Data and Metadata. 2024; 3:.217
doi: 10.56294/dm2024.217

ORIGINAL

L1 Interference in English Major Students' Pronunciation at Technical University of Cotopaxi

Interferencia de la lengua materna en la pronunciación de estudiantes de la carrera de inglés en la Universidad "Técnica De Cotopaxi"

Marcia Janeth Chiluisa Chiluisa[1], Olga Lorena González Ortiz[1], Marco Paul Beltran Semblantes[1]

[1]Universidad Técnica de Cotopaxi, Latacunga, Ecuador.

Cite as: Chiluisa Chiluisa MJ, González Ortiz OL, Beltran Semblantes MP. L1 Interference in English Major Students' Pronunciation at Technical University of Cotopaxi. Data and Metadata. 2024; 3:.217. https://doi.org/10.56294/dm2024.217

Submitted: 10-01-2024 **Revised:** 03-06-2024 **Accepted:** 20-10-2024 **Published:** 21-10-2024

Editor: Adrián Alejandro Vitón-Castillo

Corresponding author: Marcia Janeth Chiluisa Chiluisa

ABSTRACT

This study aims to investigate the impact of mother tongue interference (Spanish) on the pronunciation of the phoneme /d/ in different positions among seventh-semester students majoring in English at the Technical University of Cotopaxi. The study employs a mixed approach with a correlational design. The correlation between the variables allows for the analysis of the quantifiable relationship between Spanish as a mother tongue interference and the quality of the pronunciation of the phoneme /d/ in English. The degree and direction of this correlation will help determine whether and to extent the interference has a significant impact on pronunciation. The findings of the study shed light on the challenges faced by students when pronouncing words with the phoneme /d/ in different positions. In the initial position, the interference is characterized by the transference of Spanish tongue positions and aspiration tendencies, leading to the production of [d] instead of the standard English sound, information detailed in the results and discussion section. In the middle position, students exhibit a tendency to apply Spanish flapping and elision patterns, resulting in the articulation of a tap or alveolar flap [ɾ] instead of the expected English sound. In the final position, the influence of Spanish leads some students to voice the English final /d/ even when English requires voicelessness, indicating the persistence of L1 interference. The results emphasize the importance of addressing specific phonetic and phonological aspects that arise due to mother tongue interference in pronunciation training. Understanding the intricate interplay between L1 influence and the articulation of the phoneme /d/ can lead to targeted interventions that enhance students' pronunciation skills and contribute to their overall communicative competence in English.

Keywords: Mother Tongue; Interference; Pronunciation; Variations.

RESUMEN

Esta investigación tiene como objetivo investigar el impacto de la interferencia de la lengua materna (español) en la pronunciación del fonema /d/ en diferentes posiciones entre estudiantes de séptimo semestre matriculados en la carrera de Inglés de la Universidad Técnica de Cotopaxi. El estudio emplea un enfoque de métodos mixtos con un diseño correlacional. La variable independiente es la interferencia de su lengua materna, mientras que la variable dependiente es la pronunciación de los estudiantes. Los hallazgos del estudio arrojan luz sobre los desafíos que enfrentan los estudiantes al pronunciar palabras con el fonema /d/ en diferentes posiciones. En la posición inicial, la interferencia se caracteriza por la transferencia de posiciones de la lengua española y tendencias de aspiración, lo que lleva a la producción de [d] en lugar del sonido estándar en inglés. En la posición media, los estudiantes exhiben una tendencia a aplicar patrones de elisión y aleteo en español, lo que resulta en la articulación de un golpecito o aleteo alveolar [ɾ] en lugar del

sonido esperado en inglés. En la posición final, la influencia del español lleva a algunos estudiantes a expresar la /d/ final en inglés incluso cuando el inglés requiere falta de voz, lo que indica la persistencia de la interferencia de la L1. Los resultados enfatizan la importancia de abordar desafíos fonéticos y fonológicos específicos que surgen debido a la interferencia de la lengua materna en el entrenamiento de la pronunciación. Comprender la intrincada interacción entre la influencia de la L1 y la articulación del fonema /d/ puede conducir a intervenciones específicas que mejoren las habilidades de pronunciación de los estudiantes y contribuyan a su competencia comunicativa general en inglés.

Palabras clave: Interferencia; Lengua Materna; Pronunciación; Variaciones.

INTRODUCTION

The learning of English pronunciation is influenced by a variety of linguistic and psychological factors that have been widely analyzed in applied linguistics. According to the linguistic interference model proposed by Lado,[1] students tend to transfer the phonetic structures of their mother tongue (L1) to the target language (L2), which leads to the occurrence of phonological errors. This phenomenon is noticeable among students learning English, who, as Silva[2] points out, face difficulties in trying to produce sounds that do not exist in Spanish, resulting in a less natural pronunciation or one that deviates from the standard norm of English.

Learning English comes with challenges, especially when it comes to pronunciation. Vyomakesisri,[3] mentions that, “any student learning English as a second language have problems in pronouncing the words correctly” (p.22). Since English is spoken by people of various nationalities, there is a wide variation in accents and pronunciation styles around the world. This can lead to misunderstandings and difficulties in communication, even between competent speakers, which also is remarked by Gilakjani,[4] with the statement “a speaker has acceptable pronunciation when other people can understand him/her and the speaker’s English is of great value to listen to” (p.2). Correct English pronunciation is essential for effective and clear communication; pronunciation involves not only producing correct sounds, but also the ability to use proper stress and intonation to convey meaning and intentions appropriately.

Ecuadorian students may experience difficulties producing certain sounds in English that do not exist in their native language, resulting in different or unnatural pronunciation.[2] They may also have problems with the intonation and rhythm of English, which affects comprehension and fluency in oral communication as Lado,[1] quotes, ‘Because the student transfers habits of English system to Spanish there will be a problem when the sound systems of English and Spanish differ’ (p.26).

Interlanguage Theory

Interlanguage theory, a fundamental concept in the field of second language acquisition (SLA), was introduced by Larry Selinker in the early 1970s. It seeks to explain the transitional linguistic system that language learners develop as they progress towards proficiency in a second language (L2). This theory explains the earlier belief that L2 acquisition is a linear process where learners move from a direct translation of their native language (L1) to complete mastery of the target language. Instead, interlanguage theory underscores the dynamic and evolving nature of language acquisition. Selinker’s[5] interlanguage theory posits that learners develop a unique and autonomous linguistic system that sits between their L1 and the target language. This system is shaped by a range of factors, including L1 influence, exposure to the target language, individual learning strategies, and cognitive processes. Interlanguage is seen as a temporary state in which learners’ linguistic knowledge is characterized by both elements from their L1 and approximations of the L2. This intermediate stage is influenced by the learners’ existing linguistic repertoire and cognitive resources.[5]

Contrastive Analysis

Contrastive Analysis is a theoretical framework within the field of second language acquisition (SLA) that aims to predict and explain the difficulties and errors language learners might encounter when acquiring a new language.[6] This approach originated in the mid-20th century and was influenced by behaviorist theories of learning and structural linguistics. The key concept behind Contrastive Analysis is to systematically compare the linguistic elements of a learner’s native language (L1) with those of the target language (L2) to identify similarities and differences. The ultimate goal is to shed light on areas where learners might face challenges due to the divergences between the two languages.

The Contrastive Analysis Hypothesis, proposed by Robert Lado in the 1950s, posits that similarities between L1 and L2 structures facilitate language learning, while differences lead to difficulties and errors. According to Lado, when the structures of L1 and L2 are similar, transfer of knowledge can occur, aiding the learner’s understanding. However, when structures diverge, learners might struggle to acquire new patterns and may

apply L1 rules inappropriately to L2 contexts, leading to interference.[6]

The Contrastive Analysis Hypothesis states that the mechanisms that can affect the acquisition of a second language are diverse and come from both internal and external factors, the key concepts used to explain how native language interference affects foreign language learning are mentioned below.

Structural Comparisons: Contrastive Analysis involves a thorough comparison of linguistic elements, including phonological, morphological, syntactic, and semantic aspects, between L1 and L2. This comparison aims to identify potential areas of difficulty and predict the types of errors learners might make.

Positive Transfer: Positive transfer occurs when linguistic features in L1 facilitate the learning of corresponding elements in L2. For example, if words order is similar between L1 and L2, learners are likely to have an easier time grasping sentence structures.

Negative Transfer (Interference): Negative transfer, or interference, arises when learners apply L1 rules to L2 contexts, resulting in errors. These errors can stem from structural differences between the languages. For instance, if L1 lacks a certain grammatical feature present in L2, learners might omit or misuse it due to negative transfer.

Error Prediction: By identifying structural divergences through Contrastive Analysis, educators can predict the types of errors learners are likely to make and design instructional strategies that target these specific challenges.

Limitations: Contrastive Analysis has several limitations. Not all errors in second language (L2) learning are due to differences with the native language (L1); internal factors such as the student's competence and individual learning process also play a role. Contrastive Analysis focuses on negative interference caused by structural differences, but overlooks aspects such as motivation and cognitive strategies. Additionally, it underestimates the positive impact of similarities between L1 and L2 on learning. It simplifies the process by assuming that all students of the same L1 face the same difficulties, without considering individual differences, which are influenced by sociocultural context and linguistic changes.

Language Interference

Language interference, a phenomenon deeply rooted in the realm of bilingualism and second language acquisition, holds a pivotal role in shaping linguistic patterns, communication nuances, and cognitive processes. It encapsulates the intricate interplay between one's native language (L1) and the acquired language (L2), unfurling a myriad of complex interactions that range from phonological and syntactic to lexical and pragmatic dimensions.[5] Selinker, in his work Interlanguage, mentions that this phenomenon has captivated the attention of researchers and linguists alike, as it unravels the intricate dance between linguistic systems and offers insights into the intricacies of language acquisition and use.

Mother tongue Interference

The interference of the mother tongue in the pronunciation of English is a common difficulty that affects many non-native students. The different sounds, intonation patterns and phonological structures between Spanish and English can give rise to systematic errors in pronunciation. In Spanish, the phoneme /d/ is pronounced as a voiced alveolar stop consonant, where the tongue touches the alveolus, the space between the upper and lower teeth. In contrast, in English, the phoneme /d/ is also a stop consonant, but its phonetic realization can vary depending on its position in the word and surrounding consonants. For example, in words like 'day' or 'dog', the phoneme /d/ is pronounced similarly to Spanish. However, in words like 'hand' or 'adventure', the phoneme /d/ is often pronounced with a slight voicing or may even be dropped in some dialects.

The interference of the mother tongue in the pronunciation of English by seventh semester students at the Technical University of Cotopaxi could be manifested in the transfer of the pronunciation of the phoneme /d/ from Spanish to English. This could result in a different pronunciation in words where the phonetic realization of the phoneme /d/ differs between the two languages.[7,8,9] These phonetic differences can lead to a variation pronunciation of the phoneme /d/ in English, which affects the clarity and comprehensibility of communication.[10]

METHOD

Addressing research questions. This combination of approaches enabled a clear comprehension to the issue of L1 interference in pronunciation, considering that quantitative research provides numerical and statistical data to support qualitative observations, while qualitative research offers a deep understanding of individual student experiences and the reasons behind the interference. This combination of approaches enhances the validity and interpretation of the results, providing a richer and more complete view of the phenomenon in question. Data collection was carried out in five stages to comprehensively address L1 interference in the pronunciation of the /d/ phoneme in English learners: Pronunciation Recordings, Qualitative and Quantitative Analysis, Comparison with Standard English, Validation, and Interpretation:

1) Development of a Word Checklist: A checklist was designed that contained a list of words in English and

Spanish that included the phoneme /d/ in various positions (beginning, middle, and end). This allowed us to compare the pronunciation of similar words in both languages and to analyze the phonetic differences and deviations. 2) Pronunciation Recordings: Pronunciation recordings of the students were collected. Participants were asked to pronounce the words on the checklist in both English and Spanish. The students provided 3 audios where they pronounce the words by /d/ phoneme position. This allowed us to analyze how they apply the phonetic and phonological rules of their mother tongue to English and if these results in interference. 3) Qualitative & Quantitative Analysis: A qualitative analysis of the recordings was performed to identify interference patterns and pronunciation errors. It was examined how the students treated the phoneme /d/ in different positions and if they applied the rules of Spanish to English. Instances of interference and pronunciation errors in the recordings were quantified. Percentages and frequencies were calculated to determine the prevalence of different types of interference at specific phonetic positions. 4) Comparison with Standard English: Student recordings were compared with a standard English pronunciation to identify deviations and differences. This allowed evaluating the degree of influence of L1 on pronunciation. 5)Validation and Interpretation: The results of the data collection were validated and interpreted in the context of the research. Trends and interference patterns were identified based on phonetic positions and related to the phonological characteristics of Spanish.

The data collection was carried out through the recording of pronunciations of words in English and Spanish, focusing on the phoneme /d/. The mixed methodology allowed a deep and complete understanding of how the students apply the phonetic and phonological rules of their L1 to English and how this affects their pronunciation. Aggarwal & Ranganathan,[11] mention that a descriptive study is structured to depict the arrangement of one or multiple variables, without considering any causal or alternative hypotheses. The present research describes the correlation between the mother tongue interference in the English pronunciation of the 7th semester English Major at the technical University of Cotopaxi. The correlation of the mother tongue interference was made by a checklist of 30 words in spanish and 30 words in english, divided in three groups according to the position of the phoneme /d/ (beginning, middle & ending) and each word was organized with a vowel in alphabetical order, in Spanish and English.

Bhandari,[12] mentions that a correlational research design examines connections between variables without the researcher exerting control or altering any of them. This research is correlational because it focuses on analyzing the relationship and associations between two variables: the interference of the mother tongue (L1) and the pronunciation of the phoneme /d/ in English students at the Technical University of Cotopaxi. In this type of research design, the aim is to identify if there is a relationship between the variables without manipulating any of them. In this case, the independent variable is the interference of L1 (Spanish) in the pronunciation of the phoneme /d/ in different phonetic positions, while the dependent variable is the actual pronunciation of the students. The objective is to determine if there is a significant correlation between L1 interference and different or deviant pronunciation of the phoneme /d/.

The research seeks to establish whether the presence and main aspects of L1 interference in the pronunciation of the /d/ phoneme are associated with variations or pronunciation difficulties in students. Through the analysis of pronunciation recordings and comparison with standard English, it aims to determine if students who show greater L1 interference also present more affected pronunciation. For the development of this research, the sample consists of seventh-semester students from the National and Foreign

Language Pedagogy, English Major, at the Technical University of Cotopaxi.

For the present project, the population sample selected were seven students of the seventh semester of the National and Foreign Pedagogy, English Major, of the Technical University of Cotopaxi the seventh semester ‘A’ was conformed by 28 students where only 7 were taken into consideration for the participation of the students. 5 of the students were female among the 21 and 25 years old, and 2 of the participants were male, among 22 and 23 years old. The 7 participants were informed about the objective of the research and were given the corresponding consent to participate.

Nayeem & Huma,[13] mention in their paper, ‘Non-probability sampling method mostly involves judgment, instead of randomization, participants are selected because they are easy to access’ (n.p) A type of ‘non-probability sample’ known as convenience sampling was applied. The criteria for the selection of the 7 participants was based on the accessibility and availability of the students that were part of the sample. Convenience sampling involves selecting participants who are more accessible and convenient to the researcher, rather than selecting them randomly or following a more rigorous sample selection process. In this case, the researchers may have selected students from the National and Foreign Language Pedagogy major at the Technical University of Cotopaxi who were willing and available to participate in the study.

The criteria for the selection of the 7 participants was based on factors such as the availability of time, the willingness to be recorded pronouncing words in English and Spanish, and also on the diverse representation of different levels of L1 interference in the pronunciation of the language. phoneme /d/. The seventh semester students are participating in pre-professional practices, in this way, the level of pronunciation of students is

relevant.

DISCUSSION

In this section, the results obtained are analyzed in relation to prior knowledge, using the information collected from the sample regarding the research problem.

The discussion section aims to assess and demonstrate the significance of the results in relation to the existing knowledge about the research problem. It also seeks to explore and interpret new perspectives or insights about the problem after considering the findings obtained.

A list of 60 words (30 in Spanish and 30 in English) was provided to the students, which they had to pronounce in both languages. Deviations of the /d/ phoneme were analyzed in three positions: beginning, middle, and end of the words. The organized data is presented in the following table.

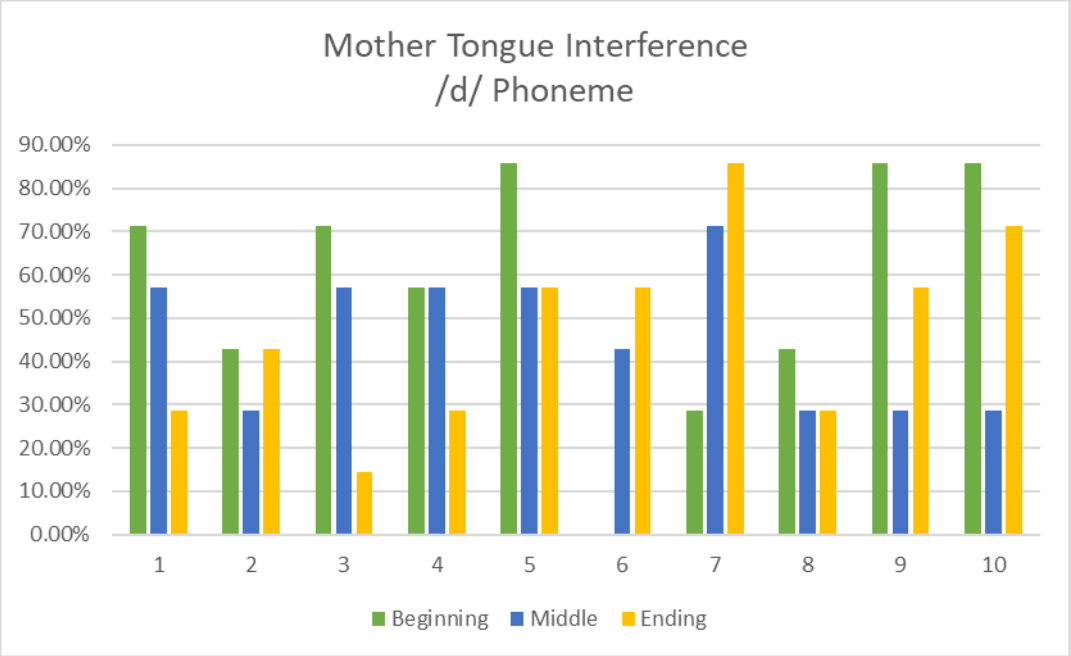

Figure 1. Mother tongue Interference of the /d/ phoneme in three sections

The mother tongue interference of the /d/ phoneme in English pronunciation can have several notable effects, both linguistically (the incorrect transfer of L1 patterns) and pedagogically (practice exercises focused on tongue placement and constant feedback.). Linguistically, it can cause errors in sound production due to differences between languages. Pedagogically, educators must employ specific strategies to correct these difficulties and improve students' English pronunciation. This phenomenon arises due to the differences in how the /d/ phoneme is realized and pronounced in the native language (Spanish) and the target language (English). These effects impact language learners' ability to accurately reproduce English sounds and can influence their overall linguistic competence. The study's findings reveal that students encounter difficulties when pronouncing words beginning with the phoneme /d/. Many of these students struggled to achieve accurate pronunciation, with interference levels exceeding 28 %. This signals a significant departure from the established standard pronunciation identified by the researcher.

The interference of the mother tongue in the pronunciation of the /d/ phoneme's initial position arises from the transfer of phonetic and articulatory patterns from Spanish to English. Students inadvertently apply Spanish tongue positions and aspiration tendencies to the English /d/ sound, leading to pronunciations that deviate from the established English norms. On the other hand, in the context of the middle-positioned phoneme /d/, students encountered varying degrees of difficulty. Four out of ten words displayed a relatively manageable 28,7 % interference rate, while the remaining four words exhibited more significant mother tongue interference, surpassing 57 %. The middle-positioned phoneme /d/ presented fewer difficulties for students, although varying levels of mother tongue interference persisted. The analysis emphasized the impact of Spanish phonetic patterns, particularly in relation to flapping and elision tendencies in English. This underlines the complexities students face when adapting to the nuances of English pronunciation influenced by their native language.

The correlation between the interference of the mother tongue (independent variable) and the pronunciation of the /d/ sound by students (dependent variable) can be significant, because when students learn a second language, specially one with phonetic elements that differ from their mother tongue, the native language

influences their pronunciation.

In this context, the interference of the mother tongue refers to how the phonetic patterns and sounds of the first language affect the way students produce the /d/ sound in the second language. For example, if the /d/ sound in the students´mother tongue is pronounced differently or not as distinctly as in the second language, this can lead to pronunciation challenges.

A positive correlation might be observed where higher interference from the mother tongue leads to more pronounced deviations in the students´pronunciation of the /d/ spund, making it less accurate according to the standards of the target language. Conversely, a negative or weak correlation might indicate that the mother tongue has little to no significant effect on the students´pronunciation of this sound.

For the teachers is very important to understand this correlation in order to have useful teaching strategies to address specific phonetic challenges posed by mother tongue interference, which helps students´ pronunciation.

Finally, challenges arise in pronouncing the final /d/ due to language differences, with mother tongue interference causing Spanish-influenced voicing in English words. In the pronunciation of the final /d/ in English can result in voicing where English would have voiceless consonants. Spanish, with its clear voiced /d/ in final position, influences some Spanish speakers to pronounce English final /d/ as voiced, even when English dictates voicelessness.

CONCLUSIONS

In conclusion, the foundation upon which this research is built comprises a comprehensive theoretical framework that draws from various crucial concepts within the fields of phonetics, phonology, and second language acquisition. Through an intricate examination of these foundational principles, such as the Contrastive Analysis and the Interlanguage Theory, the study delves into the complex interplay between the students' native language, Spanish, and their journey toward acquiring proficient English pronunciation skills. This conclusion reflects not only the synthesis of the various threads of knowledge woven throughout the study but also highlights the significance and implications of the theoretical underpinnings.

The study's findings highlight pronounced challenges encountered by students in the pronunciation of words initiating with the phoneme /d/. The observed interference levels exceeding 28 % indicate a notable divergence from standard pronunciation such is the case of the word duck. This interference of initial position /d/ stems from the transference of Spanish phonetic and articulatory patterns, leading students to unintentionally apply Spanish tongue positions and aspiration tendencies to the English /d/ sound producing the variation [d]. Similarly, middle-positioned /d/ phonemes exhibited varying levels of difficulty. This is the case of the word condescending, which had a high percentage of different pronunciation. Despite this, students tend to emphasize Spanish's influence on English flapping and elision tendencies. Lastly, the pronunciation of final /d/ stem from language differences, as Spanish-influenced voicing interferes with English voiceless consonants having a variation of [t] instead of the correct phoneme this is the case of paranoid.

The comparison between seventh semester students' pronunciation of the phoneme /d/ in English and standard English has clearly revealed how the mother tongue (Spanish) has an impact on the way students articulate this sound. The differences observed in phonetic interference have shown that students tend to face specific difficulties in the production of the phoneme /d/, due to the phonetic differences between Spanish and English. The mother tongue interference of the /d/ phoneme holds important pedagogical and linguistic implications for language instruction and learning strategies. Moreover, the linguistic implications underscore the intricate relationship between native and target language phonetic systems, contributing to our broader understanding of phonetics, phonology, and language acquisition processes.

BIBLIOGRAPHIC REFERENCES

1. Lado R. A comparison of the sound systems of English and Spanish. Hispania [Internet]. 1956;39(1):26. Available from: http://dx.doi.org/10.2307/335188

2. Silva, C. (2022). A comparative linguistic analysis of English and Spanish phonological system. GiST Educ Learn Res J [Internet]. 2022; Available from: http://files.eric.ed.gov/fulltext/EJ1372559.pdf

3. Vyomakesisri T. Challenges in learning English as secondary language. International Journal of English and Literature [Internet]. 2017;7:21–4. Available from: https://d1wqtxts1xzle7.cloudfront.net/55484729/4.IJELDEC20174-libre.pdf?1515483098=&response-content-disposition=inline%3B+filename%3DCHALLENGES_IN_LEARNING_ENGLISH_AS_SECOND.pdf&Expires=1735617569&Signature=L~-2n5hR7IxxIyE1lLjzEnQSvZLxwmopHkTLfgiuxIK6BHCMNozscS96jzlN6eTFb~lUp3xpzyTiBrIumvXHS0AShIJD4eGgvaYBRZIKhvQmL7SwpKMlXMGrWQw-Kk4-n73g2YbqVEvTkYpLXBX5EwXGG24cUZmxSQpug907lKsspqT-0Mfi~FKIAOzds07F9FTpgtQJB6X4pwoSRAyRtxTh35rl5QyZ3iIrWra9QCZpOGZO-nRC25mzGWmkRl3ifIjtfhxL34UXKxYpjGCkhQTguAQQZDo4QeSTBHeFxuso5WDHymQYYrL4IbqEMfvXLJDA-MTXEzreCqr4nYr-JQ__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA

4. Gilakjani AP. English pronunciation instruction: A literature review. International Journal of Research [Internet]. 2016;1:1–6. Available from: https://ijreeonline.com/article-1-21-en.pdf

5. Selinker L. INTERLANGUAGE. IRAL Int Rev Appl Linguist Lang Teach [Internet]. 1972;10(1–4). Available from: http://dx.doi.org/10.1515/iral.1972.10.1-4.209

6. Lado R, Fries CC. Linguistics across cultures: Applied linguistics for language teachers. [Internet], Ann Arbor, MI: University of Michigan Press; 1957. Available from: https://thuvienso.thanglong.edu.vn/flowpaper/simple_document.php?subfolder=11/95/83/&doc=119583289108047424928689637436465524 27&bitsid=932219c3-b159-47a2-a9d2-36eaa5b74a52&uid=

7. Salcedo CS. The phonological system of Spanish. Revista de Lingüística y Lenguas Aplicadas [Internet]. 2010;5:195–209. Available from: https://dialnet.unirioja.es/descarga/articulo/3269828.pdf

8. Afonso, E. The Importance of Teaching English Pronunciation in Spanish Schools. [Internet]. España. Universidad De La Laguna, 2020. Available from: http://riull.ull.es/xmlui/handle/915/22905

9. Sandoval-Fox Y, Román-Zubeldia J, Vázquez-Fernández P. Methodological process of cross-cultural adaptation of the survey "The Public Opinion Survey on Human Attributes-Stuttering (POSHA-S)" to spanish-chilean. Salud, Ciencia y Tecnología. 2024 ;4:.989.

10. MV N, Gill C. A study on the approaches of teaching English for deaf and hard-of-hearing (DHH) students in the special higher secondary schools (HSS) in south India. Salud, Ciencia y Tecnología. 2024;4:.1299.

11. Aggarwal R, Ranganathan P. Study designs: Part 2 – Descriptive studies. Perspect Clin Res [Internet]. 2019;10(1):34. Available from: http://dx.doi.org/10.4103/picr.picr_154_18

12. Bhandari, P. Correlational Research When & How to Use. [Internet]. Scribbr. 2023. Available from: https://www.scribbr.com/methodology/correlational-research/#:~:text=A%20correlational%20research%20design%20investigates,be%20either%20positive%20or%20negative.

13. Nayeem, S., & Huma, P. Non-Probability and Probability Sampling. [Internet], Pathshala, n.p. 2017, Available from: https://www.researchgate.net/publication/319066480_Non-Probability_and_Probability_Sampling

FUNDING

The authors have not received funding for the development of this research.

CONFLICT OF INTEREST

The authors declare that they have no conflicting interests.

CONTRIBUTION OF THE AUTHORS

Conceptualization: Oscar Bladimir Velasco Panchi, Jirma Elizabeth Veintimilla Ruiz, Luis David Moreano Martínez, Isabel Regina Armas Heredia.

Formal analysis: Oscar Bladimir Velasco Panchi, Jirma Elizabeth Veintimilla Ruiz, Luis David Moreano Martínez, Isabel Regina Armas Heredia.

Research: Oscar Bladimir Velasco Panchi, Jirma Elizabeth Veintimilla Ruiz, Luis David Moreano Martínez, Isabel Regina Armas Heredia.

Supervision: Oscar Bladimir Velasco Panchi, Jirma Elizabeth Veintimilla Ruiz, Luis David Moreano Martínez, Isabel Regina Armas Heredia.

Writing, proofreading and editing: Oscar Bladimir Velasco Panchi, Jirma Elizabeth Veintimilla Ruiz, Luis David Moreano Martínez, Isabel Regina Armas Heredia.

Writing - original draft: Oscar Bladimir Velasco Panchi, Jirma Elizabeth Veintimilla Ruiz, Luis David Moreano Martínez, Isabel Regina Armas Heredia.