RESEARCH METHODS USED IN STUDIES OF EFL PRONUNCIATION INSTRUCTION: A MAPPING REVIEW

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Abstract
This mapping review explores the research methods used in recent studies (2020–2025) on EFL pronunciation instruction. Following PRISMA guidelines, peer-reviewed, open-access studies were identified through Web of Science, Scopus, and ERIC. Nine studies were analysed in terms of research approach, research design, and data collection and data analysis methods. The findings reveal a strong dominance of quantitative and mixed-methods approaches, especially pre-test–post-test designs and inferential statistical analysis, while qualitative approaches remain underrepresented in current research.

Key words
EFL pronunciation, pronunciation instruction, research methods, experimental and quasi-experimental designs, mapping review

1. Introduction

Pronunciation is a core component of spoken language competence in English as a Foreign Language (EFL), shaping intelligibility, comprehensibility, and overall communicative success (Harmer, 2007; Hinkel, 2006; Scrivener, 2005). Despite its importance, pronunciation has long occupied a marginal position in language instruction and research (Harmer, 2007; Scrivener, 2005).

Alongside broader pedagogical developments, pronunciation research has become increasingly methodologically sophisticated. Experimental and quasi-experimental designs are now commonly employed to examine pronunciation development, often relying on pre-test–post-test comparisons and inferential statistical analyses (Ma, 2015). While this methodological trend has contributed to a growing body of empirical evidence, it has also resulted in a research landscape strongly oriented towards quantitative measurement and experimental control.

Previous reviews in the field have predominantly focused on the effectiveness of specific instructional approaches or techniques (e.g., Lee et al., 2015; Pacheco & Veas, 2025). By contrast, less attention has been paid to the research methods underpinning these empirical studies, although methodological choices directly affect the interpretation, validity, and generalisability of findings.

The present mapping review addresses this gap by examining the research methods used in recent experimental and quasi-experimental studies of pronunciation instruction in EFL contexts. Rather than synthesising instructional outcomes, the review maps prevailing methodological patterns, identifies underrepresented approaches, and highlights methodological constraints within the current literature. The study is guided by the following research question: *What research methods are used in studies investigating pronunciation instruction in EFL learners?*

2. Literature Review

The literature review provides a theoretical foundation for the mapping review of research methods used in studies on EFL pronunciation instruction. Rather than synthesising pedagogical findings, this section maps the conceptual and methodological landscape that informs the selection, analysis, and interpretation of studies reviewed in the subsequent sections.

3. Research Methods in Pronunciation Instruction Studies

This subsection outlines the methodological approaches most commonly employed in empirical research on EFL pronunciation instruction that are relevant to the present mapping review.

A substantial proportion of pronunciation research adopts a quantitative or mixed-methods (quantitative dominant) approach, most frequently using experimental or quasi-experimental methodologies (e.g., Sun, 2023; Trinh et al., 2022; Wahyuni, 2022). These studies typically employ pre-test–post-test procedures to examine instructional effects on learners' pronunciation performance. Quantitative approaches enable systematic examination of relationships between variables and group differences, both of which constitute central research concerns in EFL education (Ma, 2015). However, despite the traditional distinction between qualitative and quantitative research, many researchers now employ mixed-methods and interdisciplinary approaches (Given, 2008).

A defining methodological feature across both quantitative and mixed-methods studies is the use of comparative instructional designs. Yenkimaleki et al. (2023) compared segmental and suprasegmental pronunciation instruction combined with perception- and production-focused practice across multiple experimental groups and a control group. They found that segmental instruction, followed by production-focused practice, most strongly improved intelligibility, while suprasegmental instruction, combined with production-focused practice, led to the greatest gains in comprehensibility. Similarly, Li et al. (2025) compared AI-mediated and peer-mediated pronunciation instruction to examine their differential effects on EFL learners' pronunciation development and affective variables.

Pronunciation assessment methods display methodological consistency across studies. Read-aloud pronunciation tests at the word, sentence, or passage level are the most commonly used instruments, often rated by trained raters. Some studies employ binary scoring systems, while others use rating scales (Alharthi, 2024; Almalki & Algethami, 2022; Xodabande et al., 2025). In mixed-methods research, these quantitative measures are typically complemented by qualitative analyses using thematic analysis to provide deeper insight into learners' instructional experience (Alharthi, 2024; Almalki & Algethami, 2022; Li et al., 2025). On the other hand, analytical methods vary considerably, as reflected in the present mapping review, with studies employing t-tests, ANOVA, Mann-Whitney U tests, reporting of effect sizes, and others.

Together, these methodological tendencies provide the framework within which the findings of the present mapping review are interpreted.

4. Methods

This section outlines the methodological procedures employed in the present mapping review, which was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021).

The review aimed to examine recent empirical research on pronunciation instruction in EFL contexts by applying a transparent and replicable search strategy, together with clearly defined inclusion and exclusion criteria. A structured search was carried out across selected academic databases and a register in order to identify peer-reviewed studies that explicitly reported research methods relevant to the investigation of pronunciation instruction in EFL contexts.

No quantitative synthesis or meta-analysis was conducted in this review, as it was deemed redundant given the methodological focus of the study. Accordingly, a formal risk-of-bias assessment was not conducted, as the primary aim was to map and describe research methods used in empirical studies of EFL pronunciation instruction, rather than to evaluate the effectiveness or internal validity of instructional interventions.

Additionally, analyses of statistical heterogeneity and sensitivity were not applicable, as no statistical synthesis across studies was performed.
This framework facilitates the identification of prevailing research practices, as well as the gaps in the existing literature concerning research methods used in studies of EFL pronunciation instruction.

Eligibility Criteria
Eligibility for inclusion in this mapping review was established based on specific inclusion criteria. Studies were included if they met the following criteria: (a) they reported empirical research based on primary data, (b) they explicitly employed research methods, (c) they investigated pronunciation (segmental and/or suprasegmental features) as the main focus of the instructional intervention, (d) they were conducted in EFL contexts, (e) the participants were university EFL students, (f) they employed an experimental or quasi-experimental research design, (g) they were published between 2020 and 2025, (h) they were published in the English language, (i) they were available in open-access format, and (j) they were published as peer-reviewed journal articles.
Similarly, studies were excluded from this mapping review if they met any of the following criteria: (a) they were solely theoretical papers of any kind without empirical data, (b) they did not explicitly state research methods, (c) pronunciation (segmental and/or suprasegmental features) was examined only as part of broader speaking or language skills, (d) they were conducted solely in ESL or L1 contexts, (e) they involved participants other than university EFL students, (f) they did not employ an experimental or quasi-experimental design, (g) they were published outside the 2020-2025 time frame, (h) they were not written in the English language, (i) they were not available in open-access format, (j) they constituted duplicated records, and (k) they belonged to grey literature or non-peer-reviewed sources, mainly including conference proceedings, reports and theses (Farace & Schöpfel, 2010), which were excluded to ensure a consistent standard of methodological rigour and study quality. This exclusion may introduce publication bias by underrepresenting studies with null or negative findings.

Information Sources
The search for relevant literature was carried out in January 2026 using two major databases, Web of Science (WoS) and Scopus, together with one register, Education Resources Information Center (ERIC). WoS and Scopus were selected because they index a wide range of influential, peer-reviewed journals from various academic fields. ERIC was added to the search strategy as it strongly emphasises research in educational contexts.

Search Strategy
The search strategy combined key terms related to pronunciation, instructional contexts, learner populations, and research design using the Boolean operator "AND". The final search string used was "pronunciation AND EFL AND experiment* AND instruction AND learner*." The same search string was used in WoS, Scopus, and ERIC.
The database search identified 58 records in total, including 24 articles from Web of Science, 33 from Scopus, and 1 from the ERIC register. After the removal of 16 duplicate records, 41 studies remained for title and abstract screening and further evaluation.

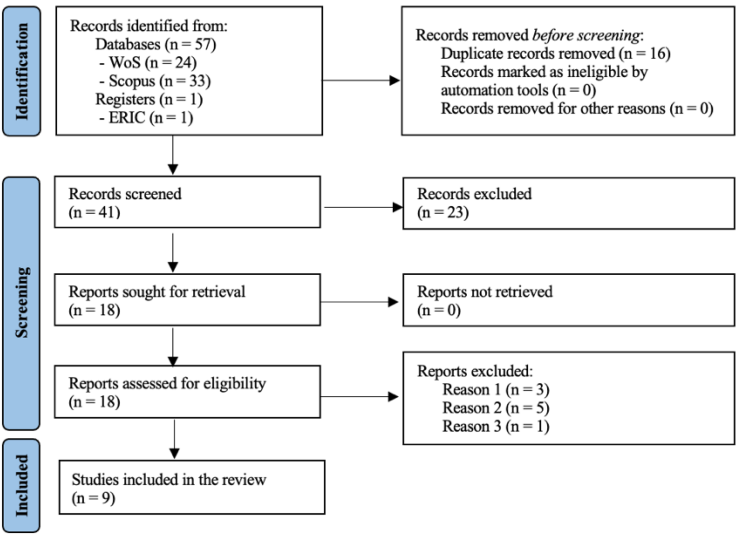


Figure 1: Adapted PRISMA Flow Diagram (Page et al., 2021)

Screening Process

The screening process was conducted to identify studies that met the predefined inclusion and exclusion criteria of this mapping review. After the removal of duplicate studies, the screening consisted of two stages: title and abstract screening, followed by full-text screening. All records were screened by a single reviewer. Given the scope of the review, no second independent reviewer was involved. The number of included and excluded studies at each stage is reported in the following subsections and summarised in the PRISMA flow diagram (see Figure 1).

Title and Abstract Screening

During title and abstract screening, studies were excluded if it was evident from their title and/or abstract that they did not align with the predetermined eligibility criteria. In particular, records were removed when pronunciation was not the main focus of the instructional intervention or if changes in pronunciation were not the primary outcome examined. This step ensured that only 18 studies clearly relevant to the aims of the review progressed to full-text screening.

Full Text Screening

During full-text screening, several studies were excluded for failing to meet the final eligibility criteria of the review. The primary reason for exclusion concerned participant level. Multiple studies focused on learners who were not university-level EFL learners. Following this, 3 studies were excluded. Additionally, 5 studies were excluded because pronunciation was not the primary focus of investigation. In these cases, pronunciation outcomes were examined indirectly (e.g., via foreign accent ratings or affective variables such as anxiety or enjoyment) rather than through explicit investigation of segmental and/or suprasegmental pronunciation features. Finally, 1 study was excluded because its instructional focus or outcome measures did not sufficiently align with the review aim of analysing research methods used in experimental and quasi-experimental studies of EFL pronunciation instruction.

Data Extraction and Coding

Data were extracted manually by the reviewer using a structured table to code them. Extracted variables included research approach, research design, country of origin, participant characteristics, sample size, intervention duration, pronunciation focus, assessment methods, and data analysis procedures.

5. Results

This section presents the findings of the mapping review based on nine empirical studies investigating pronunciation instruction in EFL contexts.

Table 1 provides an overview of the studies included in the review, including study identification numbers used throughout the Results section, accompanied by publication details such as title, author(s), and year of publication.

Table 1: The Set of Included Studies

Study	Title	Author(s)	Year
1	Improving EFL Non-English Majors' Pronunciation via a Flipped Classroom: A Modular Approach	Zhang, X.; AlSaqqaf, A.	2025
2	Gesture to Learn, Hum to Speak: Promoting L2 Pronunciation through Non-Verbal Techniques	Tseng, G.; Liu , Y.-T.; Fan, S. Y.-Ch.	2025
3	The Impact of Phonetics Instruction on Pronunciation Growth and Attitude Shifts Among EFL Undergraduates: Insights From Testing and Interviews	Mohammed, F. A. E.	2025
4	How AI-Powered Voice Recognition Has Supported Pronunciation Competence among EFL University Learners	Nguyen, T. S.; Nguyen, T. D. T.; Hoang, N. Q. N.; Do, T. K. H.	2025
5	The impact of computer-assisted pronunciation on Saudi students' production of English vowel sounds	Alshehri, A. A.	2025
6	Web-based Pronunciation Training and Learning Consonant Clusters among EFL Learners	Alsuhaibani, Y.; Mahdi, H. S.; Al Khateeb, A.; Al Fadda, H. A.; Alkadi, H.	2024
7	Improving the Pronunciation of Voiceless Consonant Sounds in Vietnamese EFL Undergraduates Using the Simplified Verbotonal Approach	Bui, N. N. M.; Lian, A.; Luu, T. M. V.	2024
8	The effect of synchronous and asynchronous computer-mediated communication (CMC) on learners' pronunciation achievement	Zeinali Nejad, M.; Golshan, M.; Naeimi, A.	2021
9	Promoting the correct production of English sounds in extensive reading-circle classes: Explicit vs. implicit pronunciation training	Yakut, İ.	2020

Research Approaches and Research Designs

A clear pattern emerges across the reviewed literature. In terms of research approaches, the reviewed set of studies is overwhelmingly quantitative-dominant. Of the nine studies analysed, four studies employed a purely quantitative research approach (Studies 1, 5, 8, and 9), relying exclusively on numerical pronunciation data derived from pre- and post-intervention testing. No qualitative data were collected in these studies.

The remaining five studies adopted a mixed-methods approach (Studies 2, 3, 4, 6, and 7), combining quantitative and qualitative methods. All mixed-methods studies were quantitative-dominant, with qualitative data used primarily to accompany statistical findings rather than to produce independent results. This reflects a tendency within pronunciation research to prioritise experimental evidence of instructional effectiveness while using qualitative data to provide contextual support.

Notably, no study employed a purely qualitative approach. This absence is significant, as it suggests that pronunciation instruction remains underexplored from a solely qualitative perspective. Given that pronunciation development is closely tied to affective, perceptual, and cognitive factors, this represents a clear gap in the existing research landscape.

Regarding research design, the most frequently used design across both quantitative and mixed-methods studies was the quasi-experimental pre-test–post-test design (Studies 1, 3, 4, 7, 8, 9), either with or without a control group. Studies 6 and 9 also incorporated delayed post-tests, reflecting an interest in both immediate gains and retention.

To provide a comparative overview of the methodological characteristics of the reviewed studies, Table 2 summarises country of origin, research method, research design, sample characteristics, and intervention duration.

Table 2: Characteristics of Included Studies

Study	Country	Research Approach	Research Design	Participants	Sample Size	Duration
1	China	Quantitative	Quasi-experimental	Chinese EFL undergraduates	100 (EG = 49; CG = 51)	14 weeks
2	Taiwan	Mixed-methods (quantitative dominant)	Experimental	Taiwanese EFL university students	93 (31 per group)	12 days
3	Saudi Arabia	Mixed-methods (quantitative dominant)	Quasi-experimental	Saudi female EFL undergraduates	72 (EG = 36; CG = 36)	14 weeks
4	Vietnam	Mixed-methods (quantitative dominant)	Quasi-experimental	Vietnamese EFL university learners	37	4 months
5	Saudi Arabia	Mixed-methods (quantitative dominant)	Experimental	Saudi Hijazi EFL university students	18 (EG = 9; CG = 9)	11 weeks
6	Saudi Arabia	Quantitative	Experimental	Saudi EFL university students	58 (EG = 28; CG = 30)	2 training sessions + delayed post-test
7	Vietnam	Mixed-methods (quantitative dominant)	Quasi-experimental	Vietnamese EFL undergraduates	70 (EG = 35; CG = 35)	10 instructional lessons (within one course)
8	Iran	Quantitative	Quasi-experimental	Iranian female EFL university learners	45 (FTF = 15; SCMC = 15; ASCMC = 15)	15 weeks
9	Turkey	Quantitative	Quasi-experimental	Turkish EFL university students	39 (EG = 22; CG = 17)	8 weeks + 2-week delayed post-test

Research Methods Across Studies

Concerning research methods, pronunciation development was assessed using controlled elicitation tasks, including word-, sentence-, and passage-level reading, as well as phonemic discrimination tasks with learners' speech audio-recorded for analysis. Pronunciation performance was predominantly evaluated through human rater judgement, employing either binary scoring or analytic rating scales, with interrater reliability systematically reported. Quantitative analysis relied primarily on inferential statistical procedures, such as paired-samples and independent-samples t-tests, ANOVA, non-parametric tests, and correlation analyses. In mixed-methods studies, qualitative data (questionnaires, interviews, focus groups) were included. Table 3 provides an overview of these differences.

Table 3: Data Collection and Analysis Methods Across Studies

Study	Pronunciation Focus	Data Collection Methods	Data Analysis Methods
1	Segmental and suprasegmental features	English Pronunciation Test (word, sentence, paragraph reading)	Independent samples t-test; paired samples t-test; effect size (Cohen's d)
2	Segmental and suprasegmental features	Read-aloud pronunciation pre-test/post-test rated on segmentals, intonation, stress, and rhythm; learner questionnaire	Paired-samples t-tests; one-way ANOVA; Scheffé post hoc tests; effect sizes (Cohen's d); thematic analysis
3	Segmental and suprasegmental features	Pronunciation pre-test and post-tests (reading words and sentences); semi-structured interviews	Paired-samples t-test; descriptive statistics; thematic analysis
4	Segmental and suprasegmental features	Pronunciation pre-test and post-tests; system-generated performance logs; questionnaires; focus-group interviews	Pearson correlations; descriptive statistics; thematic analysis
5	Segmental features	Recorded vowel production in /hVd/ context; ratings by trained phoneticians; semi-structured interviews	ANOVA; pre-test post-test comparisons; post-test group comparison
6	Segmental features	Three word-level production tests (pre-test, immediate post-test, delayed post-test); binary scoring (0/1)	Mann-Whitney U tests
7	Segmental features	Pronunciation tests (word, sentence, and passage reading); blind ratings by two trained raters; semi-structured interviews	Mann-Whitney U tests; ANCOVA; effect sizes (rank biserial correlation, Cohen's d); content analysis
8	Segmental and suprasegmental features	Lexical stress production test; phonemic discrimination (minimal pairs) test; binary rating	Paired-samples t-tests; one-way ANOVA; post hoc tests; non-parametric tests; effect sizes
9	Segmental features	Word-reading pronunciation test (29 high-frequency words), binary scoring (correct/incorrect)	Descriptive statistics; paired-samples t-tests; independent-samples t-test; effect size (Cohen's d)

Overall, the methodological profile of the reviewed studies indicates that empirical research on EFL pronunciation instruction is characterised by a strong reliance on quantitative approaches and quasi-experimental designs. Qualitatively oriented research is largely absent. Moreover, the methodological patterns highlight a strong emphasis on controlled speech measurement, rater-based evaluation, and statistical validation in pronunciation research. This methodological imbalance identifies the need for more diversified methodological approaches in future pronunciation research.

6. Discussion

The present mapping review set out to examine the research methods used in experimental and quasi-experimental studies of pronunciation instruction in EFL contexts. The findings reveal a clear and consistent methodological profile across recent empirical research. This discussion interprets these patterns, evaluates their implications, and situates them within the broader landscape of EFL pronunciation research.

A central finding of the review is the overwhelming dominance of quantitative and mixed-methods (quantitative dominant) approaches. All nine included studies relied on numerical pronunciation data as the primary source of evidence, with no study employing a purely qualitative design. This confirms the earlier observation that EFL pronunciation research prioritises measurable learning outcomes and statistical validation (Ma, 2015). While this emphasis allows for systematic comparison across studies and supports stronger inferential claims regarding causal relationships, it also reflects a narrow methodological orientation within the field. Qualitative approaches to the given research area represent a significant gap in the literature.

The frequent use of a quasi-experimental pre-test–post-test design (6 of 9 included studies), often with intact classes and non-random assignment, further portrays the constraints under which pronunciation is conducted in educational settings (Sun, 2023; Trinh et al., 2022; Wahyuni, 2022). This prevalence also raises concerns regarding internal validity, particularly when sample sizes are small (Study 5) or when the intervention period is short (Study 6).

The review also reveals methodological consistency in pronunciation assessment methods. Across studies, pronunciation development was commonly measured through controlled elicitation tasks, including word-, sentence-, and passage-level read-aloud tests, frequently evaluated by trained raters. This reflects the established tradition in pronunciation research, where production tasks are favoured for their reliability and comparability across participants (Alharthi, 2024; Almalki & Algethami, 2022; Xodabande et al., 2025). Although such tasks allow for precise measurement of segmental and suprasegmental accuracy, they may underrepresent learners' communicative pronunciation abilities in authentic interactions.

While assessment instruments showed relative consistency, researchers employed a wide range of statistical procedures, including paired-samples and independent-samples t-tests, ANOVA, Mann-Whitney tests, correlation analyses, and effect size reporting. This diversity might reflect growing awareness regarding selecting appropriate statistical choices.

Limitations

One limitation relates to the scope of the review. The present review was restricted to studies conducted in university-level EFL contexts and published in English-language, open-access journals between 2020 and 2025, only in selected databases and a register. While these criteria ensured a consistent level of methodological transparency and accessibility, they may have led to the exclusion of relevant studies published in other languages, outside the selected time frame, in restricted-access, or in other databases or

registers. Furthermore, the exclusion of grey literature may have introduced publication bias by underrepresenting studies reporting null or insignificant results.
The second limitation concerns the focus on experimental and quasi-experimental research designs. Consequently, descriptive and other designs were excluded, even though such approaches may offer valuable insights into pronunciation instruction.
Another limitation of this review is geographical bias. All studies included in this review were conducted in Asian EFL contexts, primarily in East Asia and the Middle East. No studies originated from other continents. This concentration limits the extent to which the findings can be generalised to other educational and sociolinguistic contexts.
Finally, although the review followed PRISMA 2020 guidelines for transparent reporting, not all checklist items were applicable due to the methodological mapping focus of the study. In addition, the review was not registered, and no formal protocol was prepared.

7. Conclusion

This mapping review set out to examine the research methods employed in experimental and quasi-experimental studies of pronunciation instruction in EFL contexts.
The analysis of nine empirical studies revealed a clear methodological pattern characterised by a strong reliance on quantitative and quantitative-dominant mixed-methods approaches. Across the reviewed literature, experimental and quasi-experimental pre-test–post-test designs were most frequently adopted, reflecting the field's emphasis on controlled comparison and quantitative measurement. Pronunciation outcomes were predominantly assessed using read-aloud or other controlled elicitation tasks, evaluated by trained human raters, and analysed using inferential statistical procedures such as t-tests, ANOVA, non-parametric tests, and effect size reporting.
At the same time, the review highlights notable limitations. Qualitative research designs were absent, and longitudinal perspectives were only minimally represented through delayed post-tests. In addition, the geographical concentration of studies in Asian EFL contexts raises concerns regarding the broader applicability of findings across diverse educational and sociolinguistic environments. Furthermore, future reviews could focus on literature outside the exclusion criteria to enrich the present mapping review by including additional aspects, such as publications in other languages, accessible in other ways than open-access format, published in an extended time period, or marked as grey literature, to eliminate publication bias.
In conclusion, by mapping prevailing research practices rather than synthesising instructional effectiveness, the present mapping review contributes a methodological perspective that complements existing content-focused reviews (e.g., Lee et al., 2015; Pacheco & Veas, 2025). In doing so, it highlights both strengths and limitations of current research practices and provides a foundation for more methodologically balanced investigations into EFL pronunciation instruction.

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