RESEARCH ARTICLE

The effectiveness of L2 pronunciation instruction: A critical systematic review of the intervention studies

Oktay Yağız[1]

Fatma Kaya[2]

Rabia Ötügen [3]

[1] Atatürk University, Türkiye / Contact: yoktay@atauni.edu.tr
[2] Atatürk University, Türkiye / Contact: fatma.kaya@atauni.edu.tr
[3] Atatürk University, Türkiye / Contact: rabia.otugen@atauni.edu.tr

Abstract
Pronunciation instruction studies have taken considerable attention in the field of foreign language teaching and research in recent years. For this systematic review, only the intervention studies indexed in SSCI were included. A literature search up to April 2024 was conducted using the Web of Science and relevant meta-analytic studies. Fifty-five interventions met the eligibility criteria based on the PRISMA 2020. This review is twofold: to examine the effects of English L2 pronunciation instruction and to identify the methodological status of these studies in terms of treatment formulation, design, sampling type/size, treatment duration, and outcome measures. Results showed that pronunciation instruction treatments positively affected L2 users' pronunciation performance. Regarding research methodology, the studies employed mostly pre- and post-tests, with at least one experimental group having relatively few delayed tests. The most common participant group was undergraduate students with pre-intermediate and intermediate levels. The participants' performance tended to be measured through technological tools in recent years. The suprasegmental features of speech that occurred with greater frequency compared to the mere segmental features. These studies also tended to include native speakers' ratings in the assessment phase of the instruction. The findings of this study are assumed to provide insights and recommendations for future research studies in L2 pronunciation.

Keywords
L2 pronunciation instruction, intervention research, English pronunciation, systematic review
Submission date
21.05.2024
Acceptance date
20.06.2024

https://doi.org/10.47216/literacytrek.1487243

Introduction

Pronunciation, as a linguistic ability and an easily observable indicator of language proficiency, entails producing and discriminating individual speech sounds or phonemes, referred to as segmental units, and the prosodic speech features that involve stress, rhythm, and intonation, referred to as suprasegmental aspects of language. These

phonemic and prosodic features of a language can therefore be a valuable tool for language learning with an explicit and controlled mode of cognitive functioning. Explicitly acquired knowledge, skills, and strategies can convert more difficult patterns into concrete, understandable, and finally, more learnable ones (Wulff & Ellis, 2018). Intentional and controlled learning becomes a key reason for successful L2 learning where natural communicative contexts are unavailable, or learners' proficiency level is low.

Effective oral communication requires meaningful word articulations that are understandable and coherent in terms of discourse and syntactic combinations. Intelligible pronunciation in English is essential for successful oral communication for both native and non-native speakers. Pronunciation is a spoken language aspect that can either ease intelligibility or impede oral communication. However, it does not merely have to do with intelligibility; it is also a matter of social acceptance, perception, and personal value. In line with its affective role on interlocutors, pronunciation can be perceived as "charming, pleasant or prestigious as well as unnatural or even irritating" (Baran-Łucarz, 2016, p. 41). Given the significant role of pronunciation in sustaining successful communication in multilingual contexts, research evidence has shown that pronunciation problems negatively affect successful communication (Deterding & Kirkpatrick, 2006; Jenkins, 2000) and may cause misunderstandings and breakdowns in communication (Sardegna & Jarosz, 2023). These phonological problems may result in avoidance of participation and misinterpretation (Rogerson-Revell, 2008). The belief that intelligible pronunciation may be acquired through intense exposure to L2 native environments and speakers has been dismissed (Sardegna & Jarosz, 2023). To improve language learners' competence to understand English speech and be accurately understood, explicit teaching methods, strategies, and contents are recommended.

This suggestion has inspired many experimental studies to test the effectiveness of pronunciation teaching interventions. These studies revealed that teachers should be aware of the rationale as well as the theoretical and pedagogical components of pronunciation education, and they should be assisted in their teaching since students require implementational and effective guidance. Research into L2 pronunciation and its instruction have been conceptually regarded through three major phenomena:

intelligibility, comprehensibility, and accentedness. Intelligibility has become a significant focus in both research and practice. According to Jenkins (2002), mutual intelligibility should be the focus of second language learners' pronunciation and is the main indicator of their proficiency (Pennington & Rogerson-Revell, 2019). Comprehensibility, or "ease of understanding" (Munro & Derwing, 1995), refers to the effort required for the listener to be able to understand an utterance. Comprehensibility, both conceptually and empirically, encompasses not only segmental and prosodic features but also structural and lexical aspects of L2 speech. Accentedness is defined as “the degree to which the pronunciation of an utterance sounds different from the expected production pattern” (Munro et al., 2006, p. 112).

Relevant research fosters L2 pronunciation instruction for intelligibility and comprehensibility as a realistic and achievable goal instead of native-like mastery (Isaacs, Trofimovich, & Foote, 2018; Levis, 2005). Many researchers prioritize suprasegmentals since they consider that L2 suprasegmental features play a central role in intelligibility and/or comprehensibility (Gilbert, 2012), and suprasegmental errors have a considerable place in the assessment of L2 speech compared to segmental errors (Kang, Rubin, & Pickering, 2010). While suprasegmentals teaching is considered to be more effective than segmentals teaching to improve intelligibility (e.g., Derwing et al., 1998; Gordon, Darcy, & Ewert, 2013; Saito & Saito, 2017), Jenkins (2002) emphasizes the role of segmentals for intelligibility, particularly among the non-native speakers. However, as Lee et al.'s (2015) meta-analytical review highlighted, when segmental and suprasegmental features are combined, pronunciation instruction would have a greater effect.

While a growing body of research into L2 speech has been conducted regarding pronunciation teaching methodologies, approaches, priorities, and models, suggesting insights and providing theoretical and practical knowledge for language classrooms, the obtained results, methodological procedures, assessment tools, the use of research designs, interventional diversities, and participants’ demographics need to be systematically compiled for further research and minimizing gaps. There is a scarcity of updated, systematic, and critical analysis of the relevant research for this purpose. Saito (2012) reviewed the results of 15 quasi-experimental studies on the effects of L2

pronunciation instruction and showed that instruction was effective in improving segmental and suprasegmental aspects of L2 sounds with a varying degree and that it enhanced comprehensibility. In their meta-analysis, Lee et al. (2015) reviewed 86 research reports encompassing research articles, theses, conference proceedings, book chapters, conference presentations, and unpublished manuscripts. They focused on the effectiveness of L2 pronunciation instruction, including the overall effects and potential moderators, as well as methodological issues. They highlighted the threat to the validity of pronunciation research due to small sample sizes and different types of needs for a shift in the duration of the interventions. Saito and Plonsky (2019) proposed a framework to synthesize methodological practices and evidence in L2 pronunciation research. In the same way, another review (Thomson & Derwing, 2015) underlined some methodological constraints, such as small sample sizes that jeopardize the reliability of research results, a lack of diversity in sampling types, the longevity of treatments, the use of delayed tests, specific attention to the phonological features of instructions, and reliance on controlled assessment designs. In a more recent study, Metruk (2024) conducted a systematic review of the studies that have focused on the pronunciation development of the learners related to using MALL, reviewing 15 empirical studies published between 2015 and 2022. The reviewed articles showed that mobile learning, in particular smartphones, was effective in L2 pronunciation improvement with participants' positive attitudes.

Method

Identifying the Initial Research Questions

To better understand the effectiveness of L2 pronunciation instruction, provide some insights about the potential role of the moderator variables, and determine the strengths and weaknesses of the relevant research, this study addressed the following research questions:

1. According to the obtained intervention studies, what are the research findings regarding the effectiveness of L2 pronunciation teaching?
2. What is the methodological status of L2 pronunciation teaching in terms of causation?

Identifying Relevant Studies

The search terms and the key concepts related to L2 pronunciation teaching were initially identified. To analyze the search results, only the Web of Science (WoS) database was employed since it offers many search options, provides complete information on the publications (i.e., title, author, sources, abstract, author, and keywords), includes only highly ranked and reputable journals, and is acknowledged to be prestigious (Joshi, 2016). For this reason, our study exclusively focused on the research articles published in the journals indexed in Science Citation Index Expanded (SCI-EXPANDED), Social Sciences Citation Index (SSCI), and Arts & Humanities Citation Index (A&HCI). Since search strings are expected to cover as much comprehensively as possible (Schardt et al., 2007), the query strings based on the relevant sources and the research questions were identified in the WoS database as follows: “English pronunciation teaching” OR “English pronunciation instruction” OR “L2 pronunciation teaching” OR “L2 pronunciation instruction” OR “EFL” OR “ESL pronunciation” “EFL” OR “ESL” pronunciation teaching” OR “EFL” OR “ESL pronunciation instruction” OR “EFL or “ESL” teaching pronunciation” OR “second language pronunciation” OR "phonetics instruction" OR "form-focused pronunciation instruction".

Study Selection

Based on the research questions, the inclusion and exclusion criteria were determined and shown in the following table:

Table 1

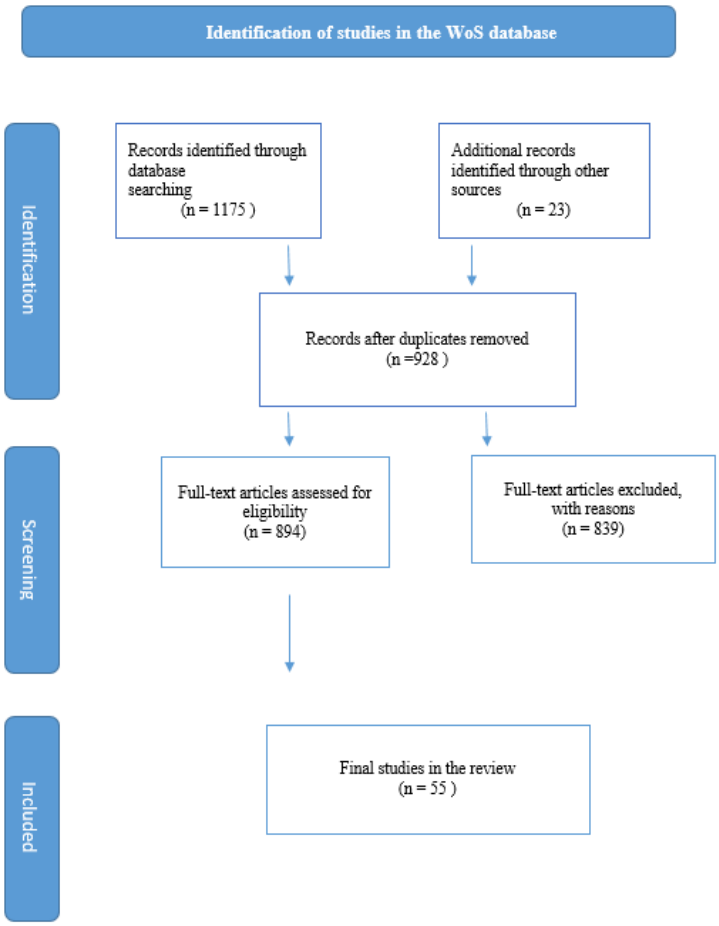
Inclusion and Exclusion Criteria

Criterion	Inclusion	Exclusion
Period	No limit	N/A
Language	English	Non-English published articles
Type of research	Peer-reviewed original research	Conference proceedings, book chapters, reviews
Journal indexed	SCI-EXPANDED, SSCI, A&HCI	Journals Indexed out of SSCI, AHCI, and SCI-EXPANDED
Research scope	English L2 pronunciation teaching	Pronunciation studies other than English
Research focus	Intervention/causation research between/among variables	Mere descriptive or mere qualitative research
Population & sample origin	English as a second/foreign language	Native English speakers

Based on the inclusion and exclusion criteria, 55 research articles were selected and thoroughly reviewed for appropriateness. The reviewed articles are marked with an asterisk (*) in the list of references. Fig.1 shows the flow diagram employed in the study.

Figure 1

PRISMA Flow Chart on Article Identification, Screening, Eligibility Procedures, and Inclusion



Data Charting and Collation

Upon completing the study selection stage, the articles that were obtained were charted. Each selected article was classified based on the author(s), year, location of study, study purpose, research method, sample size/type, outcome measures, and main findings. The recorded information of the studies is shown in Table 2, Supplementary Material.

Summarizing and Reporting Findings

In the final stage, the major findings were summarized, and some critical inquiries were posed to discuss the research evidence and assess the studies in terms of their findings, taking their methodological structures into account.

Results

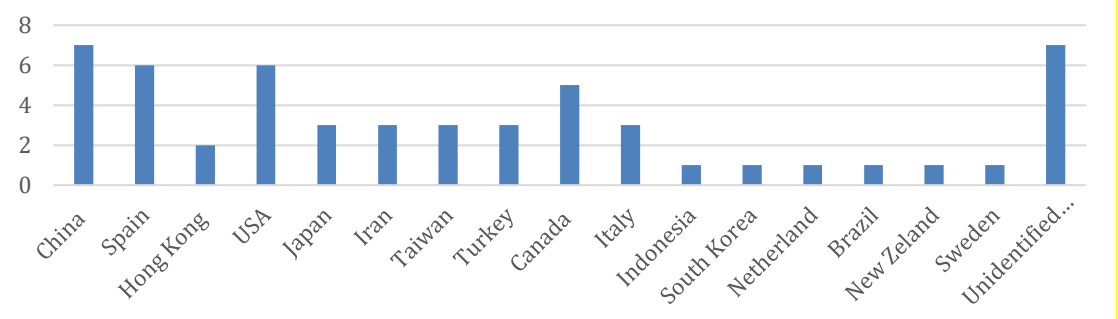
The causal studies that were determined according to the abovementioned criteria have aimed to test and enhance the effectiveness of proposed treatments and the authors' assumptions about L2 pronunciation instruction. The exclusion of the non-experimental research, which was based merely on descriptive data, provided rapid projection for the practitioners. The following sections encompass a comprehensive analysis of the obtained results. These sections consist of the research location and years over time, research purpose, design, sample features, treatment duration, performance assessment, and the main findings of the experimental pronunciation instruction research. The obtained results also provide insights into the methodological approach of the relevant research.

Pronunciation Instruction Research Settings

The experimental research focusing on the effectiveness of English pronunciation instruction was primarily conducted in expanding circle countries (e.g., China, Spain, Japan, and Turkey), compared to the outer and inner circle countries of English. In these countries, acquisition patterns and cultural contexts seem to influence L2 pronunciation perception and curricular features. On the other hand, the experimental pronunciation studies in the inner circle countries where English is used as a first language and widely studied as a second language, such as the US and Canada, are relatively less than those studies in the other group. Only one study has been detected attempting to enhance the pronunciation aspects of the L2 users in the outer circle countries (i.e., New Zealand) with some colonial history in which English has played a significant role in education, governance, and popular culture.

Figure 2

Experimental Pronunciation Research According to Countries

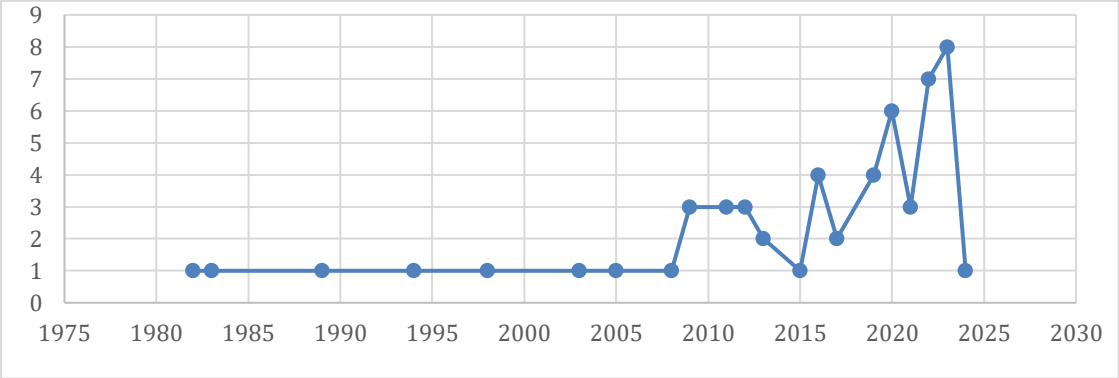


Pronunciation Instruction Research According to Years

Regarding the experimental pronunciation research in terms of years, it is evident that there is increasing attention to the pronunciation development of L2 users. The increasing interest over the years seems to be parallel with the variability of the research topics. Particularly in the last four years, treatment-based pronunciation research has been increasingly published in the SSCI-indexed journals.

Figure 3

Experimental Pronunciation Research According to Years



Treatment Formulation of the Pronunciation Instruction Research

In line with technological development, relevant research has tended to employ technological instruments, particularly ICT tools, automatic speech recognition programs, and computer-assisted treatments (2, 3, 4, 5, 7, 8, 10, 15, 19, 20, 21, 24, 28, 29, 31, 33, 34, 39, 45, 47, 48, 49, 50). Following new technological tools, new instructional types (e.g., types of feedback) and proposed models (e.g., form-focused instruction) investigating segmental and suprasegmental features of English attract attention. Suprasegmental research has attempted to improve the L2 users' comprehensibility (how easy L2 speech is for a listener to understand) rather than their intelligibility (how understandable L2 speech is). As for the distinction between segmental and suprasegmental features of English pronunciation studies, segmental-based studies are still individually investigated (11,17,22,27,51) though it is not clear that segmental mispronunciation may impede intelligibility, and it is often assumed that segmental problems do not cause difficulties for the listeners in a contextualised environment (Pennington & Rogersen-Revell, 2019).

The recent studies (5, 12, 17, 22, 26, 45, 46, 51, 53, 55) tend to move from a focus on form to communicative practices in the design of the experimental settings, as many researchers have emphasised the need for suprasegmental aspects of English pronunciation for intelligibility and comprehensibility rather than establishing their design to improve the accentedness of learners.

In a typical quantitative study, the number of participants affects the reliability of the research, where more participants are expected (Johnson & Christensen, 2017). However, except for eight studies (1, 3, 24, 25, 26, 31, 40), the number of subjects was less than 100. As for the level of schooling, the overwhelming majority of the participants were undergraduate students, and few of the studies included different age groups (1, 4, 46). Secondly, employees and learners with mixed ages participated in the experimental studies (6, 7, 8, 11, 12, 14, 15, 24, 29, 33, 35, 36, 37, 38, 39, 41, 42, 44, 45, 47, 48, 51, 55) Few studies focused on diverse sample groups in terms of proficiency. For example, the studies with beginner- or advanced-level participants were ignored (1, 7, 16, 18, 30, 39, 46, 49). Moreover, in some of the studies, there seemed to be no information about the participants' proficiency features, which impeded a study from being replicated in a future study (2,3,4,6,12,14,23,24,34,36,40,48,50,54, 55). Participants' performances were often evaluated by native speakers of English (NS). Native speaker assessment was primarily seen in the studies investigating speech comprehensibility (3, 5, 18, 22, 30, 32, 35, 36, 38, 41, 43, 44, 45, 48, 52, 53, 55). As the researchers tended to improve the comprehensibility and intelligibility of the L2 learners, they seemed to benefit from NS raters. However, the same lack of information about the source of raters was also detected in this section (4, 6, 7, 8, 12, 14, 15, 19, 21, 24, 27, 29, 33, 40, 42, 47, 50, 54).

Table 3

Methodological Status of the Interventional Studies

		f	*%*
Duration of Treatment	40-60 minutes	2	3.64
	70-90 minutes	1	1.82
	1-5 hours	9	16.36
	6 hours and more	2	3.64
	1-10 days	2	3.64
	11 days and more	3	5.45
	1-5 weeks	11	20.00
	6-10 weeks	7	12.73
	11-15 weeks	5	9.09

	16 weeks and more	2	3.64
	1-5 months	2	3.64
	6 months and more	2	3.64
	1-5 session	2	3.64
	6 sessions and more	1	1.82
	1 semester	1	1.82
	1-2 year	1	1.82
	No data	2	3.64
	Total	55	100
Sample Size	1-15	2	3.64
	16-30	13	23.64
	31-60	15	27.27
	61-90	14	25.45
	91-120	7	12.73
	121-150	2	3.64
	151 and more	2	3.64
	Total	55	100
Level of Schooling	Primary School	1	1.82
	Secondary School	1	1.82
	High School	1	1.82
	Undergraduate	24	43.64
	Graduate	3	5.45
	Undergraduate + Graduate	2	3.64
	Employees & General L2 learners	23	41.82
	Total	55	100
Proficiency Level	Elementary	1	1.82
	Beginner	5	9.09
	Intermediate	24	43.64
	Advanced	2	3.64
	Mixed levels	8	14.55
	No Data	15	27.27
	Total	55	100
Test Design	Pre/posttest	43	78.18
	Pre/post/delayed test	8	14.55
	No pre/post/delayed test	4	7.27
	Total	55	100
Raters	Native Speaker	17	30.91
	Non-Native Speaker	8	14.55
	Native + Nonnative Speaker	9	16.36
	Software	3	5.45
	No Data	18	32.73
	Total	55	100
Outcome Measures	Production Test	75	63.56
	Perception Test	12	10.17
	Interviews/ Questionnaires/ Inventory	18	15.25
	Other Data Collection Tools	13	11.02
	Total	118	100

Discussion and Conclusion

This study aimed to explore and characterize the experimental studies on the effectiveness of pronunciation instruction published in exclusively SSCI-indexed

journals. Of the initially identified articles, 55 research articles were considered eligible for this systematic literature review based on PRISMA 2020.

Effective pronunciation instruction has become a question for language practitioners and researchers. However, the precise measurement of improvement in performance poses a significant challenge. The earlier studies, which tested the effectiveness of pronunciation instruction, were primarily laboratory-based (e.g., de Bot & Mailfert, 1982; de Bot, 1983) and were conducted in controlled laboratory settings. Nevertheless, the focus has gradually shifted towards classroom-based research.

The first research question focused on the effectiveness of experimental pronunciation research over the years. Pronunciation instruction positively impacted the targeted form(s), with almost 87% of the studies reporting significant improvement. The findings of the present study are in line with the results of the previous meta-analytic research (Lee et al., 2015) and the narrative review (Thomson & Derwing, 2015), which indicate that pronunciation treatments positively affect L2 speech. Metruk (2024), in a specific systematic review with different inclusion criteria, also found significant effects of mobile devices on L2 users' pronunciation performance. Moreover, given the data they obtained, Lee et al. (2015) demonstrate that pronunciation instruction may be more effective when both phonological features (i.e., segmental and suprasegmental) of English are taught together. However, our findings still demonstrate the lack of combined features in a single study.

However, due to the predominant focus on specific pronunciation features, the extent to which these interventions contribute to the comprehensibility and intelligibility of L2 speech remains inadequate. Also, despite the significant impact of pronunciation teaching that nearly all the studies reached, the effect sizes, particularly those of the recent studies, should be cautiously examined. As the number of studies that entirely or partly employ technology in pronunciation instruction tends to increase, the diversity of the instructional and assessment tools also attracts attention. This increase is inevitable since computers, mobile devices, and other ICT tools have become pervasive. However, though the effectiveness of the recent research has been generally significant, their sample size may cause some constraints. This assumption has also been mentioned in

Lee et al.'s (2015) meta-analytic study due to the lack of perceptual accuracy of technology-based instructional materials.

The second research question focused on the methodological status of the experimental research into pronunciation instruction. While this study profiled the methodological preferences and settings that researchers established, some suggestions and evaluations have been offered for further research. The treatment formulation of almost all the studies has been established in classroom settings. However, in this type of research setting, extraneous variables should be eliminated, and the confounding variables should be controlled for the validation of the studies. This assumption was also highlighted by the previous studies (Lee et al., 2015; Plonsky, 2011). Complementary data tools provide further insights encompassing some variables, such as individual differences, motivation, and interactions in L2. These complementary instruments may reveal evidence that quantitative tools cannot achieve (Thompson & Derwing, 2014). Given this assumption, it can be said that, though it is not common, mixed-methods research (8,9,10,23,24,29) tends to take place more compared to previous studies. This may be attributed to the popularity of mixed methods research since it strengthens the reliability of studies. In addition, experimental studies appear to be established within the duration of treatment. Only one study (46) was conducted using longitudinal methods of research to verify that teaching pronunciation is beneficial for L2 users.

The methodological procedures and conditions may also lead to some concerns. For example, the small sample size of most of the experimental studies may jeopardize the reliability and generalizability of the findings. Thompson and Derwing (2014) highlighted the importance of a large number of samples for a typical quantitative study. Accurate measurement of the language input, particularly to examine improvement intelligibility and comprehensibility, requires time (Pennington & Rogerson-Revell, 2019). However, the reviewed studies took hours or days, which can reduce the reliability of the empirical evidence. Therefore, interventional studies may yield reliable improvements in intelligibility and comprehensibility, although these enhancements may necessitate several weeks or even months to become evident.

The lack of participant diversity in methodological implementations significantly undermines the reliability and generalizability of interventions. For

instance, the overwhelming majority of the participants in the reviewed studies were university students, with minimal representation from secondary, high school, or graduate students. Though the age of learning is a crucial predictor of L2 pronunciation attainment (Flege et al., 1995), surprisingly, it is rarely studied in L2 pronunciation research. Only one study was seen aiming at young learners, which could affect L2 pronunciation pedagogy. Similarly, the proficiency levels of the participants were predominantly confined to the pre-intermediate or intermediate level. The pronunciation performance due to typical pronunciation instruction and the strengths and weaknesses of other target populations with different L2 proficiency levels must also be examined.

Though the abovementioned concerns have already been underlined in the previous review (Thomson & Derwing, 2015) and meta-analytic studies (Lee et al., 2015), the current study findings obtained identical results. It is essential to keep in mind that a single research study does not suffice to be persuaded. The replication of the study by other researchers, involving examining the same variables with different participants, settings, and methodologies, enhances confidence in the research findings as it leads to a much more robust body of evidence (Johnson & Christensen, 2017). Compared to the previous studies, the recent publications appear to provide detailed information, which makes the entire procedure understandable and replicable. For example, the proficiency levels of the participants and the treatment duration were hard to understand in the previous findings. However, the available data sources are yet to be adequate. Future studies can therefore combine different data collection tools in pronunciation effectiveness studies.

As to the assessment stage of pronunciation research, recent studies, unlike overreliance on read-aloud tests, appear to use spontaneous speech, picture description, or interviews, which aim to enhance intelligibility and comprehensibility rather than reducing foreign accents. This tendency seems to lead researchers to use native English speakers as the raters of intelligibility. However, as Jenkins (2012) poses the question of "intelligible to whom," consideration of the phenomenon of intelligibility between L2 speakers can be another research topic. Further, the interconnectedness of perception and production (Flege, 1995) emphasizes the necessity of assessing both to ascertain the

effectiveness of instructional methods. In this case, the reliability and comprehensiveness of the research findings can be considerably enhanced.

In recent years, there has been a noticeable shift in the attention given to pronunciation instruction within the realm of second language teaching and research. This shift is evidenced by a growing number of experimental studies in this field focusing on the effectiveness of pronunciation teaching. However, it should be acknowledged that there is a significant amount of variability in research designs, which may limit the replicability of findings. Nevertheless, the obtained findings show that explicit instruction of phonological forms can have a substantial impact. This is likely due to its ability to direct learners' attention to phonetic information, facilitating learning in a manner that an implicit manner hardly achieves.

Although this study provides relevant information for researchers and practitioners, some limitations should be acknowledged. First, intervention studies not published in SSCI-indexed journals, book chapters, or dissertations were excluded. Further research can be carried out to obtain more information. Second, only those studies that focused on the English language were included in the study; pronunciation research in other foreign languages was ignored. This could also be a research topic for L2 researchers. Finally, other databases could have been used in the search phase. However, a periodic search refreshment was performed, and relevant meta-analyses, systematic reviews, and narrative reviews were examined to reduce the possibility of missing any study that met the specified criteria. Despite these limitations, this study revealed that experimental research testing the effectiveness of pronunciation instruction in L2 settings has been quantitatively and qualitatively enhanced in terms of its pedagogical and methodological contribution. However, the aforementioned shortcomings need to be addressed in future studies, such as the samples' diversity, experimental design features, validation procedures, and outcome measures.

Ethics committee permission information

Ethical approval is not applicable, because this article does not contain any studies with human or animal subjects.

References

Baran-Łucarz, M. (2016). Conceptualizing and Measuring the Construct of Pronunciation Anxiety: Results of a Pilot Study. In M. Pavlak (Eds.), *Classroom-oriented research: Reconciling theory and practice* (pp. 39-56). Springer International Publishing. https://doi.org/10.1007/978-3-319-30373-4_3

*Bashori, M., van Hout, R., Strik, H., & Cucchiarini, C. (2024). I can speak: Improving English pronunciation through automatic speech recognition-based language learning systems. *Innovation in Language Learning and Teaching*, 1–19. https://doi.org/10.1080/17501229.2024.2315101

*Bassetti, B., Cerni, T., & Masterson, J. (2022). The efficacy of grapheme-phoneme correspondence instruction in reducing the effect of orthographic forms on second language phonology. *Applied Psycholinguistics*, *43*, 683–705. https://doi.org/10.1017/S014271642200008X

*Cakir, I. (2012). Promoting correct pronunciation through supported audio materials for EFL learners. *Energy Education Science and Technology Part B: Social and Educational Studies*, 4(3), 1801-1812.

*Chen, H. C., & Tian, J. X. (2022). Developing and evaluating a flipped corpus-aided English pronunciation teaching approach for pre-service teachers in Hong Kong. *Interactive Learning Environments*, *30*(10), 1918-1931. https://doi.org/10.1080/10494820.2020.1753217

*Dai, Y., & Wu, Z. (2022). Mobile-assisted peer feedback on EFL pronunciation: Outcome effects, interactional processes, and shaping factors. *System*, *111*(3), 102953. https://doi.org/10.1016/j.system.2022.102953

*Dai, Y., & Wu, Z. (2023). Mobile-assisted pronunciation learning with feedback from peers and/or automatic speech recognition: A mixed-methods study. *Computer Assisted Language Learning*, *36*(5-6), 861-884. https://doi.org/10.1080/09588221.2021.1952272

De Bot, K. (1983). Visual feedback of intonation I: Effectiveness and induced practice behavior. *Language and Speech*, *26*(4), 331-350.

De Bot, K., & Mailfert, K. (1982). The teaching of intonation: Fundamental research and classroom applications. *TESOL Quarterly*, *16*(1), 71-77. https://www.jstor.org/stable/3586564

*Dekaney, E. M. (2003). The effect of computerized versus classroom instruction on the phonetic pronunciation of English. *JRME*, *51*(3), 206-217. https://doi.org/10.2307/3345374

Derwing, T. M., Munro, M. J., & Wiebe, G. E. (1998). Evidence in favor of a broad framework for pronunciation instruction. *Language Learning, 48(3)*, 393–410. https://doi.org/10.1111/0023-8333.00047

Deterding, D., & Kirkpatrick, A. (2006). Emerging South-East Asian Englishes and intelligibility. *World Englishes*, *25(3-4)*, 391-409. https://doi.org/10.1111/j.1467-971X.2006.00478.x

*Evers, K., & Chen, S. (2022). Effects of an automatic speech recognition system with peer feedback on pronunciation instruction for adults. *Computer Assisted Language Learning, 35*(8), 1869-1889. https://doi.org/10.1080/09588221.2020.1839504

Flege, J. E. (1995). Second language speech learning: Theory, findings and problems. In W. Strange (Ed.), Speech perception and linguistic experience: Issues in cross-language research (pp. 233-277). York Press.

Flege, J. E., Munro, M. J., & MacKay, I. R. (1995). Effects of age of second-language learning on the production of English consonants. *Speech communication*, *16*(1), 1-26. https://doi.org/10.1016/0167-6393(94)00044-B

*Fouz-González, J. (2017) Pronunciation instruction through Twitter: The case of commonly mispronounced words, *Computer Assisted Language Learning*, *30*(7), 631-663. https://doi.org/10.1080/09588221.2017.1340309

*Fouz-González, J. (2019). Podcast-based pronunciation training: Enhancing FL learners' perception and production of fossilised segmental features. *ReCALL, 31*(2): 150–169. https://doi.org/10.1017/S0958344018000174

*Fouz-González, J. (2020). Using apps for pronunciation training: An empirical evaluation of the English File Pronunciation app. *Language Learning & Technology*, *24*(1), 62–85. https://doi.org/10125/44709

*Galante, A., & Thomson, R. (2017). The effectiveness of drama as an instructional approach for the development of second language oral fluency, comprehensibility, and accentedness. *TESOL Quarterly*, *51*(1), 115-142. https://doi.org/10.1002/tesq.290

*Gilakjani, A. P., & Rahimy, R. (2019). Factors influencing Iranian teachers' use of computer assisted pronunciation teaching (CAPT). *Education and Information Technologies, 24*, 1715–1740. https://doi.org/10.1007/s10639-018-09851-6

*Gilakjani, A. P., & Rahimy, R. (2020). Using computer-assisted pronunciation teaching (CAPT) in English pronunciation instruction: A study on the impact and the teacher's role. *Education and Information Technologies*, *25*, 1129–1159. https://doi.org/10.1007/s10639-019-10009-1

Gilbert, J. B. (2012). *Clear speech: Pronunciation and listening comprehension in North American English* (4th ed.). New York: Cambridge University Press.

*Gooch, R., Saito, K., & Lyster, R. (2016). Effects of recasts and prompts on L2 pronunciation development: Teaching English /ɹ/ to Korean adult EFL learners. *System*, *60*, 117-127. http://dx.doi.org/10.1016/j.system.2016.06.007

*Gordon, J. (2021). Pronunciation and task-based instruction: Effects of a classroom intervention. *Research Perspectives on Practice*, *52*(1), 94–109. https://doi.org/10.1177/0033688220986919

Gordon, J., Darcy, I., & Ewert, D. (2013). Pronunciation teaching and learning: Effects of explicit phonetic instruction in the L2 classroom. In J. Levis & K. LeVelle (Eds.), *Proceedings of the 4th pronunciation in second language learning and teaching conference* (pp. 194–206). Iowa State University. https://www.iastatedigitalpress.com/pslltarticle/15215/galley/13704/view/

*Hua, C. (2022). Effects of mixed instruction on Chinese EFL learners' perception of phonemic contrasts. *International Review of Applied Linguistics in Language Teaching*, *60*(2), 315-337. https://doi.org/10.1515/iral-2018-0243

*Ibarrola, A. L. (2011). Imitating English oral texts: A useful tool to learn English pronunciation? *Porta Linguarum*, *16*, 49-63.

Isaacs, T., Trofimovich, P., & Foote, J. A. (2018). Developing a user-oriented second language comprehensibility scale for English-medium universities. *Language Testing*, *35*(2), 193–216. https://doi.org/10.1177/0265532217703433

Jenkins, J. (2000). *The phonology of English as an international language.* Oxford University Press.

Jenkins, J. (2002). A sociolinguistically based, empirically researched pronunciation syllabus for English as an international language. *Applied Linguistics*, *23*(1), 83-103. https://doi.org/10.1093/applin/23.1.83

Jenkins, J. (2012). English as a lingua franca from the classroom to the classroom. *ELT Journal, 66(4),* 486–494.

*Jiang, Y., & Chun, D. (2023). Web-based intonation training helps improve ESL and EFL Chinese students' oral speech. *Computer Assisted Language Learning*, *36*(3), 457-485. https://doi.org/10.1080/09588221.2021.1931342

Johnson R. B., Christensen L. (2017). Validity of research results in quantitative, qualitative and mixed research. In R. B. Johnson, & L. Christensen (Eds.), *Educational research: Quantitative, qualitative, and mixed approaches* (pp. 306–310). Sage Publications.

Joshi, A. (2016). Comparison between Scopus & ISI Web of Science. *Journal Global Values*, *7*(1), 1-11.

Kang, O., Rubin, D., & Pickering, L. (2010). Suprasegmental measures of accentedness and judgments of language learner proficiency in oral English. *The Modern Language Journal, 94(4),* 554–566. https://doi.org/10.1111/j.1540-4781.2010.01091.x

*Kartal, G., & Korucu-Kis, S. (2020). The use of Twitter and Youglish for the learning and retention of commonly mispronounced English words. *Education and Information Technologies*, *25*, 193–221. https://doi.org/10.1007/s10639-019-09970-8

*Kruk, M., & Pawlak, M. (2023) Using internet resources in the development of English pronunciation: The case of the past tense -ed ending. *Computer Assisted Language Learning*, *36*(1-2), 205-237. https://doi.org/10.1080/09588221.2021.1907416

*Lan, EM. (2022). A comparative study of computer and mobile-assisted pronunciation training: The case of university students in Taiwan. *Education and Information Technologies*, *27*, 1559–1583. https://doi.org/10.1007/s10639-021-10647-4

*Lee, B., Plonsky, L., & Saito, K. (2020). The effects of perception- vs. production-based pronunciation instruction. *System*, *88*, 102185. https://doi.org/10.1016/j.system.2019.102185

Lee, J., Jang, J., & Plonsky, L. (2015). The effectiveness of second language pronunciation instruction: A meta-analysis. *Applied Linguistics, 36(3),* 345–366. https://doi.org/10.1093/applin/amu040

Lee, J., Jang, J., & Plonsky, L. (2015). The effectiveness of second language pronunciation instruction: A meta-analysis. *Applied Linguistics, 36(3),* 345–366. https://doi.org/10.1093/applin/amu040

Levis, J. M. (2005). Changing contexts and shifting paradigms. *TESOL Quarterly, 39(3),* 369–377. https://doi.org/10.2307/3588485

*Luo, B. (2016). Evaluating a computer-assisted pronunciation training (CAPT) technique for efficient classroom instruction. *Computer Assisted Language Learning*, *29*(3), 451-476. https://doi.org/10.1080/09588221.2014.963123

*Macdonald, D., Yule, G., & Powers, M. (1994). Attempts to Improve English L2 Pronunciation: The Variable Effects of Different Types of Instruction. *Language Learning*, 44(1), 75-100. https://doi.org/10.1111/j.1467-1770.1994.tb01449.x

Metruk, R. (2024). Mobile-assisted language learning and pronunciation instruction: A systematic literature review. *Education and Information Technologies*, 1-28. https://doi.org/10.1007/s10639-024-12453-0

*Mompean, J. A., Fouz-González, J. (2016). Twitter-based EFL pronunciatıon instruction. *Language Learning & Technology*, *20*(11), 166-190. http://llt.msu.edu/issues/february2016/mompeanfouzgonzalez.pdf

Munro, M. J., & Derwing, T. M. (1995). Foreign accent, comprehensibility, and intelligibility in the speech of second language learners. *Language Learning, 45(1),* 73–97. https://doi.org/10.1111/j.1467-1770.1995.tb00963.x

Munro, M. J., Derwing, T. M., & Morton, S. L. (2006). The mutual intelligibility of L2 speech. *Studies in Second Language Acquisition, 28(1)*, 111-131. https://doi.org/10.1017/S0272263106060049

*Neri, A., Mich, O., Gerosa, M., & Giuliani, D. (2008). The effectiveness of computer assisted pronunciation training for foreign language learning by children. *Computer Assisted Language Learning*, *21*(5), 393-408. https://doi.org/10.1080/09588220802447651

Pennington M.C., & Rogerson-Revell P. (2019). Pronunciation in the classroom: Teachers and teaching Methods. In C.N. Candlin, & J. Crichton (Eds.), *English pronunciation teaching and research*: Research and practice in applied linguistics. Palgrave Macmillan. https://doi.org/10.1057/978-1-137-47677-7

Plonsky, L. (2011). *Study quality in SLA: A cumulative and developmental assessment of designs, analyses, reporting practices, and outcomes in quantitative L2 research* [Doctoral dissertation], Michigan State University.

Rogerson-Revell, P. (2008). Participation and performance in international business meetings. *English for Specific Purposes*, *27*(3), 338-360. https://doi.org/10.1016/j.esp.2008.02.003

*Saito, K. (2011a). Examining the role of explicit phonetic instruction in native-like and comprehensible pronunciation development: An instructed SLA approach to L2 phonology. *Language Awareness*, *20*(1), 45-59. https://doi.org/10.1080/09658416.2010.540326

Saito, K. (2012). Effects of instruction on L2 pronunciation development: A synthesis of 15 quasi-experimental intervention studies. *TESOL Quarterly*, *46*, 842–854. https://www.jstor.org/stable/43267893

*Saito, K. (2013). Reexamining effects of form-focused instruction on L2 pronunciation development: The role of explicit phonetic information. *Studies in Second Language Acquisition*, *35*(1), 1–29. https://doi.org/10.1017/S0272263112000666

*Saito, K. (2015). Variables affecting the effects of recasts on L2 pronunciation development. *Language Teaching Research*, *19*(3), 276–300. https://doi.org/10.1177/1362168814541753

Saito, K., & Plonsky, L. (2019). Effects of second language pronunciation teaching revisited: A proposed measurement framework and meta-analysis. *Language Learning*, *69*(3), 652-708. https://doi.org/10.1111/lang.12345

*Saito, Y., & Saito, K. (2017). Differential effects of instruction on the development of second language comprehensibility, word stress, rhythm, and intonation: The case of inexperienced Japanese EFL learners. *Language Teaching Research, 21(5),* 589–608. https://doi.org/10.1177/1362168816643111

Saito, Y., & Saito, K. (2017). Differential effects of instruction on the development of second language comprehensibility, word stress, rhythm, and intonation: The case of inexperienced Japanese EFL learners. *Language Teaching Research, 21(5),* 589–608. https://doi.org/10.1177/1362168816643111

*Saleh, A. J., & Gilakjani, A. (2021). Investigating the impact of computer-assisted pronunciation teaching (CAPT) on improving intermediate EFL learners' pronunciation ability. *Education and Information Technologies*, *26*, 489–515. https://doi.org/10.1007/s10639-020-10275-4

Sardegna, V. G., & Jarosz, A. (2023). Learning English word stress with technology. In R. I. Thomson, T. M. Derwing, J. M. Levis, & K. Hiebert (Eds.), *Proceedings of the 13th Pronunciation in Second Language Learning and Teaching Conference*, Brock University. https://doi.org/10.31274/psllt.16142

Schardt, C., Adams, M. B., Owens, T., Keitz, S., & Fontelo, P. (2007). Utilization of the PICO framework to improve searching PubMed for clinical questions. *BMC Medical Informatics and Decision Making*, *7*, 16. https://doi.org/10.1186/1472-6947-7-16

*Seferoğlu, G. (2005). Improving students' pronunciation through accent reduction software. *British Journal of Educational Technology*, *36*(2), 303–316.

*Sun, W. (2023). The impact of automatic speech recognition technology on second language pronunciation and speaking skills of EFL learners: A mixed methods investigation. *Frontiers in Psychology*, *14*, 1210187. https://doi.org/10.3389/fpsyg.2023.1210187

*Tanner, M. W., & Landon, M. (2009). The Effects of computer-assisted pronunciation readings on ESL learners' use of pausing, stress, intonation, and overall comprehensibility. *Language Learning & Technology*, *13*(3), 51–65. http://llt.msu.edu/vol13num3/tannerlandon.pdf

*Tejedor-García, C., Escudero-Mancebo, D., Cámara-Arenas, E., González-Ferreras, C., & Cardeñoso-Payo, V. (2020). Assessing pronunciation improvement in students of English using a controlled computer-assisted pronunciation tool. *IEEE Transactions on Learning Technologies 13*(2), 269-282.

Thomson, R. I., & Derwing, T. M. (2015). The effectiveness of L2 pronunciation instruction: A narrative review. *Applied Linguistics, 36(3),* 326–344. https://doi.org/10.1093/applin/amu076

*Tsang, A. (2022). Effects of narrow listening on ESL learners' pronunciation and fluency: An 'MP3 flood' programme turning mundane homework into an engaging hobby. *Language Teaching Research*, 26(3), 434-454. https://doi.org/10.1177/1362168819894487

*Vázquez, L. Q., & Romero, J. (2020). ESP1 within ESP: The design and implementation of a pronunciation module in a technical English course. *Journal of Linguistics, Philology and Translation, Onomázein* [Special Issue VI], 210-228. https://doi.org/10.7764/onomazein.ne6.11

*Wen, Y., Li, J., Xu, H., & Hu, H. (2023). Restructuring multimodal corrective feedback through augmented reality (AR)-enabled videoconferencing in L2 pronunciation teaching. *Language Learning & Technology*, 27, 83–107. https://hdl.handle.net/10125/73533

Wulff, S., & Ellis, N. C. (2018). Usage-based approaches to SLA. In D. Miller, F. Bayram, J. Rothman, & L. Serratrice (Eds.), *Bilingual cognition and language: The state of the science across its subfields* (pp. 37–56). John Benjamins. https://doi.org/10.1075/sibil.54

*Xue, X., & Dunham, R. E. (2023). Using a SPOC-based flipped classroom instructional mode to teach English pronunciation. *Computer Assisted Language Learning*, *36*(7), 1309-1337. https://doi.org/10.1080/09588221.2021.1980404

*Yang, J., Sun, B., Kuang X., & Thomas, M. S. C. (2023). Enhancing the auditory usage of L2 e-storybooks by precedingly providing learners with perceptual intervention. *Interactive Learning Environments*, *31*(10), 7320-7334. https://doi.org/10.1080/10494820.2022.2067185

*Yeldham, M. (2023). Examining the impact of abdominal enhancement techniques to assist Chinese speaking English learners' phoneme pronunciation. *Language Teaching Research*, *27*(4), 930–957. https://doi.org/10.1177/1362168820961774

*Yeldham, M., & Choy, V. (2022). The effectiveness of direct articulatory–abdominal pronunciation instruction for English learners in Hong Kong. *Language, Culture*

and Curriculum, *35*(2), 184-199. https://doi.org/10.1080/07908318.2021.1978476

*Yenkimaleki, M., & van Heuven, V. (2021). Effects of attention to segmental vs. suprasegmental features on the speech intelligibility and comprehensibility of the EFL learners targeting the perception or production-focused practice. *System, 100*, 102557. https://doi.org/10.1016/j.system.2021.102557

*Zhang, R., & Yuan, Z. (2020). Examining the effects of explicit pronunciation instruction on the development of L2 pronunciation. *Studies in Second Language Acquisition*, *42*(4), 905-918. https://doi.org/10.1017/S0272263120000121