing

Information processing theory offers valuable insights into how individuals acquire written language (Anderson, 1983). However, for ESL and EFL learners, this cognitive process is also shaped by their cultural context. Implicit attitudes towards cultures play a significant role in L2 writing development. Positive implicit attitudes toward the target culture have been associated with increased motivation and engagement in language learning, which may contribute to improved writing outcomes. Conversely, as Al-Hoorie's (2016, 2017) research indicates, negative implicit attitudes can hinder a learner's willingness to engage with the culture, potentially affecting the depth and authenticity of their written expression.

Cognitive Styles and Writing Performance

A learner's cognitive style is another critical factor influencing writing performance, particularly the field-dependent and field-independent orientation. Individuals with a field-dependent (FD) cognitive style often depend on external cues and contextual frameworks, which can present challenges in tasks requiring independent organisation of written work In contrast, those with a field-independent (FI) cognitive style typically demonstrate greater proficiency in analytically structuring their writing in a logical and self-contained manner (Baghestani, 2018; Kafipour & Noordin, 2021; Rezaee & Farahian, 2012). Consequently, these inherent cognitive styles substantially influencethe overall organisation, coherence, and clarity of ESL/EFL texts.

The relevance of Individual Differences to Language Proficiency

Beyond specific styles, broader individual differences shape the information processing strategies used in writing. Learners naturally exhibit varying cognitive preferences, with FI learners often excelling in analytical processing by breaking down information, while FD learners rely on a more holistic approach, integrating ideas within a broader context (Witkin, 1962; Witkin et al., 1977). Furthermore, language proficiency itself is a key differentiator. ESL learners, who are often immersed in English-speaking environments, typically develop higher oral language proficiency, which can significantly aid the encoding and retrieval processes necessary for writing (Dörnyei & Skehan, 2003). In contrast, EFL learners may struggle more with written English due to generally lower oral proficiency and fewer opportunities for practice (Buragohain et al., 2023; Rao, 2016). These distinctions have direct implications for writing development, as oral proficiency and environmental exposure influence the cognitive resources available during written composition.

Rapid and wide use of GenAI in writing needs the review to document the very first wave of studies considering this new variable, acknowledging that the academic writing environment is now in a state of rapid transformation. The influence of GenAI extends beyond mere tool use; it potentially reshapes learners' implicit attitudes towards writing, authorship, and the cultural authenticity of AI-generated text, introducing a new and urgent variable into the existing framework of individual

differences (Bozkurt, 2023). Thus, this review allows for a unique examination of the field's trajectory immediately before and at the inception of a major technological paradigm shift.

Research objectives and questions

This study predominantly focuses on articles investigating the impact of differences in individuals' information processing in the context of the practical applications of SLA research" as suggested. Additionally, this investigation introduces prospective avenues for future research within the domain of information processing in SLA, with the aim of consolidating an existing theoretical foundation and elucidating the factors that might influence the effective utilisation of information processing theories and approaches in the field of SLA. To guide this systematic review, the following research questions were formulated to provide precise focus and direction. There are three main research questions in this review to explore: Firstly, it is about how do field-dependent and field-independent cognitive styles influence the English writing performance of Chinese ESL/EFL learners? Secondly, this studies on what is the relationship between implicit cultural attitudes and the English writing proficiency of Chinese ESL/EFL learners? Lastly, this study finds out what are the predominant research methodologies and designs used in studies investigating the impact of cognitive styles and cultural attitudes on L2 writing?

Methods

To ensure a rigorous and transparent synthesis, This systematic review adhered to PRISMA guidelines (Moher et al., 2009) for reporting, while the literature scoping process was informed by the framework established by Arksey and O'Malley (2005).

This decade-long timeframe was deliberately selected to capture the most recent and evolving body of work, a period marked by significant advancements in the measurement of implicit psychological constructs and a growing scholarly consensus on the importance of individual differences in Second Language Acquisition (SLA).

The search utilized a structured string using Boolean operators (AND, OR) to combine terms related to related to "information processing," "cognitive styles," "implicit attitudes," "English writing," and "Chinese learners." The study selection process, detailed in the PRISMA flow diagram (Figure 1), involved a rigorous two-stage screening of titles/abstracts and full texts against predetermined inclusion criteria, ultimately yielding 32 studies for in-depth analysis. A standardized coding framework was then applied to extract data on cognitive styles, implicit attitudes, writing outcomes, and research methodologies, ensuring a systematic and comparable synthesis of the findings.

The systematic review began with an extensive literature search conducted across prominent electronic databases, namely the Education Resources Information Centre (ERIC), British Educational Index (BEI), Educational Research Complete (ERC) and Web of Science (WoS). The search was confined to studies published in English. To enhance precision, the search involved searching peer-reviewed academic articles within the specified timeframe" as suggested. . The initial search terms encompassed terms such as "information processing", "second language acquisition", "higher education", "English as a second language (ESL)", "English as a foreign language (EFL)", "field dependent," "field independent," "cognitive styles," "implicit attitudes," "cultures," and "English writing performance (EWP)," "English as a foreign language (EFL)".

To optimise the search, a method akin to that of Toh et al.'s (2016) was adopted. The refined search string for this review used the previously mentioned terms in conjunction with descriptors relevant to the context of the study.

Rationale for Timeframe Selection

This review analyses literature from August 2013 to August 2023, a period chosen for its distinct scholarly significance. The decade beginning in 2013 saw the maturation of research into complex individual differences like implicit attitudes and cognitive styles, benefitting from established methodologies and a focus on the human learner in isolation from advanced AI writing assistants (Dörnyei & Ryan, 2015). This provides a robust, pre-GenAI baseline against which future research can be measured. The inclusion of studies up to August 2023 is particularly salient, as it captures the pivotal moment when generative AI tools like ChatGPT became globally ubiquitous.

Inclusion of studies

The inclusion of studies creatiaria are

- Population: Chinese ESL/EFL learners
- Focus: Field-dependent/independent cognitive styles and/or implicit cultural attitudes
- Outcome: English writing proficiency measures
- Publication type: Peer-reviewed empirical studies
- Language: English
- Timeframe: August 2013–August 2023

The systematic review focused on studies pertinent to the impact of Chinese learners' field-dependent and field-independent cognitive styles and implicit attitudes towards cultures on their English writing performance. Selected research studies fulfilled the criteria of relevance to these themes within the context of English writing performance. A pivotal criterion was that these studies elucidate the link between field-dependent-independent cognitive styles, implicit attitudes towards cultures and English writing performance. The initial search yielded a substantial volume of articles from three core educational databases and Web of Science (WoS): ERIC, BEI and ERC (via EBSCO host) filtered 366 articles and WoS found 11,043 articles, totalling 11,409 articles. To facilitate efficient organisation, all identified citations were managed through a reference management software (EndNote). Duplicate citations were meticulously identified and manually removed during this stage.

Exclusion of studies

To ensure the quality and relevance of the data gathered the screening and assessment process was conducted systematically of data screening and assessment. The systematic review process involved conducting a comprehensive examination of relevant studies. The result was organised into a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram, following the guidelines outlined by Moher et al., (2009). The PRISMA diagram serves as a visual representation of the included articles, offering insights into the systematic review's scope and outcomes. The first step in this process was the removal of duplicates. A total of 269 duplicate articles were identified and excluded from the data set, leaving 11,140 articles for further evaluation.

Finally, the research process involved assessing the remaining articles for current information processing in written English acquisition. This process resulted in reducing the number of articles to 32. The remaining articles were all related to written English acquisition and were found to be significant for the study. These articles were then used for further analysis and data interpretation. The primary reasons for exclusion at the full-text stage were focus on technology-enhanced writing without cognitive/attitudinal variables, lack of relevance to Chinese learners, and insufficient focus on writing outcomes.

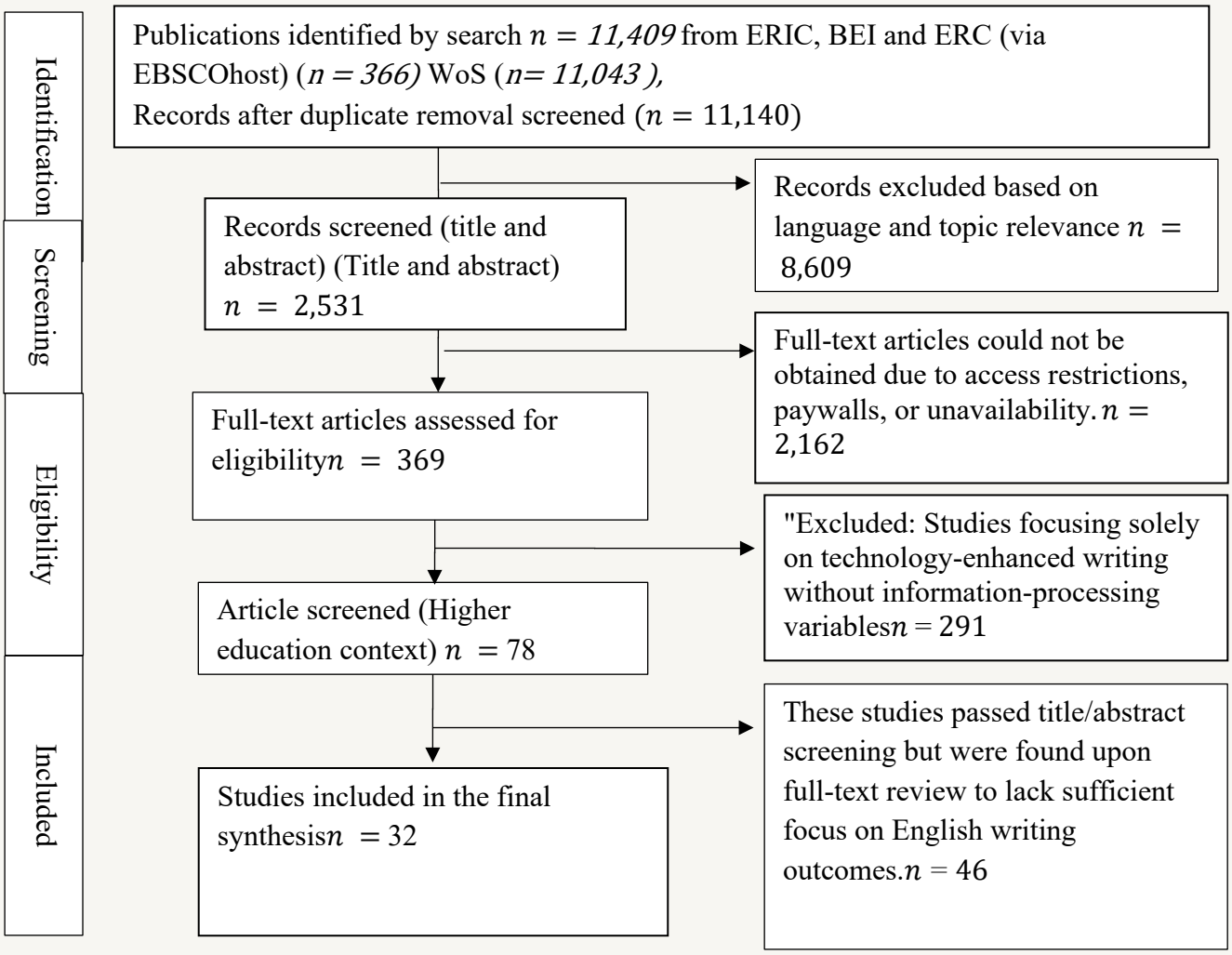

Figure 1: *PRISMA diagram of included articles in the systematic review*

Results

In this review, keyword co-occurrence analysis was used to map dominant themes relevant to cognitive styles and implicit attitudes in L2 writing. Particularly, in the field of information processing in written English acquisition to uncover meaningful relationships and patterns within a corpus of documents. In this study, this method was employed to gain valuable insights into the thematic structure and research trends within the field of language acquisition and English writing performance, specifically focusing on the analysis of 32 screened and filtered research articles published between 2013 and 2023.

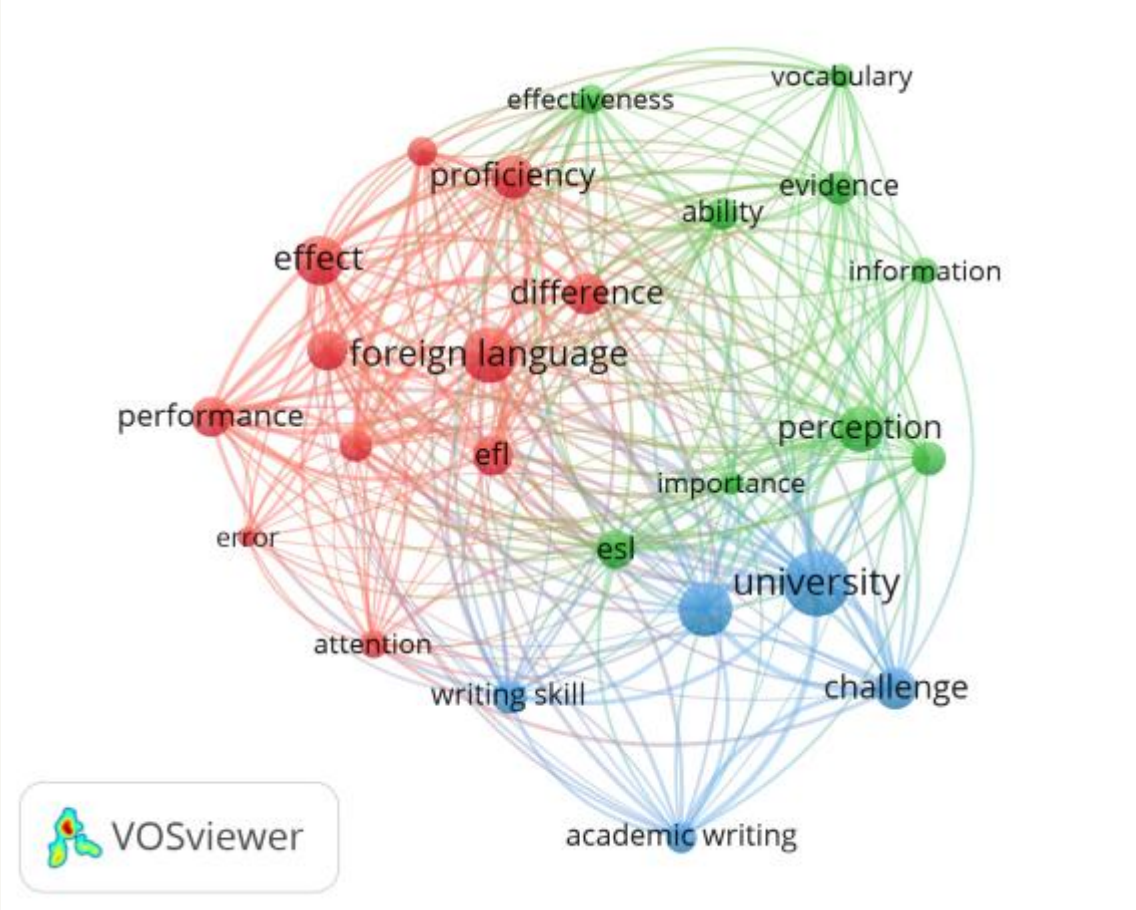

Figure 2: *Keyword co-occurrence network based on abstracts and keywords of included* studies

Note: The analysis identified four distinct thematic clusters, visually represented by different colours in Figure 2: (1) cognitive processing (blue), (2) pedagogical interventions (green), (3) learner characteristics (red), and (4) writing outcomes (yellow).

Overview of the keywords

The keyword co-occurrence analysis yielded several noteworthy findings. Firstly, it pinpointed the central themes that have dominated information processing in written English acquisition over the past decade. Prominent keywords that emerged from the analysis included "vocabulary," "proficiency," "effectiveness," "perception," "performance," and "information." "These keywords reflect the field's sustained focus on the building blocks of writing proficiency (vocabulary, performance) and the mechanisms (effectiveness, perception) through which individual differences may operate. In addition, with their high co-occurrence frequencies, signify the core topics that researchers have consistently explored, reflecting ongoing scholarly interest in writing proficiency development from information processing perspectives. such as language proficiency, vocabulary acquisition and the effectiveness of academic writing.

Furthermore, the analysis illuminated the dynamic evolution of research priorities within academic writing. Noticeable increases" to avoid implying statistical significance without supporting analysis, indicating emerging trends and areas of heightened interest. For instance, "foreign language" and "evidence" showed a notable upward trajectory, suggesting a growing emphasis on assessing the role of foreign language proficiency and empirical evidence in English academic writing practices. Based on descriptive comparison of co-occurrence frequencies across the decade, certain keywords exhibited noticeable increases

The keyword co-occurrence analysis also facilitated the identification of key research clusters or subfields within English writing acquisition. Through cluster analysis, distinct groupings of keywords were identified that frequently co-occurred, signifying specialised research niches. For

instance, One cluster, which we term the 'pedagogical challenges' cluster, revolved around 'writing skill' and included keywords like 'challenge,' 'ability,' and 'difference' indicating a dedicated subfield within academic writing research focused on understanding the challenges associated with writing skills, articularly in EFL/ESL academic writing contexts.

Additionally, the analysis may indicate intersections between academic writing and topics like university education and attention, suggesting potential areas for interdisciplinary collaboration and knowledge diffusion. Keywords bridging multiple clusters, such as "university," "attention," and "writing skill," highlighted intersections between academic writing and topics like university education and attention. These connections underscored the importance of interdisciplinary approaches in understanding and improving academic writing proficiency.

The coding framework

The thematic patterns identified through keyword co-occurrence analysis informed the development of our coding framework, ensuring alignment between emergent themes and a priori theoretical constructs. To systematically analyse and synthesise the selected articles, a comprehensive coding framework was devised. This framework served as a structured guide for extracting relevant information and insights from the chosen studies. The coding framework encompasses key dimensions such as cognitive styles (field-dependent and field-independent), implicit attitudes towards cultures, and English writing performance (ESL and EFL). These dimensions are intricately interconnected and collectively form the foundation for investigating the impact of cognitive styles and attitudes on English writing performance. The coding framework facilitated the systematic extraction of data, enabling subsequent analysis and interpretation Furthermore, for the primary studies included in this review, we coded and considered the reported validity and reliability metrics of the measurement tools used. This information bolstered our confidence in the synthesized findings and informed our interpretation of results.

Procedure

The procedure for conducting this systematic review closely mirrors the approach outlined by Morris et al., (2021) including independent article review, consistency checking, comparison, discordant coding resolution, and completion of coding procedures. These procedures ensured the systematic and reliable extraction of data from the selected articles. By adhering to this robust methodological approach, the systematic review can effectively address the research questions and contribute valuable insights to the field of investigating the impact of cognitive styles and implicit attitudes on Chinese learners' English writing performance.

Findings

The analysis of the 32 selected studies revealed distinct patterns related to the core variables of this review. The keyword co-occurrence analysis (Figure 2) initially highlighted central themes in the literature, such as "vocabulary," "proficiency," and "performance," setting the stage for a deeper, research-question-driven synthesis" to improve grammatical accuracy and stylistic flow. The synthesis of the 32 studies is organized below to address each of our three research questions in turn.

The Influence of Cognitive Styles on Writing Performance

A consistent finding across multiple studies is the differential impact of cognitive styles on writing acquisition. Learners with a field-independent (FI) cognitive style demonstrated a significant affinity for structured, analytical writing instruction. For instance, Baghestani (2018) found that FI learners responded well to formulaic instruction, a finding that aligns with Witkin's (1962) theory of analytical cognitive styles. Conversely, Kafipour & Noordin (2021) demonstrated that FD learners thrived in supportive environments. This divergence highlights a critical pedagogical tension: an

instructional approach optimized for one cognitive style may inadvertently disadvantage the other, underscoring the need for differentiated teaching methods. Their writing performance was often enhanced by a supportive classroom atmosphere and teacher-led guidance, as they tend to integrate information within a broader social and contextual framework (Kafipour & Noordin, 2021).

Motivation plays a crucial role in EFL and ESL writing performance, particularly in relation to how learners engage with writing tasks based on their cognitive processing preferences (El-Soussi, 2021; Tsao et al., 2021; Wang & Xu, 2023). Motivation interacts with cognitive styles in shaping writing outcomes, as learners' intrinsic or extrinsic motivational orientations may amplify or mitigate the effects of their cognitive processing preferences. Intrinsically motivated learners may invest extra effort in crafting their written texts, striving for both accuracy and creativity. On the other hand, extrinsically motivated learners may focus on meeting external criteria, such as assignment requirements, potentially influencing their writing styles (Chen & Hwang, 2022). The societal expectations regarding language proficiency and writing skills in EFL and ESL contexts can influence learners' motivations and goals (Green & Fujita, 2016; Honarzad & Rassaei, 2019). Learners aiming for academic or professional success may have specific objectives in developing advanced writing skills in English.

EFL and ESL learners who exhibit analytic processing tend to excel in tasks that require attention to detail, such as grammar and vocabulary accuracy. This pattern, observed in Hava's (2021) study of EFL writers, reflects the trade-off between local and global processing that characterizes analytic approaches to writing (Hava, 2021). In contrast, learners with a holistic processing style may excel in generating creative and contextually meaningful content, but they may overlook finer details. Field-dependent learners in EFL and ESL contexts may rely heavily on contextual cues and may produce writing that mirrors the patterns they encounter in their reading materials (Wu, 2018).

On the other hand, field-independent learners might display a more critical and detail-oriented approach to writing, potentially excelling in tasks like essay analysis and argument development. EFL and ESL learners with higher working memory capacity may excel in tasks that require complex sentence construction and argumentation (Morgan-Short et al., 2018). They can hold multiple components of writing (e.g. thesis statement, supporting evidence, counterarguments) in their working memory, contributing to coherent and well-structured essays.

Learners who struggle with attention control in EFL and ESL writing may face challenges in maintaining focus during the writing process (Sarid et al., 2021). This can result in fragmented and disorganised texts. Educators can support such learners with strategies to improve attention and concentration during writing tasks. The age at which learners begin acquiring English can also shape their writing abilities. Younger learners often exhibit greater language acquisition plasticity, which can result in more native-like language production. However, older learners may rely more on cognitive strategies developed through previous language learning experiences (Lin et al., 2017). EFL and ESL learners with strong metacognitive awareness can set clear writing goals, monitor their progress and adjust their writing strategies accordingly. They are more likely to engage in effective self-editing and revision, which can enhance the quality of their written work.

In summary, addressing RQ1, the evidence consistently demonstrates that field-dependent and field-independent cognitive styles differentially shape writing processes. FI learners benefit from analytical, rule-based instruction, while FD learners perform better in context-rich, socially supportive environments. These findings confirm that cognitive style functions as a significant mediator of L2 writing performance and must be considered in both research and pedagogical practice.

The Relationship Between Implicit Attitudes and Writing Proficiency

An analysis of the research designs employed in the selected studies reveals a strong preference for quantitative approaches with 22 of the 32 studies (69%) employing quantitative or quasi-

experimental designs. Quasi-experimental designs were the most frequently used methodology, featured in studies by Hassan et al. (2021), Lin et al. (2017), and others, allowing researchers to explore potential causal relationships in authentic classroom settings. This was followed by survey-based studies (e.g., Shen et al., 2019; Escorcia & Ros, 2019) and a smaller number of qualitative case studies (e.g., Al Maawali, 2022) and longitudinal designs (Buragohain et al., 2023). Sample sizes exhibited considerable variation, ranging from small-scale intensive studies (n=7) to large-scale surveys (n>1000), reflecting the diverse epistemological approaches within the field.

The recognition of various individual differences in information processing in English writing acquisition necessitates a more comprehensive exploration of how these factors influence EFL and ESL writing Starting with Alkubaidi's (2019) study, an action research method was employed, which involved exploration, intervention and reflection stages, and this was conducted on a relatively small sample of 17. This approach was distinctive due to its small sample size" for smoother academic expression compared to the quasi-experimental design used by Hassan et al. (2021), Nusrat et al. (2019), Lin et al. (2017), Ishikawa and Suzuki (2023), and Konieczny and Eckert (2022). These studies had larger sample sizes, ranging from 15 to 108, indicating broader participant coverage. . These perceptions may indirectly reflect learners' implicit attitudes toward the learning environment and, by extension, the target culture embedded within it as detailed in Table 1.

In their study, Shen et al. (2019) adopted a digital survey method, involving a considerably larger group of 295 participants. In contrast, Al Maawali (2022), as well as Okuda and Anderson (2018) explored their research questions through a case study approach with two rounds of interviews, conducted on 43 and 7 participants respectively. Rahnuma's (2023) study differed again, utilising semi-structured interviews with an unspecified number of participants. Mendoza et al. (2022) opted for a qualitative study with secondary data, involving a sample of 74. Chang et al. (2022) and Xie et al. (2022) made use of surveys in their research, involving vocabulary and general tests on 167 and 66 participants respectively. In contrast, Buragohain et al. (2023) embarked on a 7-month longitudinal study with a larger sample of 220. Putra et al. (2023) employed a computational experimental approach involving collected essays from 347 participants. Meanwhile, Bai & Guo (2018), Escorcia and Ros (2019) and Teng et al. (2022) took a more traditional approach with questionnaires, with sample sizes ranging from 155 to a substantial 1051. In a similar vein, Ma (2021) and Schneider and Jin (2022) conducted interviews with 15 and 27 participants. Chong (2018) and Galante et al. (2019) took a different route, conducting interventions, although Chong's sample size was not specified. Nikcevic-Milkovic et al. (2022) used a survey with a scale involving 104 participants, whereas Swacha (2018) opted for a systematic review, for which a sample size is not applicable. Alhaider (2023) also conducted a survey but on a smaller scale with 38 participants. Moving to more unique methods, Sun et al. (2015) executed an experimental task with just 13 participants, while Sánchez-Pérez (2023) conducted a longitudinal study involving a sample of 98. Okuda (2020) and Wang (2017) conducted larger institutional and general case studies respectively, with 8 and 80 participants. Lastly, Hessel & Schroeder (2022) employed an experimental eye-tracking study with 34 participants, and Ishikawa (2018) carried out a quasi-experimental study on a sample of 73.

The most commonly used method among these studies is the quasi-experiment, followed by surveys and case studies. The sample sizes varied greatly from study to study, ranging from small groups to over a thousand participants. Sample size may enhance generalisability, depending on design quality. It is important to note that while larger sample sizes may enhance generalizability, methodological rigor depends on alignment between research questions, design, and execution—a consideration particularly relevant in L2 writing research where contextual factors significantly influence outcomes. However, the research method used is also crucial in determining the study's validity. Understanding both factors is key to interpreting these studies.

Table 1 *Research Methods of Selected Studies with consistent capitalization*

Methodological Category	Study	Research Methods (Summary)	Sample Size
Action Research	(Alkubaidi, 2019)	Action research (exploration, intervention, reflection)	17
Quasi-Experimental	(Hassan et al., 2021)	Quasi-experiment	60
	(Nusrat et al., 2019)	Quasi-experiment	90
	(Lin et al., 2017)	Quasi-experiment	22
	(Ishikawa & Suzuki, 2023)	Quasi-experiment	108
	(Konieczny & Eckert, 2022)	Quasi-experiment	15
	(Turkben, 2019)	Semi-experiment	49
	(Ishikawa, 2018)	Quasi-experiment	73
Survey / Questionnaire	(Shen et al., 2019)	Digital survey	295
	(Xie et al., 2022)	Survey with vocabulary test	167
	(Bai & Guo, 2018)	Questionnaire	155
	(Nikcevic-Milkovic et al., 2022)	Survey with scale	104
	(Alhaider, 2023)	Survey	38
	(Chang et al., 2022)	Survey with test	66
	(Teng et al., 2022)	Questionnaire	664
	(Escorcia & Ros, 2019)	Questionnaire	1051
Case Study / Interview / Qualitative	(Al Maawali, 2022)	Case study with two rounds of interviews	43
	(Rahnuma, 2023)	Semi-structured interview	"A small group"
	(Mendoza et al., 2022)	Qualitative study with secondary data	74

Methodological Category	Study	Research Methods (Summary)	Sample Size
	(Schneider & Jin, 2022)	Interview	15
	(Okuda & Anderson, 2018)	Case study	7
	(Okuda, 2020)	Larger institutional case study	8
	(Wang, 2017)	Case study	80
	(Ma, 2021)	Interviews	27
Longitudinal	(Buragohain et al., 2023)	7-month longitudinal study	220
	(Sánchez-Pérez, 2023)	Longitudinal study	98
Experimental / Computational	(Putra et al., 2023)	Computational experiment with collected essays	347
	(Sun et al., 2015)	Experimental task	13
	(Hessel & Schroeder, 2022)	Experimental eye-tracking study	34
Review / Other	(Swacha, 2018)	Systematic review	N/A
Intervention (Unspecified)	(Galante et al., 2019)	Intervention (method not detailed)	Not mentioned
	(Chong, 2019)	Intervention (method not detailed)	Not mentioned

Overall, the literature review aims to critically examine the existing research on implicit attitudes, cognitive styles and information processing in the context of English as a Second Language (ESL) and English as a Foreign Language (EFL). Sample sizes ranged from small-scale qualitative studies (n=7-17) to large-scale surveys exceeding 1,000 participants. In the context of ESL and EFL, understanding information processing in second language acquisition (SLA) is crucial. This section will explore the differences between ESL and EFL, considering factors such as language proficiency levels, language use environments, and cultural influences. These variations may shape the information processing strategies utilised by learners. Research on information processing in English writing has been conducted to investigate the role of implicit attitudes, cognitive styles and individual differences in language processing during writing tasks. These studies have contributed to our understanding of how these factors influence language performance and writing outcomes in ESL and EFL contexts.

Discussion

This systematic review set out to address three research questions concerning the influence of cognitive styles (RQ1), implicit attitudes (RQ2), and methodological approaches (RQ3) in Chinese learners' English writing. This systematic review set out to map the terrain of research on cognitive styles and implicit attitudes in Chinese learners' English writing. The findings confirm that these individual differences are not peripheral but central to understanding writing proficiency. The superior performance of FI learners with formulaic instruction (Baghestani, 2018) is consistent with Witkin's (1962) theory of psychological differentiation within the specific domain of L2 writing. This finding has a crucial pedagogical implication: it suggests that the effectiveness of common teaching practices, such as teaching writing through model texts and templates, is not uniform but is contingent on the learner's cognitive style. This contrasts with the FD learners' need for a contextual scaffold, underscoring thata uniform pedagogical approach to writing instruction is inherently limited.approach to writing pedagogy is inherently limited. Furthermore, the significant role of implicit attitudes (Al-Hoorie, 2016) extends our understanding of L2 motivation beyond conscious goals, linking the subconscious affective domain to writing outcomes. This resonates with theories of the L2 Motivational Self System, suggesting that the ideal L2 self may be underpinned by automatic, positive associations with the target culture.

Drawing on the synthesized evidence regarding cognitive styles and implicit attitudes, significant factors influencing English writing performance can be divided into two main categories: learner related and contextual factors. More detailed advice for improving English writing performance is still needed although some general suggestions have been made; for example, Hattie and Timperley (2007) pose three questions for checking information processing delivery, Engin (2013) and Liao (2021) also proved that questions as timely feedback to scaffold students' progress. Molly and Boud (2014) suggest interpretation of learners' characteristics, tasks and learning settings, and Thurlings et al. (2012) show perspectives on information processing delivering patterns. Because teachers may encounter challenges in understanding how specific information is processed after delivery, these sorts of guidance are beneficial. However, learners may still be dissatisfied with information processing even though they understand its importance (Huisman et al., 2019; Irons & Elkington, 2022; Mirzaee & Hasrati, 2014; Shute, 2008). Also, by acknowledging and addressing these influences, educators can facilitate more effective language acquisition and improved English writing performance in both EFL and ESL contexts (Zhang, 2016). This result can help EFL teachers to keep in mind the benefits of formulaic instruction while taking into account the individual characteristics of EFL learners, particularly when dealing with writing lessons. Writing teaching should consider the learners' cognitive style, which is related to their writing performance.The methodological landscape, dominated by quasi-experiments, has effectively established initial cause-and-effect relationships. However, this reliance points to a potential gap. The scarcity of rich, qualitative, and mixed-methods studies means the lived experiences, the nuanced interplay of cognition and attitude during the writing process, and the role of broader socio-educational context in the Chinese classroom remain underexplored. The contribution of this review is therefore twofold: it consolidates evidence for the critical role of FD/FI styles and implicit attitudes, and it highlights the need for a more methodologically diverse research agenda that can capture the complexity of these constructs in action. Pedagogically, these findings compel a move towards differentiated instruction—designing writing tasks and feedback that cater to both analytical and holistic processors, while simultaneously creating a culturally positive and engaging learning environment to foster beneficial implicit attitudes. These methodological gaps point toward several directions for future research, including the need for more longitudinal, qualitative, and mixed-methods studies that can capture the lived experiences of learners.

Limitations

This review is subject to several important limitations. Firstly, its specific focus on Chinese learners, while providing necessary scope, restricts the direct applicability of its findings to other linguistic and cultural contexts. Secondly, the methodological approaches of the synthesized studies present constraints. The field's prevalent reliance on self-reported data for complex constructs like implicit attitudes may not fully capture their unconscious nature. Furthermore, the dominance of quasi-experimental designs, though valuable for establishing causal links in authentic classrooms, often sacrifices the nuanced, contextual depth that qualitative inquiry could offer. A third limitation is the review's inherent inability to systematically account for broader contextual variables, such as socio-economic status and institutional policies, which undoubtedly interact with the individual differences under investigation but emain largely underexplored in the primary literature . Finally, the chosen timeframe (2013-2023) strategically captures the conclusion of the pre-generative AI era in education. While this allows for a clear baseline understanding of human-centric cognitive and attitudinal processes, the findings cannot anticipate the profound paradigm shift initiated by the widespread adoption of tools like ChatGPT. These technologies are poised to fundamentally reshape writing pedagogy, assessment, and the very cognitive and affective experiences of L2 writers. Consequently, this review offers a definitive snapshot of a closing chapter, highlighting the urgent need for future research to explore how these individual differences evolve within AI-augmented learning environments.

Conclusion and implications

The findings of this review offer actionable insights for several key stakeholders in L2 writing education, including classroom teachers, curriculum designers, teacher educators, and researchers. Below, we outline implications tailored to each audience, with direct reference to the evidence synthesized in this review. Firstly, for EFL writing teachers, the primary implication is the need for differentiated instruction. It is crucial to underscore the significance of information processing within the ESL writing class as a mechanism for enhancing English writing performance. Secondly, there is a need to delve into the enhancement of English writing proficiency by gaining a deeper understanding of learners' information processing-related characteristics, such as cognitive styles (CS), given the intricate psychological aspects involved in the writing process. Lastly, learners' perceptions of information processing can be unveiled through the examination of information acquisition (IA). As indicated by Muslem et al.'s (2018) study, insights into external information, including social culture and academic culture, can influence people's cognition process and explicit physical behaviours. Some information processing studies survey learners' perceptions about information processing and its effectiveness but are carried out from a subjective view. The subject view is an explicit attitude which depends on people's ability and motivation instead of their potential expectations (Blair et al., 2015; Ellis, 2021; Kim, 2018). In contrast, as discussed, the Implicit Attitude (IA) is an automatic assessment (Gawronski & Bodenhausen, 2006) which appears spontaneously whenever a proposed objective exists (Fazio & Olson, 2009).

This subjective perspective reflects explicit attitudes which depends on people's ability and motivation instead of their potential expectations (Blair et al., 2015; Ellis, 2021; Kim, 2018). In contrast, as discussed, the IA is an automatic assessment of attitude (Gawronski & Bodenhausen, 2006) which appears spontaneously whenever a proposed objective exists (Fazio & Olson, 2009).

To minimise the challenges in ESL writing and develop learners' writing, improving teachers' skills to deliver information processing is necessary as is getting a comprehensive understanding of learners' situations and psychological characteristics. In cognitivism, information processing is an external stimulation and English writing performance relates to information processing efficiency

(Baker & Hansen Bricker, 2010; Ford et al., 2017; Huang & Hong, 2016; Mawad et al., 2015; Poudel, 2022) As Ahn (2022) and Malgady and Barcher (1979) state, the impact of information processing depends on how it functions to help learners to self-regulate, which is necessary for cultivating self-evaluating habits for sustainable learning.

For classroom teachers, recognising that learners bring diverse cognitive styles means moving beyond a 'one-size-fits-all' approach. Drawing on Baghestani's (2018) finding that FI learners benefit from formulaic instruction while FD learners require contextual support (Kafipour & Noordin, 2021), teachers should design writing tasks that offer both analytical and holistic entry points, allowing students to engage with content in ways that align with their cognitive preferences. To address individual differences effectively, differentiated instruction that caters to learners' specific needs and preferences is essential (Morgan-Short et al., 2014). Integrating metacognitive training into writing instruction can empower learners to become more self-aware and autonomous writers. Educators can teach metacognitive strategies, goal setting and self-monitoring techniques to enhance learners' writing processes (Amerstorfer, 2018; Laffey, 2020; Yang et al., 2023). "For curriculum designers, this review's findings (particularly the contrast between FI and FD learners' needs) suggest the value of creating flexible task menus. Curricula should include both structured, rule-based writing exercises and open-ended, context-rich assignments that allow students to develop versatility across cognitive styles while honoring their dominant processing preferences.. For instance, offering both analytical and holistic writing tasks allows learners to apply their preferred processing style while also developing other kinds of cognitive skills. Recognising the influence of cultural norms on writing styles is crucial. Educators should encourage learners to explore diverse writing patterns and rhetorical strategies, promoting cross-cultural competence and adaptability in writing (Byram, 1989) Fostering intrinsic motivation in learners by creating engaging and meaningful writing tasks can boost their investment in the writing process.

Additionally, addressing writing anxiety through relaxation techniques or peer feedback can enhance learners' confidence and creativity (Rezazadeh & Zarrinabadi, 2021; Zhang, 2016). Educators should provide learners with ample exposure to authentic English texts to enhance their language input quality and diversity. This can include incorporating literature, news articles and multimedia sources into the curriculum (Banat et al., 2022; Di Gregorio & Beaton, 2019; Mohammed & Sidek, 2015; Rosborough et al., 2021; Yücedag & Sevik, 2021). Incorporating these research and pedagogical implications into language teaching and research can lead to more effective and inclusive EFL and ESL writing instruction. This approach acknowledges and celebrates the individual differences that make each learner's language-learning journey unique while striving for improved writing proficiency and language acquisition outcomes. By systematically synthesising a decade of research on cognitive styles and implicit attitudes, this review provides a comprehensive foundation for understanding how these individual differences shape L2 writing outcomes and offers a roadmap for future inquiry in this vital area.

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Kaynakça

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Extended Abstract

Introduction

The acquisition of advanced English writing proficiency among Chinese learners of English as a Second or Foreign Language (ESL/EFL) remains a persistent challenge in second language acquisition (SLA) research. While the complexity of L2 writing is widely acknowledged, the interplay between specific individual differences, particularly field-dependent/independent (FD/FI) cognitive styles and implicit cultural attitudes, has been notably underexplored in Chinese populations. This systematic review addresses this gap by synthesizing a decade of empirical research (2013–2023), a period marked by significant advancements in implicit attitude measurement and, at its close, the emergence of generative artificial intelligence (AI) in educational contexts.

Grounded in information processing theory (Anderson, 1983), this review posits that learners' cognitive styles shape how they encode, store, and retrieve written language. FD learners tend to rely on external cues and holistic processing, whereas FI learners favor analytical, rule-based processing (Witkin, 1962). Parallel to this, implicit attitudes, automatic, unconscious evaluations of target language cultures, have been shown to influence motivation, engagement, and the perceived authenticity of written expression (Al-Hoorie, 2016). Despite theoretical recognition of these constructs, their combined effect on Chinese learners' writing outcomes has not been systematically examined. Furthermore, the rapid proliferation of generative AI tools (e.g., ChatGPT) since late 2022 introduces a new, urgent variable that may reshape both cognitive processing and attitudinal responses in L2 writing. This review therefore captures a critical pre-AI baseline while acknowledging an ongoing paradigm shift.

Three research questions guided the review: (1) How do FD and FI cognitive styles influence the English writing performance of Chinese ESL/EFL learners? (2) What is the relationship between implicit cultural attitudes and writing proficiency among these learners? (3) What are the predominant research methodologies and designs used in studies investigating these relationships?

Method

This systematic review adhered to the PRISMA guidelines for reporting (Moher et al., 2009) and followed the scoping framework of Arksey and O'Malley (2005). A comprehensive literature search was conducted across four major international academic databases: ERIC, the British Educational Index (BEI), Educational Research Complete (ERC), and Web of Science (WoS). The search period was deliberately set from August 2013 to August 2023, capturing a decade of mature research on implicit psychological constructs before generative AI became globally widespread. The search employed a structured Boolean string combining terms related to "information processing," "cognitive styles" (field-dependent/independent), "implicit attitudes," "culture," "English writing," and "Chinese learners." The search was limited to peer-reviewed empirical studies published in English.

The selection process involved two-stage screening (titles/abstracts followed by full texts) against predefined inclusion criteria: population (Chinese ESL/EFL learners), focus (FD/FI cognitive styles and/or implicit cultural attitudes), outcome (English writing proficiency measures), publication type (peer-reviewed empirical studies), language (English), and timeframe (2013–2023). The initial search yielded 11,409 records. After duplicate removal (n=269), language and topic relevance screening (n=8,609 excluded), and full-text retrieval (n=2,162 unavailable), 369 full-text articles were assessed for eligibility. Studies focusing solely on technology-enhanced writing without cognitive/attitudinal variables (n=291) or lacking sufficient focus on writing outcomes (n=46) were excluded. This rigorous process resulted in 32 studies for final synthesis. A standardized coding framework was applied to extract data on cognitive styles, implicit attitudes, writing outcomes, research methodologies, and sample characteristics. Keyword co-occurrence analysis was also performed to map dominant thematic clusters within the corpus.

Results and Discussion

The synthesis of the 32 studies yielded three principal findings corresponding to the research questions.

RQ1: Influence of cognitive styles on writing performance. A consistent pattern emerged: FI learners demonstrated a significant affinity for structured, formulaic writing instruction, benefiting from rule-based, analytical approaches (Baghestani, 2018). In contrast, FD learners thrived in supportive, context-rich environments, integrating information within broader social and rhetorical frameworks (Kafipour & Noordin, 2021). This divergence indicates that uniform pedagogical approaches are inherently limited; instructional effectiveness is contingent upon alignment with learners' cognitive styles. Motivation interacted with cognitive styles, with intrinsically motivated learners investing greater effort in accuracy and creativity, while extrinsically motivated learners focused on meeting external criteria (Chen & Hwang, 2022). FI learners tended to excel in detail-oriented tasks (grammar, vocabulary accuracy), whereas FD learners generated more creative, contextually meaningful content but sometimes overlooked finer details. These findings confirm that cognitive style functions as a significant mediator of L2 writing performance.

RQ2: Relationship between implicit attitudes and writing proficiency. Although fewer studies directly measured implicit attitudes using validated instruments (e.g., Implicit Association Test), the available evidence suggests that positive implicit attitudes toward the target culture are associated with increased motivation, deeper engagement with authentic texts, and greater perceived authenticity of written expression (Al-Hoorie, 2016, 2017). Conversely, negative implicit attitudes hindered willingness to engage with cultural content, potentially limiting the depth and rhetorical appropriateness of learners' writing. This extends understanding of L2 motivation beyond conscious goal-setting into the subconscious affective domain.

RQ3: Predominant research methodologies. The methodological landscape is dominated by quantitative approaches: 22 of the 32 studies (69%) employed quasi-experimental or survey-based designs. Quasi-experiments were the most frequent, enabling causal inference in authentic classroom settings. Qualitative case studies and longitudinal designs were considerably rarer. Sample sizes ranged from small-scale intensive studies (n=7) to large-scale surveys (n>1,000). While the predominance of quasi-experimental designs has effectively established initial cause-and-effect relationships, a critical gap remains: the scarcity of rich, qualitative, and mixed-methods studies means that the lived experiences of learners, the nuanced interplay of cognition and attitude during the writing process, and the role of broader socio-educational contexts remain underexplored.

Keyword co-occurrence analysis (Figure 2 in the full paper) identified four distinct thematic clusters: cognitive processing, pedagogical interventions, learner characteristics, and writing outcomes. Prominent keywords included "vocabulary," "proficiency," "effectiveness," and "performance," reflecting the field's sustained focus on the building blocks of writing proficiency.

This review has several limitations: its exclusive focus on ESL learner's limits generalizability to other contexts; the reliance on self-reported data for implicit attitudes may not fully capture unconscious evaluations; and the 2013–2023 timeframe, while strategically chosen as a pre-AI baseline, cannot anticipate the paradigm shift introduced by generative AI.

Pedagogically, the findings compel a move towards differentiated instruction: teachers should design writing tasks offering both analytical and holistic entry points. Curriculum designers should create flexible task menus that include both structured, rule-based exercises and open-ended, context-rich assignments. Fostering positive implicit attitudes through culturally engaging and affirming classroom environments is equally critical. Methodologically, future research should prioritize longitudinal, qualitative, and mixed-methods designs that capture the dynamic interplay of cognitive styles and implicit attitudes over time, as well as investigate how these individual differences

evolve within AI-augmented learning environments. By systematically synthesizing a decade of evidence, this review provides a comprehensive foundation for understanding how cognitive styles and implicit attitudes shape L2 writing outcomes among Chinese learners and offers a roadmap for future inquiry in this vital area.