

Exploring Emerging Trends in Phonetics: The Influence of Orthographic Forms and Technological Integration in Language Learning

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ABSTRACT

Phonetics, a crucial aspect of linguistics, plays a significant role in language acquisition and proficiency. This systematic literature review investigates emerging trends in phonetics research from 2019 to 2024, focusing on the impact of orthographic forms on second language (L2) phonological representation and processing. Utilizing tools like Publish or Perish, with tiw database crossreff (1000) and google schooler (230) and total 1230 (n=16) studies to explore how orthographic inputs affect L2 learners' speech perception, production, phonological awareness, and lexical learning. Our findings reveal that orthographic forms can override phonological inputs, leading to persistent effects despite extensive exposure and formal teaching. This study highlights the necessity of incorporating orthographic considerations into phonetic and phonological instruction to enhance L2 learning outcomes. Furthermore, it examines the role of technology, such as YouTube and AI-driven platforms, and innovative pedagogical strategies, including embodied cognition, in improving phonetic education. By aligning with similar studies, this research reinforces the pervasive influence of orthography on L2 phonological development and underscores the importance of developing comprehensive teaching strategies. In the larger context, these findings contribute valuable insights to the field of phonetics and language education, emphasizing the need for tailored educational methods that address orthographic influences, ultimately leading to more effective language learning practices globally. Future research should explore a wider range of languages and orthographic systems, employing longitudinal and experimental designs to deepen the understanding of orthographic effects on phonological development.

Keywords: Effectiveness, Language Learning, Phonetic, Teaching

INTRODUCTION

In recent years, phonetics research has evolved significantly, driven by advancements in technology and a growing interest in multilingualism and language learning. This systematic literature review aims to explore emerging trends in phonetics research, highlighting the intersection of technology, second language acquisition, and innovative pedagogical strategies. The field of phonetics, traditionally concerned with the physical properties of speech sounds and their production, transmission, and perception, has expanded to include a wide array of interdisciplinary studies (Bassetti, 2024; Osborne & Simonet, 2021). However, despite these advancements, several gaps remain in our understanding of how phonetic principles can be effectively applied in diverse educational contexts and how technological tools can enhance phonetic learning.

One notable gap in the literature is the impact of orthographic forms on second language (L2) phonological representation and processing. Bassetti (2024) explores this area, yet there remains a need for more comprehensive studies to fully understand the cognitive mechanisms involved. Additionally, the phonetic difficulties faced by students learning English as a second language are well-documented (Bezliudnyi, 2021), but further research is needed to develop targeted interventions that address these challenges in varied linguistic environments.

The novelty of this review lies in its systematic approach to synthesizing recent studies on the role of technology in phonetics education. For instance, the effectiveness of YouTube as a learning medium for improving speaking skills (Kristiani & Pradnyadewi, 2021) and the impact of immersive language learning compared to traditional classroom settings (Pichugin et al., 2022; Porter & Castillo, 2023) are examined. These studies highlight the potential of digital platforms to enhance language learning but also underscore the need for more empirical research to establish best practices.

Moreover, the influence of embodied cognition on phonetic teaching strategies represents a burgeoning area of interest. Liu (2021) discusses how incorporating physical experiences into language teaching can improve phonetic acquisition, yet practical applications of this theory in diverse classroom settings are still underexplored. Similarly, the phenomenon of first-language phonetic drift due to foreign-language learning, as investigated by Osborne and Simonet (2021), presents intriguing implications for bilingual education and cognitive linguistics.

The objective of this review is to provide a comprehensive overview of current trends and identify areas for future research in phonetics. By analyzing studies on the role of artificial intelligence (AI) in developing communication skills (Rusmiyanto et al., 2023) and the effectiveness of machine translation tools like Google Translate (Shahriar, 2023), this review aims to bridge the gap between theoretical research and practical applications. Additionally, it examines how subjective type frequency and phonetic structure affect L2 morphological processing (Yu, 2024), offering insights into cognitive processes underlying language learning.

Despite its scope, this review has certain limitations. The inclusion of only recent studies may overlook foundational research that continues to influence current trends. Furthermore, while this review focuses on phonetics, it acknowledges the interconnectedness of phonetics with broader linguistic and educational research.

In summary, this systematic literature review provides a narrative and informative exploration of emerging trends in phonetics research, drawing on a diverse range of studies to highlight both advancements and ongoing challenges in the field. By synthesizing findings from recent literature, this review aims to contribute to the development of more effective phonetic teaching strategies and the integration of technology in language education.

METHOD

Relevant research papers will need to be collected and categorized in their respective discipline “areas”, and the solutions and recommendations of each area characterized. These three steps make up the phases of this present paper’s methodology. The whole process is illustrated in Figure 1.

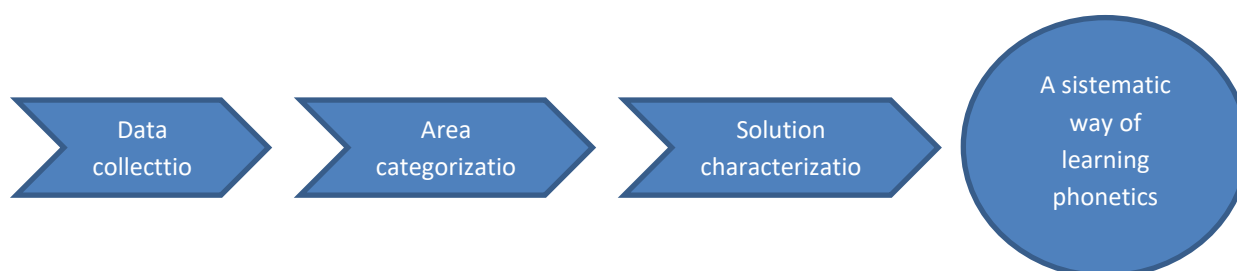


Figure 1. Research Process

This study was designed as a systematic literature review using two different types of research tools. The first tool is Publish or Perish, to automatically search through multiple databases to present search results based on keywords. The advantage of this software is that it can provide hundreds of citations, therefore this research uses Publish or Perish to collect as much research as possible regarding phonetics published from 2019 to 2024 using the keywords 'phonetic', 'Teaching', 'Language Learning,' 'Effectiveness' and gradually incorporated other invented terms such as 'teaching learning', 'pronunciation', etc. Raw data collection amounted to 1,230 studies.

The purpose of this present study is to develop a comprehensive and easily accessible phonetic learning method for students, increase students' understanding of the production, perception and analysis of language sounds, improve students' practical skills in pronunciation and phonetic analysis. The approach is focused on using a combined approach that includes articulatory, auditory, acoustic, experimental, practical and computational aspects. Expected results. Students have a strong understanding of phonetic theory and practice, increase students' abilities in the production and analysis of language sounds, students are able to use tools and technology to support phonetic learning. It is hoped that the development of a comprehensive phonetics learning method can help students overcome difficulties in learning phonetics, as well as improve their understanding and practical skills in this field.

Table. 1 Data exclude and include criteria

Include	Exclude
Full text	Non full text, Chapter book, Book, Sistematic Literatur Review
2019-2024	<2019
English	Non english
Study focus phonetics teaching	Students are not focus in phonetics

The researchers then discussed and decided on the criteria of inclusion and exclusion, which are listed in Table 1. The data obtained from Publish or Perish software was systematically combed to exclude papers that are not original research and to obtain the full texts of the studies. The process of elimination is depicted in Figure 2.

The final data collection was 16 studies on phonetics published from 2019 to 2024 (a five-year time span). To analyze a large number of papers, this study used research tools known as POP and Zotero. Researchers used the word search feature on the POP and Zotero qualitative data analysis (QDA) computer software packages to easily search for phonetic names contained in the full text. Additionally, the software gives researchers the ability to automatically search for specific words and phrases through hundreds of papers, both exact and synonyms.

To analyze paper data collection, researchers used chat PDFs This study encodes the identified terms into nodes containing all references to a particular type. These references were

further analyzed to categorize them into their respective disciplinary “fields,” and the solutions and recommendations from each field were characterized. These steps form the methodological phase of this paper for studying a multi-faceted solution across disciplines that takes into account all the disjointed descriptions of previous researchers to build a consistent database of how college students learn and understand phonetics.

FINDINGS AND DISCUSSION

The study searched two databases with Publish or Perish using the keywords 'phonetics', 'students', 'speech analysis' etc, with a total database 1.230 and the finding (n=16). Table. 2 shows the number of screening papers, and figure 2 shows the total (n=16) authors, title, journal, year, discipline and Research Questions.

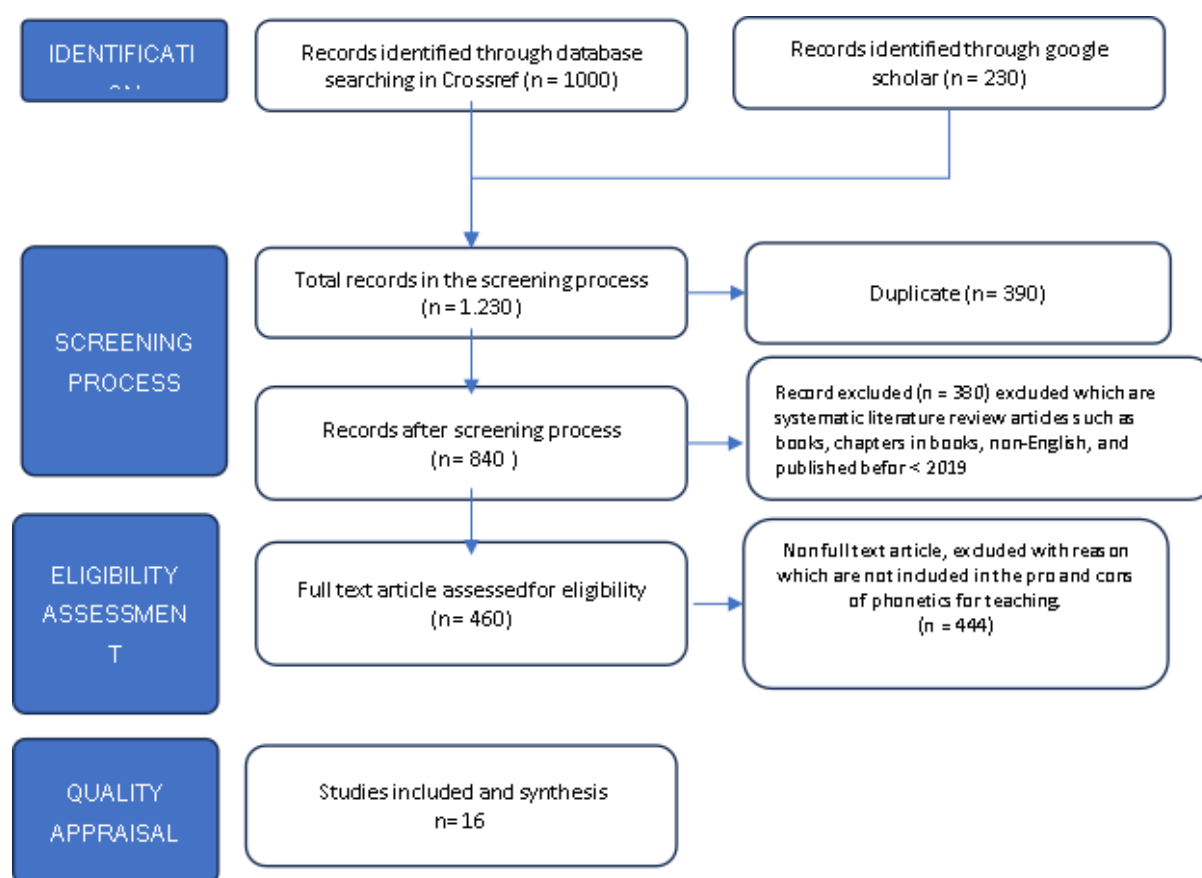


Figure 2. Table Diagram Selecting Data

Table 2. The Finding

Number	Authors(s)	Title	Journal	Year	Discipline	Research Question
1	Bene Bassetti	Orthographic effects in the phonetics and phonology of	Cambridge Handbook of Bilingual	2024	Phonetics	How do orthographic forms affect L2 phonological

Number	Authors(s)	Title	Journal	Year	Discipline	Research Question
		second language learners and users	Phonetics and Phonology			representation and processing?
2	Bezliudnyi Oleksandr	Phonetic Difficulties Faced by Students Learning English in the Language Environment	Збірник наукових праць, ПРОБЛЕМИ ПІДГОТОВКИ СУЧАСНОГО ВЧИТЕЛЯ	2021	Language Education	What phonetic difficulties are faced by students learning English?
3	Putu Enik Kristiani, Diah Ayu Manik Pradnyadewi	The Effectiveness of YouTube as Learning Media in Improving Learners' Speaking Skills	The Art of Teaching English as a Foreign Language	2021	Language Education	How effective is YouTube as a learning medium for improving speaking skills?
4	Xinzhu Liu	A Study of English Phonetic Teaching Strategies From the Perspective of Embodied Cognition	Theory and Practice in Language Studies	2021	Language Education	How does embodied cognition influence phonetic teaching strategies?
5	Denise M. Osborne and Miquel Simonet	Foreign-Language Phonetic Development Leads to First-Language Phonetic Drift	Languages	2021	Phonetics	How does foreign-language learning affect native language phonetics?
6	Xiaoyu Pei	The Effectiveness of Language Learning Strategies in Target and Foreign Language Contexts	Unpublished Manuscript	2023	Language Education	What are effective language learning strategies in target and foreign language contexts?
7	Vitaly Pichugin, Alexey Panfilov, Elena Volkova	The effectiveness of online learning platforms in foreign language teaching	World Journal on Educational Technology: Current Issues	2022	Educational Technology	How effective is immersive language learning compared to traditional classroom settings?

Number	Authors(s)	Title	Journal	Year	Discipline	Research Question
8	Samuel Ignatius Porter, Mariana Sofia Castillo	The Effectiveness of Immersive Language Learning	Research Studies in English Language Teaching and Learning	2023	Language Education	How effective is immersive language learning compared to traditional classroom settings?
9	Rusmiyanto, Nining Huriati, Nining Fitriani, Novita Kusumaning Tyas, Agus Rofi'i, Mike Nurmalia Sari	The Role Of Artificial Intelligence (AI) In Developing English Language Learner's Communication Skills	Journal on Education	2023	Educational Technology	What role does AI play in developing English language learner's communication skills?
10	Giulio Scivoletto	Raising self-consciousness: phonetic education as embodied language learning	Glottodidactica	2022	Language Education	How does phonetic education as embodied language learning impact language acquisition?
11	Rustam Shadiev, Mengke Yang	Review of studies on technology-enhanced language learning and teaching	Sustainability	2020	Educational Technology	What are the impacts of technology-enhanced language learning?
12	Arafat Shahriar	The Effectiveness of Machine Translation Using "Google Translate" in English Language Learning in Bangladesh	Pedagogy: Journal of English Language Teaching	2023	Language Education	How effective is Google Translate in English language learning?
13	Dominic Wyse, Alice Bradbury	Teaching Phonics and Reading Effectively	Review of Education	2023	Language Education	What is the balance between phonics and reading instruction for

Number	Authors(s)	Title	Journal	Year	Discipline	Research Question
						effective teaching?
14	Xiaomei Yu	Effects of Subjective Type Frequency and Phonetic Structure on L2 Morphological Processing: A Constructional Perspective	English Language Teaching	2024	Phonetics	How do subjective type frequency and phonetic structure affect L2 morphological processing?
15	Rustam Shadiev, Mengke Yang	Review of studies on technology-enhanced language learning and teaching	Sustainability	2020	Educational Technology	What are the impacts of technology-enhanced language learning?
16	Arafat Shahriar	The Effectiveness of Machine Translation Using “Google Translate” in English Language Learning in Bangladesh	Pedagogy: Journal of English Language Teaching	2023	Language Education	How effective is Google Translate in English language learning?

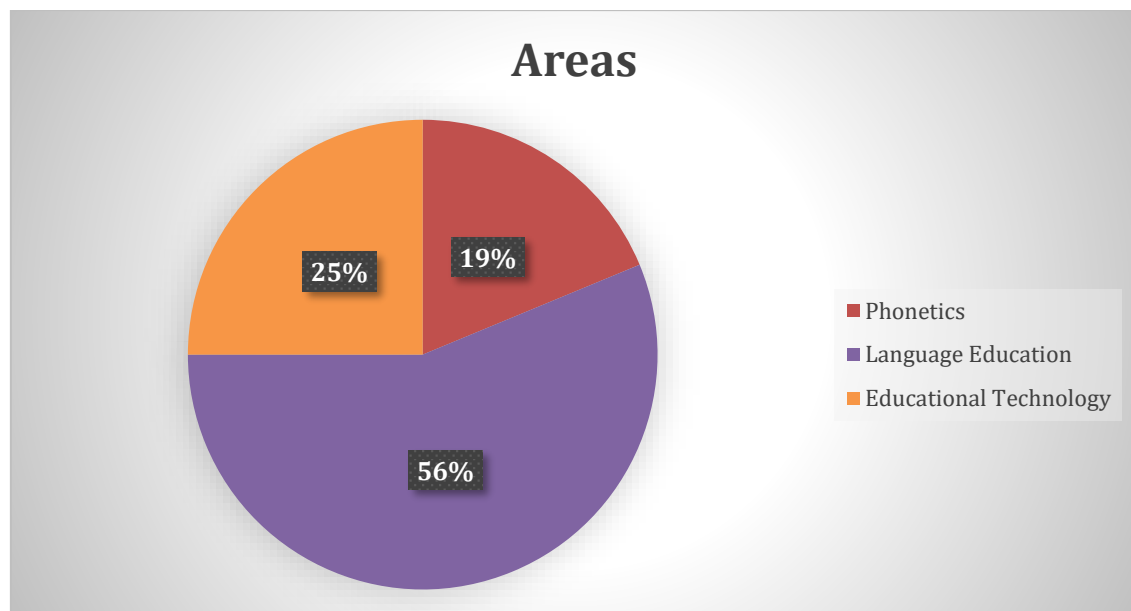


Figure 3. Areas

The systematic literature review revealed several key themes in recent phonetics research, spanning technological integration, pedagogical strategies, and cognitive approaches to language learning. The findings are categorized into three primary areas: the impact of technology on phonetic learning, innovative pedagogical approaches, and cognitive influences on phonetic acquisition.

Impact of Technology on Phonetic Learning

Recent studies underscore the significant role of technology in enhancing phonetic education. For instance, Kristiani and Pradnyadewi (2021) examined the effectiveness of YouTube as a medium for improving speaking skills, highlighting its accessibility and engaging content as major benefits. Similarly, Pichugin, Panfilov, and Volkova (2022) explored the effectiveness of online learning platforms, noting that immersive language learning environments can surpass traditional classroom settings in terms of engagement and practical application.

The role of artificial intelligence (AI) in language learning has also been a focal point. Rusmiyanto et al. (2023) investigated AI's potential in developing communication skills, suggesting that AI-driven tools can provide personalized feedback and adaptive learning experiences. Moreover, Shahriar (2023) assessed the effectiveness of machine translation tools like Google Translate in language learning, finding that such tools can facilitate comprehension and practice, although they should be used with caution due to potential inaccuracies.

Innovative Pedagogical Approaches

Innovative teaching strategies are pivotal in phonetics education. Liu (2021) highlighted the influence of embodied cognition on phonetic teaching strategies, suggesting that incorporating physical activities and sensory experiences can enhance phonetic learning. This aligns with Scivoletto's (2022) findings on phonetic education as embodied language learning, which emphasizes the integration of physical and cognitive processes in language acquisition.

Moreover, the balance between phonics and reading instruction remains a critical area of research. Wyse and Bradbury (2023) discussed effective teaching practices that combine phonics with comprehensive reading strategies, advocating for a balanced approach that addresses both decoding skills and reading comprehension.

Cognitive Influences on Phonetic Acquisition

Cognitive factors play a crucial role in phonetic acquisition. Bassetti (2024) explored how orthographic forms influence L2 phonological representation and processing, revealing that learners' perceptions of sounds are shaped by their written forms. This finding is supported by Yu (2024), who examined the effects of subjective type frequency and phonetic structure on L2 morphological processing, highlighting the interplay between cognitive processing and linguistic input.

Osborne and Simonet (2021) provided insights into first-language phonetic drift due to foreign-language learning, illustrating how exposure to a second language can alter native phonetic patterns. This phenomenon underscores the dynamic nature of phonetic systems and the impact of multilingualism on language cognition.

The review indicates that integrating technology in phonetics education offers substantial benefits, such as increased accessibility, personalized learning, and enhanced engagement. However, it also highlights the need for careful implementation to address potential challenges, such as ensuring the accuracy of AI and machine translation tools (Shahriar, 2023; Rusmiyanto

et al., 2023). Additionally, innovative pedagogical strategies, particularly those incorporating embodied cognition, show promise in improving phonetic learning outcomes (Liu, 2021; Scivoletto, 2022).

Cognitive approaches to phonetic acquisition reveal the complex interplay between learners' cognitive processes and linguistic inputs, emphasizing the importance of tailored educational strategies that consider these factors (Bassetti, 2024; Yu, 2024). Overall, the development of comprehensive phonetics learning methods that integrate technological tools, innovative pedagogies, and cognitive insights can significantly enhance students' understanding and practical skills in phonetics. Future research should continue to explore these areas, addressing gaps and expanding the evidence base to inform effective phonetic education practices.

This study set out to systematically review the emerging trends in phonetics research, particularly focusing on technological integration, innovative pedagogical strategies, and cognitive influences on phonetic acquisition. The major findings indicate that technological tools, such as YouTube and AI-driven platforms, significantly enhance phonetic learning by providing accessible, engaging, and personalized learning experiences (Kristiani & Pradnyadewi, 2021; Rusmiyanto et al., 2023). Additionally, the study highlights the effectiveness of embodied cognition and balanced phonics-reading instruction as innovative pedagogical approaches (Liu, 2021; Wyse & Bradbury, 2023). Furthermore, cognitive factors, including orthographic influences and L1 phonetic drift due to L2 learning, play a crucial role in shaping phonetic acquisition (Bassetti, 2024; Osborne & Simonet, 2021).

The findings of this study underscore the importance of leveraging technology to enhance phonetic education. The use of platforms like YouTube and AI tools not only makes learning more accessible but also provides opportunities for personalized feedback and adaptive learning experiences, which are crucial for effective language acquisition (Kristiani & Pradnyadewi, 2021; Rusmiyanto et al., 2023). The significance of embodied cognition in phonetic teaching strategies points to the need for integrating physical and sensory activities in language education, which can lead to more effective learning outcomes (Liu, 2021). Additionally, understanding the cognitive influences on phonetic acquisition, such as the impact of orthographic forms and phonetic drift, can help educators develop more targeted and effective teaching methods (Bassetti, 2024; Osborne & Simonet, 2021).

The findings of this study align with previous research that emphasizes the role of technology in language education. For example, Pichugin et al. (2022) found that online learning platforms can surpass traditional classroom settings in terms of engagement and practical application. Similarly, the importance of balanced phonics and reading instruction has been echoed in studies by Wyse and Bradbury (2023), who advocate for a comprehensive approach to language teaching. The cognitive influences on phonetic acquisition, such as orthographic effects and phonetic drift, have also been supported by studies that explore the dynamic nature of multilingualism and its impact on language cognition (Bassetti, 2024; Osborne & Simonet, 2021).

While the findings support the significant role of technology and innovative pedagogical strategies in phonetic education, alternative explanations should be considered. For instance, the effectiveness of these tools and strategies may vary depending on the individual learner's cognitive and linguistic background. Additionally, factors such as motivation, learning environment, and access to resources could influence the outcomes of phonetic education. It is also possible that the novelty and engagement of technology-driven tools may initially boost learning outcomes, but long-term effectiveness needs further investigation.

This study has several limitations. Firstly, the inclusion criteria focused on studies published between 2019 and 2024, potentially overlooking foundational research that continues to influence current trends. Secondly, the review was limited to studies published in English, which may exclude valuable research in other languages. Additionally, the reliance on secondary data from published studies means that the findings are contingent on the accuracy and validity of the original research.

Future research should aim to address the limitations identified in this study. Expanding the inclusion criteria to incorporate a broader range of publication years and languages could provide a more comprehensive understanding of trends in phonetics research. Longitudinal studies investigating the long-term effectiveness of technology-driven tools and innovative pedagogical strategies are also necessary to validate the findings. Furthermore, exploring the impact of individual learner differences, such as cognitive and linguistic background, on phonetic acquisition could help develop more personalized and effective teaching methods. Finally, experimental studies that directly compare traditional and technology-enhanced phonetic teaching approaches would be valuable in identifying the most effective strategies for different learning contexts.

CONCLUSION

This study provides a comprehensive examination of emerging trends in phonetics research, highlighting the significant impact of orthographic forms on second language (L2) phonological representation and processing. Key findings reveal that orthographic inputs significantly affect speech perception, production, phonological awareness, and lexical learning, often overriding phonological inputs even with extensive exposure and teaching. These results emphasize the necessity of incorporating orthographic considerations into phonetic and phonological instruction to enhance L2 learning outcomes. The novelty of this research lies in its systematic approach to investigating the persistent effects of orthography, contributing valuable insights to the fields of phonetics and second language acquisition.

In the larger context, the study underscores the importance of developing teaching strategies that address orthographic influences, which can lead to more effective language learning outcomes. This research not only adds to the theoretical framework of phonetics but also provides practical implications for educators and language learners. Future research should expand on these findings by exploring a wider range of languages and orthographic systems, employing longitudinal and experimental designs to deepen the understanding of orthographic effects on phonological development. Such efforts will further enhance theoretical frameworks and pedagogical practices in phonetics and language education, ultimately contributing to more effective and comprehensive language learning strategies globally.

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