



A Review of Empirical Studies on Incidental Vocabulary Acquisition in L2 Contexts

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Abstract

Vocabulary plays a central role in second language (L2) development and incidental learning constitutes an important source of lexical growth. To examine the state of empirical research on incidental vocabulary acquisition (IVA), this study reviews a total of 385 articles that was published in the twenty-first century and retrieved from China National Knowledge Internet and Web of Science, using quantitative and qualitative approaches. The general research situation is visually presented via yearly publications, highly cited literature as well as keyword co-occurrence and clustering. The findings show an overall upward trend in empirical studies concerning IVA despite fluctuations, highlighting increasing scholarly interest in this topic. Research hotspots are identified by centering on various influence factors in IVA, which can be classified into input-related, learner-related, task-related and vocabulary-related factors. At last, the present study outlines future research directions and calls for a diversification of endeavors from various perspectives.

Key words: incidental vocabulary acquisition; second language; empirical studies; influence factors.

1. Introduction

There is a consensus that vocabulary knowledge serves as an essential component of second language learning and underlies various linguistic skills (Schmitt, 2008). Consequently, efficient vocabulary learning has become a central concern in second language (L2) research and pedagogy. Generally speaking, there are two major approaches to learning vocabulary: intentional instruction and incidental

acquisition. Incidental vocabulary acquisition (IVA), first proposed by Nagy, Herman and Anderson (1985), refers to the unintentional learning of words during language use without explicit instructional focus. This view presumes that lexical knowledge in an L2 can be acquired as a by-product. Enlightened by the Incidental Vocabulary Acquisition Hypothesis, scholars subsequently delved into IVA and some termed it incidental vocabulary learning (IVL).

Endeavors have been made to explain the mechanisms of IVA and to investigate distinct factors that potentially affect its effectiveness.

Over the past decades, IVA has attracted growing attention in the field of second language acquisition (SLA) and it is still a research focus at present. To examine the status quo and to grasp the research trends, the present study systematically reviewed empirical papers on incidental L2 vocabulary learning, which were published in the twenty-first century and indexed in China National Knowledge Internet (CNKI) and Web of Science (WOS). It is hoped that this paper will inform future research on IVA and pedagogical practice in L2 vocabulary learning.

2. Research methodology

2.1 Research questions

The present study seeks to address the following research questions:

Research question 1: What is the general situation of empirical research on incidental L2 vocabulary acquisition in the twenty-first century?

Research question 2: What are the hotspots of empirical studies on incidental L2 vocabulary acquisition in the twenty-first century in terms of influence factors?

Research question 3: What are the future prospects of research on incidental L2 vocabulary acquisition?

2.2 Data sources

To ensure data quality and reliability, the reviewed studies were retrieved from Chinese Social Sciences Citation Index (CSSCI) journals in CNKI and Social Sciences Citation Index (SSCI) journals in WOS via an advanced search. The search in CNKI was conducted using the topics “二语词汇附带习得” or “二语词汇附带学习”, and the search in WOS was conducted using the strategy: Topic= (“second language” OR “L2”) AND (“incidental vocabulary acquisition” OR “incidental vocabulary

learning”). The time span covered publications from 2000 to 2025. After removing irrelevant and non-empirical studies through manual screening, 385 studies were included in the final dataset on which the present study is based, comprising 70 Chinese articles from CNKI and 315 English ones from WOS.

2.3 Research methods and procedures

This study adopts a mixed-method approach combining quantitative and qualitative research methods. With the aid of CiteSpace, the current study quantitatively analyzed the constructed dataset. Such bibliometric analysis, together with qualitative elaboration, can persuasively reflect the research status of a particular field and shed light on its future prospects.

A simple visualization analysis was initially conducted to clarify the general research situation, including the yearly publications of empirical studies on incidental L2 vocabulary learning, the top ten highly cited articles in CNKI, the top 10 highly cited articles in WOS and a keyword co-occurrence map of incidental L2 vocabulary acquisition. Based on the established statistical evidence, the author elaborated on the influence factors probed in the reviewed empirical studies. Finally, future research directions of IVA were identified through a synthesis of the bibliometric findings and existing empirical evidence.

3. General situation of empirical research pertinent to incidental L2 vocabulary acquisition

The general situation of empirical research pertinent to L2 IVA is examined through three indicators: yearly publication output, highly cited studies and keyword co-occurrence patterns.

3.1 Yearly publication of empirical papers on incidental L2 vocabulary acquisition

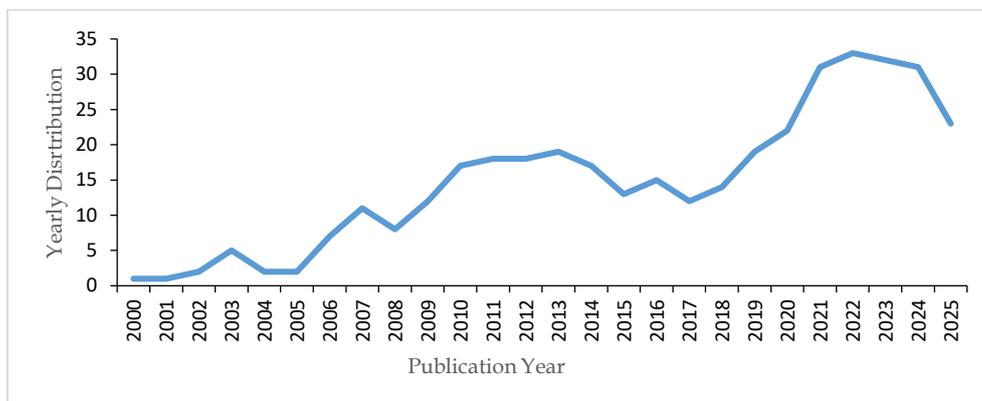


Figure 1. Number of empirical studies on IVA published from 2000 to 2025

Figure 1 presents the annual number of empirical studies on L2 IVA in the established dataset, which uncovers the diachronic development of this research field. As shown, publication output exhibits a rising trend on the whole with some fluctuations since 2000. Generally speaking, it can be divided into four periods: a period of slow growth from 2000 to 2013, a phase of relative stability from 2013 to 2019, a period of proliferation from 2019 to 2022 and a slight decline from 2022 to 2025. In the initial five years of the twenty-first century, few empirical studies were published, indicating limited scholarly attention to IVA at that time. Two publication peaks occurred in 2013 and 2022. Despite a modest decline in recent years, the overall volume remains high, suggesting that IVA continues to be an active and influential research topic in SLA.

3.2 Highly cited literature

The present study employed CiteSpace to identify those highly cited articles in the dataset. Citation counts reflect a paper's academic influence and recognition, as highly cited research often provides methodological and theoretical insights for subsequent studies. The gradual accumulation of such studies over time contributes to knowledge construction and indicates the maturity and innovation within a field. Therefore, examining highly cited literature offers insights into research hotspots and potential future prospects of a particular field.

Table 1. The top 10 highly cited articles in CNKI

Number	Title of article	Author	Year
1	An empirical study on incidental vocabulary acquisition of English majors	Gai, S.	2003
2	Effects of multiple-choice glosses on incidental English vocabulary acquisition	Duan, S., & Yan, C.	2004
3	Incidental vocabulary learning and the Involvement Load Hypothesis	Wu, J., Lang, J., & Dang, Q.	2007
4	Can learning tasks affect incidental vocabulary acquisition? A revisit of the Involvement Load Hypothesis	Wu, X.	2010

5	Incidental vocabulary acquisition in a natural reading	Zhang, X., & Qi, L.	2009
6	Effects of tasks with different involvement load on incidental acquisition of productive vocabulary knowledge	Li, Y.	2008
7	Incidental vocabulary acquisition in a natural reading condition	Wang, G.	2009
8	Incidental vocabulary learning of second language: The effects of different types of text-based tasks	Wu, W., & Xu, H.	2004
9	A comparative study of L2 incidental vocabulary acquisition: Listening vs. Reading	Wang, T., Yao, Y., & Xu, Y.	2012
10	Effects of task modes and types on incidental vocabulary acquisition	Kong, F., & Wang, X.	2014

Table 2: The top 10 highly cited articles in WOS

Number	Title of article	Author	Year
1	Incidental vocabulary acquisition through viewing L2 television and factors that affect learning	Peters, E., & Webb, S.	2018
2	Incidental learning of collocation	Webb, S., Newton, J., & Chang, A.	2013
3	Gaming as extramural English L2 learning and L2 proficiency among young learners	Sylvén, L.K., & Sundqvist, P.	2012
4	A Comparison of the effects of reading and listening on incidental vocabulary acquisition	Vidal, K.	2011
5	Incidental L2 vocabulary acquisition from and while reading: An eye-tracking study	Pellicer-Sánchez, A.	2016
6	An eye for words: Gauging the role of attention in incidental L2 vocabulary acquisition by means of eye-tracking	Godfroid, A., Boers, F., & Housen, A.	2013
7	Learning English through out-of-school exposure. Which levels of language proficiency are attained and which types of input are important?	De Wilde, V., Brysbaert, M., & Eyckmans, J.	2020
8	Second language vocabulary learning through extensive reading with audio support: How do frequency and distribution of occurrence affect learning?	Webb, S., & Chang, A.C.-S.	2015
9	Effects of captioning on video comprehension and incidental vocabulary learning	Montero Perez, M. <i>et al.</i>	2014
10	Out-of-school digital gameplay and in-school L2 English vocabulary outcomes	Sundqvist, P., & Wikström, P.	2015

Table 1 and Table 2 respectively list the top 10 highly cited articles in CNKI and in WOS. Among these 20 empirical articles, Zhang and Qi (2009) highlighted the role of reading in IVA. Pellicer-Sánchez (2016) and Godfroid *et al.* (2013) investigated L2 IVA from a cognitive perspective, where they employed the technique of eye-tracking to reveal learners' real-time processing during incidental learning. Furthermore, the vast majority of these articles sought to identify factors affecting IVA effectiveness, including learning strategies (Gai, 2003), glossing (Duan & Yan, 2004), input modes (Wang *et al.*, 2014; Vidal, 2011; De Wilde *et al.*, 2020), language proficiency (Wang, 2009; Sylvén & Sundqvist, 2012;), prior vocabulary knowledge (Gai, 2003; Wang, 2009; Peters & Webb, 2018), frequency of occurrence (Peters & Webb, 2018; Webb & Chang, 2015; Van Zeeland & Schmitt, 2013), captioning (Montero Perez *et al.*, 2014), exposure through digital gameplay (Sylvén & Sundqvist, 2012; Sundqvist & Wikström, 2015) and task modes and types (Wu *et al.*, 2006; Wu, 2010; Li, 2008; Wu & Xu, 2004; Kong & Wang, 2014; Montero Perez *et al.*, 2014). Notably, Webb *et al.* (2013) examined L2 learners' incidental acquisition of collocation knowledge. This research tops the citation list and marks a significant advancement in IVA research.

3.3 Keyword co-occurrence and clustering map of incidental L2 vocabulary acquisition

Keywords provide a concise representation of a study's main themes and core ideas, and their analysis can reveal interactions across research in a given field. By virtue of keyword co-occurrence and keyword clustering analyses, the conceptual framework and knowledge network of a particular field can be visually constructed and then research hotspots and frontiers manifest themselves.

Figure 2 presents a combined map of co-occurrence and clustering of keywords in the reviewed empirical literature. Eleven clusters were identified: word learning, new word learning, word-meaning inference, collocation

learning, reading, comprehension, listening comprehension, multimedia glosses, digital games, children, exposure. Through this, two key observations emerge: i) researchers have increasingly shifted their focus from plain text input to multimodal discourse in IVA studies; ii) there is growing attention to factors influencing IVA effectiveness, especially variables related to vocabulary and experimental factors that can be manipulated by researchers.



Figure 2. Keyword co-occurrence and clustering map of incidental L2 vocabulary acquisition

4. Factors influencing incidental L2 vocabulary acquisition

Based on the literature review, it was concluded that extant empirical studies generally investigate various factors that influence the effectiveness and efficiency of L2 IVA. Accordingly, this section synthesizes research hotspots into four categories of influence factors: input-related, learner-related, task-related, and vocabulary-related factors.

4.1 Input-related factors

Research on input-related factors mainly examines the roles of input mode, context, and input intervention in facilitating L2 learners' IVA gains.

Mode refers to the channel through which information is processed and handled, such as auditory and visual channels. In this sense, input mode in IVA can be conceptualized as the

way in which input materials are presented to L2 learners during the learning process. Research on the role of input mode in IVA has mainly focused on the relative effectiveness of different modes in facilitating incidental lexical learning and on comparisons among them. The major modes investigated include reading, listening, viewing, and combinations of two modes. According to the Incidental Vocabulary Acquisition Hypothesis, natural reading constitutes the primary source of vocabulary growth. IVA through reading has therefore been at the forefront of research in SLA. A generally positive relationship between L2 reading and IVA has been reported (Webb, 2008), as the rich contextual information in written texts allows learners to interact with lexical items and to infer the meanings of unknown words. In addition, the potential contribution of aural input has been demonstrated in several studies (e.g., Jin & Webb, 2020), although learning gains from listening tend to be lower than those from reading. This discrepancy is often attributed to the greater processing demands imposed by listening, as learners have less time to decode and integrate linguistic information (Van Zeeland & Schmitt, 2013). Compared with reading and listening, viewing has received relatively limited attention in IVA research. Recently, increasing interest has been directed toward multimodal input, especially the combination of reading and listening (e.g., Webb & Chang, 2015). This dual-mode condition has been shown to help learners segment and integrate meaningful information more efficiently (Brown *et al.*, 2008). Moreover, researchers have compared the effects of different input modes on the incidental acquisition of both single words and multiword expressions (Webb & Chang, 2022). Overall, reading-while-listening input appears to yield the most robust learning outcomes, although some inconsistent findings remain, highlighting the need for further investigation.

The meanings of unfamiliar words are constrained by the immediate linguistic

information surrounding them, commonly referred to as contextual clues. Vocabulary learning through reading relies heavily on such clues because they strongly influence learners' lexical inferencing processes. The crucial role of context in successful incidental L2 vocabulary learning has been widely acknowledged. A large body of research has examined contextual effects in IVA, with particular attention to contextual richness, defined as the extent to which a context facilitates learners' inference of target-word meanings. Webb (2008) provided strong empirical support for this assumption by reporting a positive relationship between contextual richness and learners' IVA gains. Learners exposed to richer contexts significantly outperformed those who encountered target words in poorer contexts. A substantial number of subsequent studies (e.g., Hu, 2013) have yielded converging evidence, demonstrating a close association between contextual richness and gains in form-meaning recognition. However, not all studies have produced consistent results. For instance, Zahar *et al.* (2001) categorized contexts into different types and found no significant relationship between contextual richness and vocabulary acquisition. These divergent findings suggest that the role of contextual richness in IVA remains complex and warrants further empirical investigation.

This strand of research has mainly examined reading plus and input enhancement as instructional interventions in incidental vocabulary acquisition. Reading plus refers to the incorporation of text-based vocabulary activities, such as multiple-choice questions or translation tasks, into reading comprehension. Comparative studies have shown that reading plus leads to greater incidental vocabulary gains than reading alone, supporting its facilitative role in lexical learning (Min, 2008). Input enhancement has been extensively investigated, with glosses serving as its primary focus. Glosses are brief definitions or explanations designed to facilitate comprehension during reading. Existing studies have examined

various gloss-related features, including gloss language (Kim *et al.*, 2024) and gloss type (Duan & Yan, 2004). Despite some inconsistent findings, several robust patterns have emerged: (i) texts with glosses contributed to greater vocabulary gains than those without glosses; (ii) multimodal glosses are more effective than single-mode glosses; (iii) the effects of glosses are moderated by learners' L2 proficiency and task characteristics.

4.2 Learner-related factors

Learner-related factors can be roughly divided into two categories: factors of ability and affective factors. The existing inquiries pertaining to learner factors sought to examine the impact of L2 learners' ability variables on incidental L2 lexical growth, including L2 proficiency, lexical ability, and working memory.

L2 proficiency is a crucial predictor of learners' performance in incidental vocabulary acquisition. A substantial body of research has reported a positive relationship between proficiency level and IVA outcomes. Pulido and Hambrick (2008) showed that both vocabulary gain and retention through reading increased as learners' L2 reading proficiency improved. Likewise, Huang *et al.* (2012) found that learners with higher proficiency achieved significantly better incidental vocabulary learning across different task conditions. Taken together, empirical evidence consistently indicates that more proficient learners tend to outperform those with lower proficiency in acquiring L2 vocabulary incidentally.

Sufficient vocabulary knowledge is essential for L2 learners to process input effectively (Teng & Mizumoto, 2023). Peters and Webb (2018) further argued that lexical ability is a significant predictor of IVA. Research in the twenty-first century has mainly examined two dimensions of lexical ability: prior vocabulary knowledge and lexical inferencing ability. Wu (2010) found that learners with a larger vocabulary size benefited more from vocabulary

learning through reading, a finding echoed by Gai (2003). More recently, Teng and Mizumoto (2023) reported that the depth of learners' vocabulary knowledge significantly predicted their IVA gains from captioned videos. In addition, learners with stronger inferencing ability tended to achieve greater incidental learning, presumably due to their more effective use of lexical inference strategies. However, the threshold of vocabulary size required for optimal IVA remains unclear and warrants further investigation.

Working memory is a cognitive system that allows learners to temporarily store, process, and retrieve information while maintaining attention during mental tasks and it has a limited capacity. Its role in predicting L2 IVA has attracted increasing research interest (e.g., Teng & Zhang, 2021). Most empirical studies suggest that learners with greater working memory capacity tend to achieve better incidental vocabulary learning outcomes, as they can simultaneously process input and engage in lexical inference. However, Teng and Mizumoto (2023) reported no statistically significant differences in IVA gains among learners with varying capacities measured by the Operation-Span Task. This discrepancy may stem from other individual differences, such as L2 proficiency, prior vocabulary knowledge, or age. Despite some inconsistent findings, working memory remains a crucial factor closely related to L2 IVA.

Despite the bulk of endeavors on learner-related factors in IVA in SLA, research on affective factors. Such as motivation and topic interest, remain scarce and warrants considerable attention.

4.3 Vocabulary-related factors

Research on vocabulary-related factors in IVA primarily examines exposure frequency and intralexical factors.

Exposure frequency refers to the number of times target words are encountered by L2

learners during language input, and has been consistently identified as a robust predictor of IVA through reading. Empirical studies converge on the finding that repeated encounters with words enhance learners' vocabulary gains (Webb & Chang, 2015). However, the optimal threshold of exposure for effective IVA remains unclear. Rott (2005) reported that six exposures of a new word could facilitate lexical acquisition, whereas Elgort and Warren (2014) suggested that more than twelve encounters were necessary to achieve significant gains and retention. Moreover, Van Zeeland and Schmitt (2013) emphasized that the effect of frequency may interact with other factors, such as word type or learners' proficiency.

Intralexical factors refer to the inherent properties of target words, such as part of speech, meaning, word formation, and semantic complexity, which may influence their incidental acquisition in L2 learning. Laufer (1997) argued that these lexical characteristics affect learners' ability to infer and retain new words. Empirical studies indicate that such properties play a significant role: Xu (2012) found that polysemous words were harder for learners to infer and comprehend than words with fewer meanings. Similarly, François *et al.* (2011) reported that concrete words yielded higher learning gains than abstract words in reading and writing tasks. These findings suggest that intralexical properties interact with cognitive processing during IVA. However, research on these factors remains limited, particularly regarding complex morphological structures, collocations, and semantic networks. Future studies should systematically explore intralexical factors and their interaction with learner-related and input-related variables. Such investigations will help to better understand the mechanisms underlying incidental L2 vocabulary acquisition.

4.4 Task-related factors

Laufer and Hulstijn (2001) proposed the Involvement Load Hypothesis from cognitive

and affective perspectives. The hypothesis posits that different tasks engage learners in varying degrees of cognitive processing of vocabulary. This differential engagement, in turn, leads to varying incidental vocabulary learning outcomes, with tasks involving higher involvement loads producing greater lexical gains. Motivated by this framework, researchers have shown strong interest in examining the role of output tasks in IVA. Existing studies on task effects in IVA have primarily focused on how task types and task modes influence learners' incidental vocabulary learning effectiveness.

In the present study, task type is narrowly defined as the question formats provided to learners during incidental vocabulary learning through reading or listening. Laufer and Hulstijn (2001) compared EFL learners' acquisition of ten target words across three task conditions: reading comprehension, cloze exercises, and sentence writing. Among these, sentence writing imposed the highest involvement load, whereas reading comprehension involved the lowest. Their results showed that learners in the sentence-writing condition achieved the greatest vocabulary gains, followed by those in the cloze condition, with the reading-only group performing the weakest. Similarly, Kim (2011) examined the same three task types with 164 ESL learners and obtained comparable results. These findings suggest that task type is closely related to task complexity: cognitively more demanding tasks promote deeper lexical processing and thus lead to greater incidental vocabulary learning gains than simpler tasks.

Apart from task type, task mode is another important predictor of L2 learners' incidental acquisition of vocabulary. Task mode refers to the form of learners' output, mainly writing and speaking. However, relatively few studies have examined how different output modes affect IVA. Laufer and Hulstijn (2001) compared learners' vocabulary gains in writing and reading tasks, finding that the writing

group achieved higher acquisition and better retention of target words. This advantage is commonly attributed to the higher cognitive and involvement load of writing, which requires learners to actively manipulate lexical knowledge and thus promotes deeper processing (Huang *et al.*, 2012). Some studies have also explored IVA in continuation writing (Wang, 2005; Jiang & Tu, 2016) and in speaking tasks (Tian, 2011). Nevertheless, systematic comparisons between different output modes in IVA remain limited, and their relative effectiveness is still unclear.

5. Prospects for research on incidental L2 vocabulary acquisition

Based on the achievements identified in the reviewed literature, certain inadequacies can be noted and several issues merit future scholarly attention.

First of all, further theoretical development and validation are needed. To date, a relatively mature theoretical framework for L2 IVA has been established. Although models such as the Dual Coding approach, Cognitive Theory of Multimedia Learning, the Involvement Load Hypothesis have been applied to explain IVA, further theoretical development is needed. Novel models could provide deeper insights into the mechanism underlying IVL. Additionally, the construct of vocabulary remains underdefined in extant empirical research, as most studies focus on receptive knowledge of single-word meaning and form. Future research can benefit from addressing productive and implicit vocabulary knowledge, and from establishing clearer theoretical constructs, thereby enabling a more rigorous and comprehensive explanation of the IVA process.

Secondly, research methodology needs to be diversified. Most existing studies rely on undergraduate samples, which limits the generalizability of their findings. Future research should therefore include learners from different age groups and educational stages,

such as primary and secondary school students, and incorporate cross-linguistic and cross-cultural comparisons. In addition, more valid and sensitive instruments should be developed to measure or quantify IVA outcomes more comprehensively. Finally, although a vast majority of studies rely on correlation and variance analyses to examine the relationships between IVA effectiveness and other variables, future research would employ more advanced statistical techniques, such as structural equation modeling, to provide more robust and theoretically informative results.

Thirdly, more potential influence factors in IVA should be explored. Although existing studies have examined several variables, the complex relationships between IVA and multiple predictors are not yet fully understood. In addition to well-explored factors such as L2 proficiency and frequency of occurrence, other individual differences warrant further investigation. Moreover, controllable external factors, including input-related and output-related variables are also underexplored. Future research could devote more effort to IVA in spoken discourse and to investigating the roles of glossing and captioning in multimodal contexts. Delving into these factors and their interaction effects can provide stronger pedagogical implications for designing more effective L2 vocabulary learning and teaching practices.

Last but not least, greater interdisciplinary integration is needed. Although prior studies have demonstrated the initial integration between research on L2 IVA and other disciplines, including psychology and pedagogy, this line of research remains limited. With advances in related disciplines, future IVA research should further integrate neuroscientific methods, such as brain imaging, to examine learners' cognitive processing more precisely. In addition, big data and artificial intelligence offer new opportunities for analyzing large-scale datasets. Such interdisciplinary innovation can lead to a deeper understanding of IVA

mechanisms and a more comprehensive theoretical framework.

6. Conclusion

This study provides a systematic review of empirical research on incidental L2 vocabulary learning in the twenty-first century by combining bibliometric and qualitative analyses. The author visualized the general research situation by virtue of Citespace and identified an overall upward trend in publications, with the most rapid growth occurring in recent years. Most studies focus on IVA effectiveness and its influencing factors, which can be grouped into input-related, learner-related, task-related, and vocabulary-related variables. In particular, learners' individual differences and multimodal interventions have received the greatest scholarly attention. Based on these findings, this study highlights the need for: (i) new theoretical frameworks or models; (ii) more diversified research methodology; (iii) more potential influence factors like learners' affective factors; and (iv) deeper interdisciplinary integration. In summary, research on IVA is burgeoning with a promising future. More valuable efforts are warranted to achieve significant theoretical breakthroughs and to benefit language learners as well as pedagogical design at the practical level.

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