Universidad de Valladolid

FACULTAD DE FILOSOFÍA Y LETRAS

DEPARTAMENTO DE FILOLOGÍA INGLESA

Máster en Profesor de Educación Secundaria Obligatoria y Bachillerato, Formación Profesional y Enseñanza de Idiomas. Especialidad: Inglés

TRABAJO FIN DE MÁSTER

Voicing the Future: Enhancing Secondary Students' Pronunciation through Speechace

Jesús Navarro Rodríguez

Tutor: Dr. Eduardo Gómez Garzarán

Valladolid, June 2025

Table of Contents

Abstract

Explicit pronunciation instruction in the Spanish secondary education system is often overlooked, despite its academic, professional, and sociocultural relevance. Current educational policies and secondary school curriculum designs relegate pronunciation to the background, devoting greater focus to other linguistic elements. In the globalized and technological context in which we are framed, AI has become a paradigm shift in the way pronunciation is taught. AI-powered pronunciation-oriented tools such as Speechace have been proposed as innovative tools with great pedagogical potential, as they offer automated feedback, personalized practice, and new learning contexts. This dissertation critically analyzes the integration and implementation of Speechace as a potentially valuable tool with pedagogical value in a Spanish secondary school and Bachillerato classroom to improve pronunciation of English as a second language (ESL). The proposal consists of four activities centered around improving learners' pronunciation and aimed at a target audience of students in their 4th year of compulsory secondary education or their 1st year of Bachillerato with a B1+ level in English. Through an analysis of elements such as accessibility, the quality of feedback provided, and automation, light is shed on the promising nature of Speechace for its proper implementation. Lastly, this dissertation defends a balanced incorporation of technology-enhanced methodology whose main aim is to improve phonological competence, thereby diminishing negative emotional responses towards pronunciation and overall, mastering English oral abilities.

Key Words: pronunciation, second language acquisition, artificial intelligence, technology-enhanced learning, Speechace.

Abstract

La enseñanza explícita de la pronunciación en el sistema de educación secundaria español suele pasarse por alto, a pesar de su relevancia académica, profesional y sociocultural. Las políticas educativas actuales y los diseños curriculares de secundaria relegan la pronunciación a un segundo plano, priorizando otros elementos lingüísticos. En el contexto globalizado y tecnológico en el que nos encontramos, la IA ha supuesto un cambio de paradigma en la enseñanza de la pronunciación. Herramientas orientadas a la pronunciación basadas en IA, como Speechace, se han propuesto como herramientas innovadoras con un gran potencial pedagógico, ya que ofrecen retroalimentación automatizada, práctica personalizada y nuevos contextos de aprendizaje. Esta tesis doctoral analiza críticamente la integración e implementación de Speechace como una herramienta potencialmente valiosa con valor pedagógico en un aula de secundaria y bachillerato español para mejorar la pronunciación del inglés como segunda lengua (ESL). La propuesta consta de cuatro actividades centradas en la mejora de la pronunciación y dirigidas a un público objetivo de estudiantes de 4.º de Educación Secundaria Obligatoria o 1.er de Bachillerato con un nivel B1+ en inglés. Mediante un análisis de elementos como la accesibilidad, la calidad de la retroalimentación y la automatización, se destaca el potencial de Speechace para su correcta implementación. Por último, esta tesis defiende una incorporación equilibrada de una metodología basada en la tecnología, cuyo principal objetivo es mejorar la competencia fonológica, disminuyendo así las reacciones emocionales negativas hacia la pronunciación y, en general, el dominio de las habilidades orales en inglés.

Palabras clave: pronunciación, adquisición de segundas lenguas, inteligencia artificial, aprendizaje potenciado por la tecnología, Speechace.

1. Introduction

In today's globalized world, the mastery of English as a second language (hereafter, L2) has constituted an essential tool to access academic, professional and personal opportunities. As an international lingua franca, English facilitates communication among international interlocutors from different sociocultural and economic backgrounds. This factor has led educational systems worldwide to adopt English as a fundamental component of teaching an L2 in educational planning. In the European Union, and more narrowly, in Spain, English has obtained a privileged situation in educational curricula and lesson plans, encompassing all educational stages. Framed in the L2 learning approaches, communicative competence is essential. Such competence encapsulates not only lexical or grammatical knowledge but also the skill to use the language efficiently in oral exchanges and verbal contexts. As a matter of fact, oral aspects, and more specifically, pronunciation, have been positioned as an irrevocable element for fluid interaction, meaningful bonds and effective flow of information (Po'latova, 2024). Regardless of this importance, pronunciation training has been traditionally ostracized in favor of other linguistic aspects in educational learning plans.

In this light, the reality of the educational Spanish classroom shows a high disparity between the theoretical importance of pronunciation and its actual presence in the teaching practice. Though current legislative policies – Real Decreto 39/2022, Real Decreto 40/2022, LOMLOE (2020)– allude to oral skills, specific references and mentions to pronunciation are limited or even omitted. In consequence, the curriculum established presents a high presence of other types of linguistic knowledge such as grammar, syntax, etc., leaving out phonetic knowledge to the margins.

In this contextualized scenario, the exacerbated technological development of recent years has artificial intelligence (AI) as its cornerstone. Computational linguistics proves to play an imperative role in the development of this AI. If the latter is born as the ultimate outcome of the computer revolution, computational linguistics is the integration of such development with linguistics. Thus, computational linguistics is an interdisciplinary area whose essential aim is to elaborate a theory on the production and understanding of natural language, so that it serves as a basis for designing computable models in order to create programs through which the machines can produce and understand natural language (Morales, 1997). AI-powered application programming interfaces are getting postulated as transgressive resources for pronunciation instruction and as a way of integrating explicit teaching of phonetics and the right articulation of sounds.

Consequently, the advent of AI-driven technologies has paved the way for new pedagogical and transgressive ways of instructing pronunciation (Zhang, 2022). Far from becoming a new threat for teachers, these technologies have allowed teachers to amplify the classroom regarding strategies, contexts, resources and practice personalization. This unprecedented growth of the AI application in education has transformed in a radical way the expectations and outcomes grounded in educational systems, learning processes, students and even teachers. Particularly, pronunciation-oriented training tools assisted by AI are becoming a keystone in the development of the acquisition of pronunciation knowledge, for it enables students to record their oral outputs, receive automated feedback and obtain a tailored and specific evaluation of their errors. Some of these AI-powered systems are the world-renowned Duolingo or ELSA Speak; nevertheless, it is essential to navigate through updated alternatives that supply students with a rich variety of educational tools and resources that better adapt to their individual needs and to the vertiginous development of modern days (Dennis, 2024). Ergo, Speechace emerges as a propitious instrument to encompass all these requirements.

Nonetheless, computer-based learning or AI-driven activities have been the subject of debate in recent years (Valencia-Galeno & Serrano-Sánchez, 2020). Among the arguments from advocates of these new learning methods is the ability of these devices to provide measurable and instantaneous information to users. Likewise, teachers often measure progress in a more structured environment than in the traditional classroom setting, lessening stress and enabling a new approach that is pedagogical rather than technical. Some forerunners of computer-based learning defend that the most optimal usage of these techniques is implementing it along with a more traditional learning plan, playing a more complementary role, and improving the interest of the contents. On the other hand, detractors of technology-enhanced learning comment on several limitations. They argue that a didactic unit or learning plans that have a computer or a technical tool as its primary source is detrimental, for it teaches in a technocratic-based way, i.e., diminishes critical thinking throughout the whole learning process. Instead of developing linguistic skills, technology manipulates and obtains the outcome irrationally and not cooperatively (Valencia-Galeno & Serrano-Sánchez, 2020).

Speechace blends pronunciation recognition systems, phonetic processing, didactic and pedagogical design and guided, scaffolded and well-structured activities to boost students' learning process. Thanks to its intuitive and easy-to-access platform, users of this application can relisten to their own recordings, pinpoint phonetical mistakes, receive instantaneous and personalized feedback and contrast their mistakes to those suggested by the AI. Speechace is a

shift in the traditional teaching methods of second languages, seeing that it suggests a revaluation and a rethinking of traditional pedagogical strategies.

This master's final project aims to illuminate this problematic situation in the Spanish classroom where L2 is instructed and delves into a reflection about the fundamental role of pronunciation in the English L2 classroom setting. Through a detailed contrastive explanation of Speechace's benefits and limitations, the present paper critically analyzes the traditional approach, thus proposing a technology-oriented educational system where oral production and pronunciation activities are well-balanced. It is not about erasing human teaching but about combining both intelligences – human and artificial– to maximize educational outcomes. This final project focuses on reducing the research gap by evaluating the efficacy of Speechace and pronunciation practice in L2 classroom settings, navigating through diverse factors such as accessibility, application accuracy and results, feedback precision and personalization. Thanks to this proposed examination, instructors and teachers will be able to select adequate tools and resources for their educational needs. Along with this research initiative, the advantages and uses of AI-powered and speech recognition applications will be examined. With this in-depth comprehension of Speechace and technology-enhanced systems, the target audience of this study –researchers, teachers and learners– will be able to make rational choices in choosing the most appropriate AI resource for their learning goals by expanding and widening their understanding of the platforms. Researchers will gain insight into how pronunciation-oriented pieces of software can be integrated in L2 acquisition studies. Teachers will substantially improve their digital literacy and will acquire new pedagogical strategies that can be incorporated into their teaching plans. Similarly, learners will develop phonological knowledge and improve their pronunciation in English. For that reason, this study's ultimate goal is to enable them to efficiently use AI technology to improve their speaking and phonological knowledge so they can obtain superior English-speaking capabilities (Dennis, 2024).

This dissertation is structured into 6 sections. The first provides an introduction. In the second section, a theoretical framework and literature review will be presented, structured around the factors that shape and affect the current educational situation. The third section is centered on the implementation of Speechace and the pedagogical proposal with the activities that suggest its incorporation into a classroom setting. In the fourth section, the possible results and a further discussion will be held, thus shedding light on the underlying implications and results that Speechace's integration could imply for the aforementioned proposal. In the fifth section, the concluding statements will be drawn up. And finally, in the last section, the

bibliographical resources and works cited referenced throughout the whole paper will be presented.

2. Theoretical framework

This section aims to conduct a thorough review of theories on technology-enhanced learning context and computer-assisted pronunciation instruction. Within this framework, particular attention is given to Speechace, a pronunciation-focused tool integrated into language learning platforms. By establishing these varied theoretical outlooks, this paper sets a wide foundation in regard to the efficacy of Speechace and its promising influence in the mastering of a second language (L2).

2.1 Factors that Influence English Pronunciation in a Secondary School Setting: Educational Curriculum, Instructional Limitations & Emotional Factors

The predominance of English as a cornerstone of learning is reflected in its ability to open up social, economic, intercultural, and employment opportunities for those who master the language. Its role as a lingua franca has made it the primary L2 in secondary schools, for it is essential in the student's future career. For pre-university students, developing the ability to communicate thoughts fluently and confidently not only enhances academic achievement but also cultivates critical thinking and interpersonal skills. These competencies are essential for personal growth, effective collaboration, and future professional success (Zainuddin & Mohamad, 2024). Pronunciation, as an oral skill, plays an imperative role in ensuring intelligibility, inasmuch as it directly shapes the speaker's clarity. The lack of correct pronunciation may hinder the whole communicative process, underlining the importance of it being addressed in the school setting.

The lack of attention given to the pronunciation of an L2 is reflected in the educational curriculum. For example, in Decree 39/2022 of September 29, which establishes the organization and curriculum of compulsory secondary education in the Community of Castile and León, there is little, if any, mention to English phonetics and phonology and their teaching in the classroom. Undoubtedly, other language aspects such as grammar, syntax, lexicon, etc., take complete control of the content and instruction of an L2, relegating pronunciation to the background, or almost to the margins, as can be seen in the educational curriculum or major

school production editing companies like Oxford, Burlington or Cambridge. Rubrecht (2016) argues that pronunciation receives the least attention among language components, despite its fundamental role in verbal communication. He emphasizes that "it is by far the one [component] that receives the least amount of attention in second or foreign language learning situations. Insufficient attention placed on the pronunciation component can lead to detrimental effects on learners" (Rubrecht, 2016, p. 7). Similarly, Park (2015) states that although there has been an augmentation in the attention placed on pronunciation in L2 teaching lately, it still holds a marginal position in the secondary education context. Hence, pronunciation has not obtained the same amount of focus, opposed to other linguistic competences like grammar and vocabulary, which have been widely targeted in the L2 classroom. These vague guidelines concerning educational curriculum negatively affect English pronunciation teaching, leading teachers to downplay its importance and prioritize more extensively detailed content. Yoshida (2016) underlined the importance of explicit phonetic instruction in teaching.

This lack of curricular attention paid to pronunciation during school planning has resulted in significant deficiencies in phonological knowledge and in recurrent errors that perpetuate inadequate oral production in English by Spanish L2 learners. This problematic concerning pronunciation, and more narrowly, vowels, has constituted the traditional hurdle for L2 learners, as illustrated by Veiga-Pérez (2017). In her study on Spanish teenager's pronunciation of ESL, Veiga-Perez conducted several speaking tasks with 20 native Spanish speakers with an average age of 15.2 years in a class of fourth year of a public secondary school. The study showed that: 1) there was a low percentage of individuals who produced /æ/ accurately, 2) in the phoneme /ɪ/, students presented a very low score of the target-like sound, and consequently, that 3) for the pair /æ/–/ʌ/ students presented more difficulties in oral production; for the pair /ɪ/–/iː/, students proved to identify better the phoneme /iː/ than the short sound /ɪ/. However, they struggled to distinguish both /ɪ/ and /iː/ phonemes in terms of production. These vowels, /æ/–/ʌ/ and /ɪ/–/iː/, proved to be hard to produce for Spanish speakers; ergo, given the data analyzed, it was concluded that the two pairs of phonemes, and overall, vowels, bring difficulties for a Spanish learner of English as a L2. It is for this reason that these findings highlight ongoing challenges Spanish learners encounter when dealing with L2 pronunciation. Navigating this issue in educational programming and curriculum is essential to enhance oral proficiency.

Nonetheless, and "despite efforts to integrate pronunciation practice into language learning curricula, many learners struggle to overcome barriers such as language anxiety, limited opportunities for meaningful interaction and insufficient feedback" (Zainuddin &

Mohamad, 2024, p. 1207). Thus, to develop effective communication skills, the teaching of pronunciation in an L2 classroom should be prominent (Bohn & Munro, 2020; Trofimovich & Isaacs, 2016). The combined results of certain studies (Bohn & Munro, 2020; Trofimovich & Isaacs, 2016; Yoshida, 2016) strongly support the idea that pronunciation plays a crucial role in language learning and requires tailored teaching strategies that enhance both student confidence and proficiency.

Additionally, acknowledging the emotional factors involved in language learning, such as anxiety, stress or pressure is essential for creating a learning environment that not only addresses individual challenges but also fosters language proficiency. In the context of the L2 English classroom, these emotional factors may possess a deep impact on the learners' participation and contribution, and more narrowly, in oral-related tasks. Pronunciation activities often intensify students' self-awareness and fear of correction, which ultimately has repercussions in their practice, progress and development in intelligible oral discourse. Emotional distress may provoke over-monitoring from students in their oral production, unwillingness to speak or even refusal to the whole learning process (Dennis, 2024). For that reason, finding emotionally supportive strategies and tools in pronunciation teaching is not just advantageous but necessary for heightening risk-taking and long-term oral development.

Moreover, other factors to be considered in the teaching of an L2 are its limitations regarding materials and time. Further limitations to learning an L2 include access to authentic resources and limited classroom hours. Secondary school English instruction may only occur a few hours a week which does not allow students many opportunities to sustain their pronunciation practice, meaningfully engage with the content, or practice consistent, intentional pronunciation. In addition, resources that are available to students may not expose them to enough varied accents, real-life speech and pronunciation practices. Limited access and no engagement in practice may negatively impact a student's ability to develop a sufficient internal phonological repertoire of correct sounds, stress patterns and intonation features.

The secondary classroom also includes bigger class sizes, and a curriculum-based type of teaching largely focused on grammar and vocabulary, leaving little time for an explicit type of teaching focused on pronunciation. In these scenarios, pronunciation practice can even be sporadic or superficial. As Hui et al. (2023) stated, "the progress of technology has provided teachers with extensive access to learning and professional development without having time and space boundaries. Indeed, using technology for educator improvement builds affinity spaces that vary from conventional environments confined by bureaucracies and hierarchies" (p. 2). All these factors in the secondary education English instruction are very real barriers to

English language learners developing and practicing phonological awareness in spoken English and oral fluency.

One method of navigating the aforementioned limitations is to provide learners with more opportunities to engage in conversation outside of class hours. However, the primary impediment to the efficacy of this strategy pertains to the fact that a significant proportion of English as Second Language (hereafter, ESL) students are not surrounded by individuals with whom they can engage in English-language discourse. The advent of technology has thus far revolutionised language learning methodologies, thereby prompting a paradigm shift in the mindset of both educators and students. Technological devices and tools are offering transgressive methods to intensify speaking skills. This shift may encourage educators to explore new language instruction methods and empower students to take control of their learning process.

Mastering pronunciation is a pivotal factor in a foreign language; hence, “studies underscore the necessity of incorporating teaching of pronunciation, which includes elements such as individual sounds, intonation patterns, and speech flow, within language teaching programs to develop well-rounded oral abilities” (Dennis, 2024, p. 112). Phonetic training and detailed and constructive feedback are vital elements in improving speech pronunciation. Additionally, Derwing and Munro (2018) emphasize the importance of explicit instruction for teachers in pronunciation and affirm that teaching assistance in such competence will lead to more optimal language acquisition in oral performances. Himmayati and Triyoko (2024) state that an English learner ought to recognize the sound system of a language and be capable of producing the sounds in a way that it is intelligible for a native speaker prior to any grammar rule. Consequently, the importance of explicit pronunciation instruction lies in the fact that “phonetics plays a crucial role in any classroom of language literature in today's educational system of language literature. A person who learns English needs to be able to use it for many different things” (p. 560).

In sum, while English possesses a central position in the secondary education curriculum owing to its undeniable global relevance, pronunciation frequently remains an overlooked component within classroom instruction. Factors such as insufficient curricular emphasis, instructional limitations (such as large class sizes, lack of resources, and minimal teacher training) significantly hinder learners’ ability to develop accurate and intelligible speech. These challenges are further compounded by emotional barriers like anxiety and the lack of opportunities for meaningful interaction. Addressing these multifaceted factors is essential for fostering learners’ oral fluency, phonological awareness, and overall

communicative competence. However, research (Bohn & Munro, 2020; Trofimovich & Isaacs, 2019) consistently supports the importance of explicit phonetic instruction and the integration of pronunciation as a key skill in L2 learning. In this context, technology emerges as a promising ally, offering students the tools to practice and refine their pronunciation outside traditional classroom constraints.

2.2 Use of Technology in L2 Teaching. Technology-Enhanced Language Learning

In a technology-ruled world, AI's ubiquity seems to be taking over all aspects and spheres of today's society, including those such as the economy, security, finance, and of course, linguistics and education. Duolingo or Siri, AI-powered tools that use speech technology to facilitate language learning and communication through user-friendly interfaces, have become paradigms of AI-powered models, underlining the potent range of action and capabilities available in these types of systems. Notwithstanding these prominent examples, it is pivotal to delve into further options that adequate to both the teaching and pupils' prospects. Hence, AI has become a centerfold in language education. This promising twist in educational teaching has gained attention for its automatized and immediate feedback. The importance of teaching with technology, as Ghanizadeh et al. (2015, p. 83) state, lies in the fact "that technology in different forms can be used effectively in almost all areas of language education, that modern technologies improve the quality of input, authenticity of communication, and provide more relevant and useful feedback". This aligns with the view of Seljan and Berger (2004), who stress that AI paves the way for revolutionary new pedagogical methods and sustains personalized learning processes by providing instruments that adapt dynamically to pupils' progress and cognitive profiles.

Obtaining and creating materials that could be integrated in a successful classroom setting for a target language is indispensable but limited in availability and adaptability. This is why implementing information and communication technologies (ICTs) could be the final solution to this limited materials problem. Traore and Blankson (2011) used visual and audio computer-assisted technologies and found that this integration served as a way to help students learn the L2 in a more efficient way than other groups not using technology. This approach proved to have a greater context-rich learning environment since students were able to learn phonetics while also interacting with visuals. This reinforces claims that integrating generative

AI enables the production of authentic linguistic input and improves users' involvement through multimodal devices.

Another pivotal use of technology in L2 acquisition is the issue of individuals' emotional responses, such as motivation, engagement or difficulties that shape the students' outcome. Computer-assisted pronunciation technology programs with personalized feedback and adaptive learning experiences have been demonstrated to assist with the diverse requirements of learners. These adaptable features do improve technology-assisted learning by catering to students' attitudes and individual needs, ultimately increasing the outcomes of educational technology (Dennis, 2024). Computer assisted pronunciation teaching applications have been demonstrated to be effective in adapting to each individual's needs, thus showing a flexibility in identifying individual struggles and generating accurate instruction for each student (Valencia-Galeano & Serrano-Sánchez, 2020).

Wei (2023) confirmed that language tools driven by AI notably carve out ultimate performance. Moreover, computer-mediated communication has improved language learning. Supporters of this innovative computer-oriented way of teaching advocate for the benefits of technology-enhanced education, for it enables educators to keep track of the progress in a way that proves to be more structured than in a conventional high school class, dwindling emotional discomfort and moving into a focus on elements of the pedagogy that are not technical such as decision making, task management, etc.

In addition to the improvement of the learning experience, technology-enhanced language learning in L2 has changed the role of teachers and the way they are regarded, departing from a transmitter role and moving into a learning facilitator role. With the outbreak of AI-powered tutoring and instructional systems, students are able to hold themselves accountable for their own learning development and assume more roles and competences than ever before, promoting their autonomy and educational independence (Stockwell & Hubbard, 2013). In 2023, Hui et al. encapsulated this idea of the new role of educators and noted that:

> [Technology-enhanced learning], especially social media and educational applications have already proved to be quite beneficial in autonomous learning for EFL learners. They play multiple roles in autonomous learning owing to features like provider and transmitter of accessible learning materials, creator of a flexible authentic learning environment, breaker of time and space limitation, user-friendly interface, and personalization. All these features could offer opportunities for students to interact and collaborate with others to enhance their psychological version of autonomy including motivation and confidence as well as responsibility in language learning. Meanwhile,

> it is acknowledged that the appropriate use of mobile applications can enhance learners' language skills, particularly writing, reading, and vocabulary (p. 12).

Owing to the advent of technology and its contribution with regard to materials, diverse environments and methods, the traditional transmitter role that teachers played has significantly reduced in favour of the much more enriching role of facilitators who stimulate students' autonomous learning and development. This shift not only suggests a rethinking of the traditional position of educators but also demonstrates the empowerment that technology-enhanced settings provide in taking active control of students' language learning, thus turning technology into a transgressive innovation for educational evolution and self-directed learning.

Finally, the integration of technology in L2 education has proven to be a powerful asset since it mitigates the pedagogical, emotional, instructional and curricular limitations presented in a class setting. From the widespread use of AI applications to more complex approaches relating to pronunciation instruction, computer developments have upgraded the learning experience. Elements traditionally overlooked in a classroom setting such as emotional responses, individual needs or preferences have been palliated by these tools, providing likewise authentic input and automated feedback. Education policies have historically had academic achievement as their primary aim, as reflected in student test scores over other elements like emotional response, social development, mental state, and psychological well-being. This focus often led to rigid educational approaches that built an unwelcoming and prescriptive environment that decreased students' contribution to the educational process (Darling-Hammond & Cook-Harvey, 2018). While Castile and León's education system formally highlights students' instruction, the system is mainly recognized for its high results in tests such as the Programme for International Student Assessment (PISA) (Romero, 2024). These results reflect a longstanding focus on educational policies on a curriculum-oriented approach that prioritizes measurable performance and achievement. Bachler et al. (2023) adds to this idea expressing that traditional educational approaches underline curriculum delivery and pay little attention to emotional scaffolding, thus perpetuating a cognitive-emotional divide and prioritizing academic achievements over holistic outcomes. In light of this, Speechace stands out as a promising and supportive application, helping in structured and personalized feedback that may accelerate the mastery of spoken English and that promotes a learner-centered environment. By providing tailored feedback in a private setting without the imperative need to speak in public, Speechace may be a potentially valuable asset that addresses both academic and emotional learning dimensions, for it fosters a sense of agency over learning and reduces negative emotional factors that some students display when speaking

publicly. Thus, it is relevant to remark Speechace's positive emotional impact but recognizing its potential rather than declaring its ultimate efficacy. While further research is needed to utterly assess its effect, Speechace constitutes a step toward balancing academic rigor with emotional learner needs.

The following section will explore Speechace in greater depth, examining its specific functionalities and potential impact on pronunciation development in secondary education.

2.3 Speechace as a tool for improving pronunciation

Speechace is a speech recognition AI-powered website programmed to evaluate L2 pronunciation and fluency, mainly focusing on English learners. What Speechace does is to evaluate the accuracy of the interlocutors. As the Speechace website itself states, the objective is "to make practicing and improving speaking attainable without intensive 1 on 1 instruction [...] and to provide immediate pinpointed feedback on mistakes". This study makes use of the web-based version of Speechace (http://www.speechace.com/).

2.3.1 Operation and characteristics

Speechace has been designed to function independently, dwindling the necessity for teaching intervention in the learning process. Speechace's usability is intuitive, proving to be easy for individuals with no prior training and making it accessible to beginners in linguistic training, thus fostering independent learning. The platform possesses three pivotal assets: it supports opportunities for both perception and production practice, delivers individualized and immediate feedback, and prioritizes accuracy.

The platform has seventeen units to practice English: Level 1, Healthcare, Hospitality-Vietnam, Beginner, Vowels, Consonants, Fluency, Fluency Speaking Practice, Vowels 2, Consonants 2, Simple Sentences, Basic Sentences, Beginner Sentences, Intermediate Sentences, Citizenship, Poem and Demo All Activity Types. This tool has a batch of words and sentences for every unit in which the individual simulates the native-like model offered by the system. This continuous repetitive model enhances learners' internalization and assimilation of English concepts and phonology triggering native-like phonetic articulation.

After completing each task, feedback is obtained rated up to 100%, pinpointing the errors that the individual made, suggesting in which syllable the error is, the correct phoneme

and how it is actually supposed to sound like, hence, giving a corrective loop that promotes perception and production (see Figure 5 below in Section 3. Implementation).

Similarly, Speechace presents a form of gradual learning as the layers of difficulty range from minimal production to paragraphs. This is reflected on the three levels presented on the website: word, sentence and paragraph. This layered way of instruction not only shows how the educational process is based on scaffolding literature and principles but in the same way enables students to increase difficulty by degrees.

The recognition system, which is not limited to just detecting words but also segmental features, pace and inappropriate pauses, allows the possibility to relisten to their own productions and compare them to baseline production. These recourses prove to be advantageous in the learning process (Alnafisah, 2022). Along with this, the website's visually attractive design with several colours, items and figures facilitates users' navigation until they finish their activities. Thus, by reporting the pronunciation errors through colour-coded feedback students achieve a greater understanding of their corrections in an effective way. The observation of these colour patterns enables students to pinpoint rapidly which words and sounds need further attention, turning the whole learning situation more natural and systematic (Ningsih, 2024).

Another distinctive characteristic of Speechace is its adaptation to individual learner performance in the course of time. Through the website's data storage from previous attempts, Speechace allows students to keep track of their learning throughout all the sessions and target ongoing mistakes. Moreover, users of this platform are able to link auditory input with visual representations of speech through the visuals and phonological transcriptions that Speechace generates. This multichannel platform is also compatible with a diverse range of technological devices such as laptops, tablets, smartphones, demonstrating its accessibility in many pedagogical contexts such as classes, seminars, personal study environment, etc. Furthermore, thanks to the integrated reporting program available in the platform, tutors can check and control learner progress, adding performance information at individual and group levels and alleviating decisions involving data in course planning.

As for the cost and reliability, while some features have free access to all users, the full version requires a subscription fee of $4.99 per month. This affordability and success have made reputable organizations adopt Speechace, such as City University of Seattle, University of Naples or Massachusetts Institute of Technology, and thus emphasizing the reliability of the platform.

Speechace's design is based on three crucial principles: providing opportunities for both perception and production practice, offering individualized and immediate feedback, and prioritizing accuracy. It is an intuitive and visually appealing tool that increases independent English learning thanks to 17 themed lessons, with varied difficulty levels ranging from basic to intermediate. Likewise, the topics of study in each theme are diverse, from healthcare to hospitality. Speechace allows users to simulate native pronunciation and offers personalized corrections scored up to 100%, pinpointing phoneme errors, pace mistakes and segmental features. Overall, the website's earning methodology is gradual, from words to paragraphs, increasing self-awareness and improvement thanks to the replaying option.

2.3.2 Benefits and limitations of Speechace

As has been previously stated, Speechace is a sound recognition AI-driven application programmed to evaluate phonetic outcomes and fluency in L2 utterances. Since it was first made available, there have been studies delving into its advantages and disadvantages in regard to educational purposes. For instance, Zainuddin & Mohamad (2024) in their study of Speechace found out that the application was regarded positively by students, who rated it as useful and easy to understand. Similarly, Mutiara et al. (2024) conducted a phonetic experiment with thirty students and Speechace, demonstrating that there were improvements in pupils' pronunciation, for they were helped by the feedback report given right after completing the speaking test.

Digital tools like Speechace provide multiple pedagogical benefits in the L2 English classroom, particularly offering pronunciation accuracy and fostering students' confidence. These benefits are as follows: pronunciation-focused knowledge acquisition, corrective and instantaneous feedback, pronunciation improvement through meaningful interaction, guided practice, access to native-like models, increased confidence, accessibility, and availability.

The first benefit postulates pronunciation as a key role, for it contributes to the intelligible and fluid communication development. It provides non-native speakers with the opportunity to practice narrowly and to be exposed to native-like models which are essential in order to increase pronunciation skills.

Corrective and instantaneous feedback enables students to pinpoint and proofread their errors. Jaimes and Vázquez (2021) affirm that immediate feedback contributes meaningfully

to the accuracy of non-native speakers. Automated feedback has proven to be advantageous in the accuracy and self-confidence of the students and recurrent exposure to linguistic and phonetic patterns of native English speakers boosts the accent's authenticity and naturalness. SpeechAce offers a feedback report that underlines specific oral mistakes, offering improvements and alternative choices with visual and auditory indications. This detailed feedback allows students to monitor their progress and filter their outputs.

Likewise, sociocultural theory backs up the idea that Speechace is useful for a classroom setting, inasmuch as it allows students to compare their performances with those of native speakers and participate in phonetic challenges. This sociocultural approach supports the idea that language emerges through social and meaningful interactions and linguistic input exposure (Solórzano & Paredes, 2024).

Speechace's guided practice allows students to participate in "specific pronunciation exercises such as repeating difficult sounds, practicing phonetic patterns, and focusing on word stress and intonation. This focused approach allows learners to address their individual pronunciation weaknesses, leading to gradual improvement over time" (Solórzano & Paredes, 2024, p. 80).

Furthermore, thanks to the practice with models that simulate native speakers, learners achieve a feeling of increased self-assurance in their pronunciation skills, boosting their involvement and engagement in their learning experience.

Another imperative functionality of Speechace is its convenience, accessibility and availability: Speechace is a program accessible on different devices such as computers, smartphones, tablets, etc. thus facilitating access to contents and engaging in activities according to each student's particular pace. Speechace's multi-device availability "ensures that non-native speakers can engage in regular pronunciation practice, maximizing their progress over time" (Solózano & Paredes, 2024, p. 81).

Although Speechace's benefits are broad and their potential utility in a secondary education setting has been demonstrated, there are restrictions that must be taken into account when implementing it, such as small sample size, technical accessibility issues, gender disparity, overlook of suprasegmental features, challenges in discourse-level feedback, partial oral recognition, insufficient variety of practice types and the use of synthesized voice in recordings.

While Speechace offers valuable feedback, certain limitations have been identified, related to small sample size and potential algorithmic biases (Ningsih, 2024). Automatized feedback presents limits, for it does not consider personal differences, inasmuch as its error

types are determined by technological limitations rather than pedagogical considerations. Consequently, the assessment and the creation of feedback related to discourse prove to be a relevant challenge for AI systems. As a consequence, perfect accuracy is complicated to accomplish (Shadiev & Yang, 2020).

Technical limitations such as access to technological devices or the Internet may influence the learning outcome. While Speechace's accessibility is broad, access to modern devices that support Speechace is not within everyone's reach, not operating correctly in older or unsupported systems. This disparity highlights socioeconomic backgrounds and inequalities since not all students may run the application outside of the classroom setting. Similarly, for the optimal use of Speechace, a stable Internet connection is imperative. Slow or unstable Internet connections would trigger disruptions, lower students' satisfaction and ultimately undermine the whole learning process.

In terms of gender disparity, it has been found out that there is a limitation due to the predominantly female sample and limited applicability, indicating that further research or investment on the part of Speechace's developers on gender discrepancies must be carried out.

Other weaknesses manifested by Speechace are the lack of suprasegmental features such as intonation, stress, rhythm, etc., which are a primary factor in L2 acquisition. While Speechace identifies segmental elements, i.e., individual sounds, the platform often neglects the prosodic features that may be indispensable for spoken English. This restriction can interfere with the students' capacity to acquire native-like pronunciation and can affect their intelligibility in real-life communicative settings.

Another important issue is partial oral recognition. Some speech recognition tools focus on accent characteristics rather than how easily the oral output can be understood, i.e., its intelligibility. Intelligibility-based approaches to L2 pronunciation underline the nature of errors over their quantity when determining priorities for improvement. In other words, the importance and the type of mistakes committed should be prioritized instead of their frequency. Therefore, Speechace should integrate this principle into its error coding scheme by focusing less on accent discrepancies and putting the spotlight on errors that undermine communication.

In the same way, an insufficient variety of practice types offers limits in the students' learning development. Integrating a broader selection of practice activities such as interactive dialogues or more contextualized practice, would better support Speechace's objective of mastering pronunciation and fluency. This expansion would not only strengthen the targeted L2 pronunciation in the classroom but also create new learning experiences.

Another limitation is the reliance on synthesized voice in most recordings, which is neither ideal for training nor representative of authentic human speech. Using exclusively human-produced recordings would provide more effective perceptual training and greater authenticity (Alnifasah, 2022).

In sum, Speechace stands out as a promising tool for pronunciation, providing automated feedback, guided practice and access to native models and promoting accuracy. The tool has demonstrated advantageous benefits not only in the mastery of pronunciation skills but also in autonomous engagement. Nonetheless, and notwithstanding its positive features, some limitations underline the necessity for careful integration such as algorithmic biases, lack of suprasegmental elements or emphasis on accent over intelligibility.

3. Implementation

This section outlines the implementation methodology for the integration of Speechace in 4th-year ESO and 1st-year Bachillerato classrooms to enhance English pronunciation as a L2. Since this study is conceptual rather than empirical, the methodology is designed as a hypothetical model for implementation. The proposed approach considers factors such as lesson structure, teacher facilitation, student engagement, and assessment strategies to optimize the use of Speechace in a secondary education context. Drawing from existing research on pronunciation training, AI-assisted language learning, and L2 communicative competence, this methodology provides a structured plan for how Speechace could be integrated effectively to enhance students' pronunciation skills.

This conceptual proposal has the following objectives:

1. To integrate Speechace into 4th-year ESO and 1st-year Bachillerato classrooms to improve English pronunciation as an L2.
2. To practice English pronunciation through technology-enhanced pedagogical activities.
3. To improve students' English pronunciation through the implementation of AI-driven feedback using Speechace.

3.1 Context and analysis of the educational curriculum

With regard to what has been presented previously in the literature review, it can be affirmed that a rethinking of the way that pronunciation is taught could be elaborated, and more narrowly, in the secondary school stage. This proposal will be related to the use of AI-assisted technology, since it can help the learning progress. Although the incorporation of the LOMLOE (2020) makes reference to and acknowledges the importance of communicative competences and other language skills—including pronunciation— there is neither specific mention of English pronunciation in the classroom nor tailored descriptions of the details and contents that should be taught concerning pronunciation. Similarly, both in the Real Decreto 39/2022 and Real Decreto 40/2022, which establishes the organization and curriculum of compulsory secondary education and Bachillerato respectively in the Community of Castile and León, there are still ongoing vague guidelines that do not contribute enough to teaching, leading teachers to deprioritize it in favor of more explicitly detailed content, such as grammar and writing. There is no specification of any kind regarding phonemes, nor their articulation, nor is there any clarification of other phonological details. Additionally, large publishing companies such as Oxford, in their L2 teaching books such as the one published in 2021, Oxford Key for Year 1, fall into this problem of lack of precision and specification in the phonetic teaching of English; ergo, failing to regard the tribulations of English phonetics and presenting oversimplistic methods for a secondary setting.

In accordance with the literature review, a proposal for improvement is presented in this paper. This proposal is motivated by the oblivion to which pronunciation and phonetics have been subjected in the educational sphere, as reflected in curricular and educational publishing companies. This proposal tends to answer the lack of focus with regard to pronunciation, thus suggesting several targeted activities or procedures with Speechace that are in communion with the methodological point of view. These activities focus on key aspects such as phoneme recognition, stress and intonation practice and automated feedback to enhance pronunciation in ESL.

3.2 Description and design of the proposal

3.2.1 Activities

This section will discuss the designed activities to achieve the objectives of the proposal. Therefore, the activities will first be detailed and described, as well as the target group to which they are intended, the activity planning, the materials and resources, and lastly,- the evaluation methods. This proposal could be adapted to any school level.

As presented in the theoretical revision (see Section 2), Spanish learners face difficulties concerning oral pronunciation –and more narrowly, minimal pairs such as /æ/–/ʌ/ and /ɪ/–/iː/ (Veiga-Pérez, 2017). Therefore, the different activities of this proposal target these minimal pairs through the guided use of Speechace.

The proposal will consist of nine sessions with four main activities (Table 1). The proposal is designed to encompass the following four activities: Firstly, a series of activities aimed at getting theoretical knowledge through the explanations of the basic phonological foundations and knowledge of English vowels. Secondly, an introduction to Speechace and practice with isolated words. Activity three presents sentence-level repetition of contextualized sentences. Lastly, a fourth activity in the form of a pronunciation game with random word assignment and point competition completes this proposal.

Table 1

Activity planning

Sessions	Activity	Grouping	Timing
1	1. Instruction on basic pronunciation concepts and notions: Using visual material, the position of the tongue, the existing phonemes, correct articulation, etc. will be explained.	Individual	50 min
2,3,4	2. Introduction to Speechace and first contact with isolated words.	Individual	30 min per session
5,6,7	**3.** Repetition of more complex sentences and cooperative exchange	In pairs or small groups	40 min per session
8,9	4. Random word assignment and point competition.	Individual in a whole-classroom setting	40 min per session

The first activity will consist of several parts that will start with a brief explanation of the different phonetic pairs that we find in the English language, drawing attention to the ones that have been discussed as difficult for Spanish learners of English as an L2, i.e., /ɪ/–/iː/ and /æ/–/ʌ/ (Veiga-Perez, 2017). Similarly, a theoretical foundation on vocal articulation and the occurrence and appearance of these vowels will also be part of this initial activity.

To accomplish this internalization of basic phonetic concepts, basic articulatory knowledge is required to be able to reproduce the correct movements and appropriate articulation for each vowel (Figure 2). The activity will therefore begin by displaying images that illustrate the accurate vocal movements in the mouth and tongue for vowel sounds. Some

videos on this topic that can shed visual and auditory light on these phonetic foundations are helpful for reinforcing students' understanding of English pronunciation.

Figure 2

Changes in the mouth and tongue for vocal sounds (Gilbert, 2008).

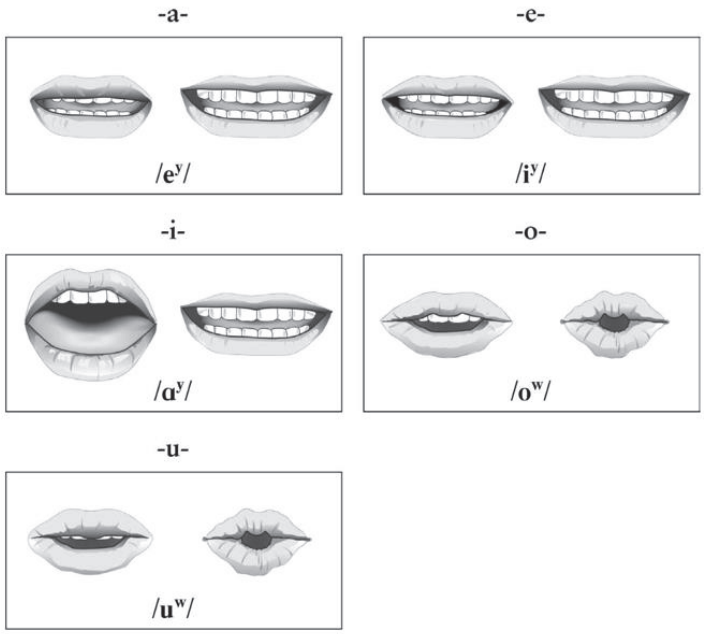


Figure 2 represents the articulatory movements and changes involved in producing different vowel sounds in the English language. The graphemes that appear at the top of each box represent the phonemes indicated inside the box respectively. These mouth and tongue changes are more noticeable to some alphabet vowels than others.

Another basic requirement to begin your training with Speechace is to know the frequency or percentage of times that certain spellings produce these vowel sounds (Figure 3). For instance, the –ai spelling, as in "rain" or "train", has a 95% percentage of likelihood of producing an /eɪ/ sound (Gilbert, 2008). Knowing the relation of spelling and production of vowel sounds in English not only helps you recognize phonetic patterns and improve your intonation but also raises phonological awareness. Likewise, this initial practice may help students to recognize subtle differences that could not be perceived otherwise due to their first language's interference. Furthermore, knowing these frequencies allows you to predict the vowel combinations that will appear, speeding up your reading and anticipating a specific pronunciation. In other words, knowing the spelling-to-sound correspondence allows the students to make sense of non-familiar words, accelerating reading fluency and pronunciation

quality. Introducing these concepts in class is helpful and vital, for knowing these phonetical patterns may diminish students' uncertainty and increase phonological accuracy. Instead of just guessing, students can back up their pronunciation outputs with data and factual information once all this process has been proceduralized, turning their practice with Speechace into something much more focused and swifter.

Figure 3

Frequencies of spellings with corresponding vowel sounds (Gillbert, 2008, p. 47).

How often does the Two Vowel Rule work?

Letters	Sounds	Percent of time[1]	Examples
-ai	/e^{y}/	95%	rain, train, afraid
-a- + final -e-		90%	cake, came, arrange
-ay		93%	day, say, play, array
-e- + final -e-	/i^{y}/	32%	Pete, athlete, recede
-ee-		92%	tree, meet, agreement
-ea-		69%	tea, please, beat, season
-y		95%	city, funny, lucky
-i- + final -e-	/a^{y}/	77%	ice, time, white, arrive
-igh-*		100%	night, light, high, sigh
-o- + final -e-	/o^{w}/	76%	cone, home, alone
-oa-		94%	coat, soap, approach
-ow-		53%	slow, below, lower, follow
-u- + final -e-	/u^{w}/	94%	blue, juice, accuse
-oo-*		88%	room, choose, foolish

How often does the One Vowel Rule work?

Letters	Sounds	Percent of time[1]	Examples
-a-	/æ/	91%	pan, has, aspirin, answer
-e-	/ɛ/	82%	ten, message, medicine, intention
-i-	/ɪ/	93%	is, simple, children, interesting
-o-	/ɑ/	74%	top, hot, problem, confident
-u-	/ʌ/	66%	cup, sun, butter, hundred, assumption

Figure 3 shows the percentage probability that those spellings produce those vowel sounds. The information and data are extracted from a combination of five big American and British frequency counts. These data include around 25 million words of text, e.g., the spelling –ai is highly likely to be pronounced as /ei/ as in "rain", "trains" or "afraid" since its percentage of time occurring is 95%.

As an example for this activity: The teacher would begin by introducing and presenting articulatory positions of vowel sounds in English, using diagrams of lip position, illustrations about mouth movement or YouTube videos[1] displaying native English speakers pronouncing minimal pairs or the accurate articulatory position. By completing this initial activity, students

are supposed to recognize articulatory discrepancies between vowel sounds, get a deeper understanding of when certain vowels usually happen and anticipate the sound that corresponds to certain spellings. Though Speechace is not actually implemented in this activity, it initiates students with foundational elements which are vitally important to analyze and make sense of the AI feedback that will be later given to them.

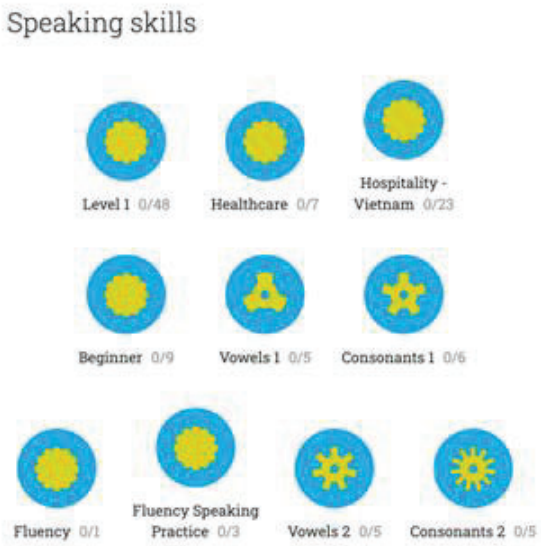
In completing this initial activity, these illustrations or videos on vocal articulation and spelling-sound correspondence aim to raise awareness about the importance of pronunciation and lay the foundation for phonetic knowledge. As a consequence, students will be able to associate sounds with words that they already know or that could have been learnt throughout the school year. They will learn how to pronounce each vowel, diphthongs or triphthongs correctly to later set the basis to continue with words, sentences or paragraphs that will appear on Speechace. The implementation and knowledge of basic notions of this type is essential to continue with the rest of the proposal activities.

The second activity would be the actual implementation of Speechace as a tool. First, students would be introduced to the platform and the correct use and handling of the program, as well as its accessibility. The tool has a more extensive and in-depth version of the content through a monthly subscription; however, to alleviate this problem and the lack of funding, the free web version can be used, which is equally advantageous, especially for groups with a lower English level and with poor knowledge of phonetics. Thus, this second activity with Speechace will consist of the repetition of isolated words. The teacher will introduce English vowels that present a very high phonetic similarity for Spanish learners due to difficulty in perceiving distinctions and owing to the lack of a corresponding vowel system in terms of pronunciation in their native language (for example, /ɪ /and /iː/ or vowels such as /ʌ, /æ), which appear to be a recurring flaw among L2-English Spanish learners (Veiga-Pérez, 2017).

Students must access the platform, and more specifically, the main Speechace menu called "Speaking Skills" (Figure 4), where they will select the content to be taught, which, in this proposal, is the vowels. Learning will be staggered, attending to scaffolding academic literature and educational principles, following the levels and lessons suggested by the platform. Thus, it will begin with "Vowels 1" (Figure 5), then with "Vowels 2" and so on.

Figure 4

Speaking Skills menu on Speechace



This figure shows Speechace's menu "Speaking skills" in which the student can find different units such as Level 1, Healthcare, Hospitality-Vietnam, Beginner, Vowels 1, Consonants 1, Fluency, Fluency Speaking Practice, Vowels 2. Of special importance for this proposal will be unit Vowels 1, Fluency, Fluency Speaking Practice and Vowels 2.

Figure 5

Vowels 1 menu on Speechace

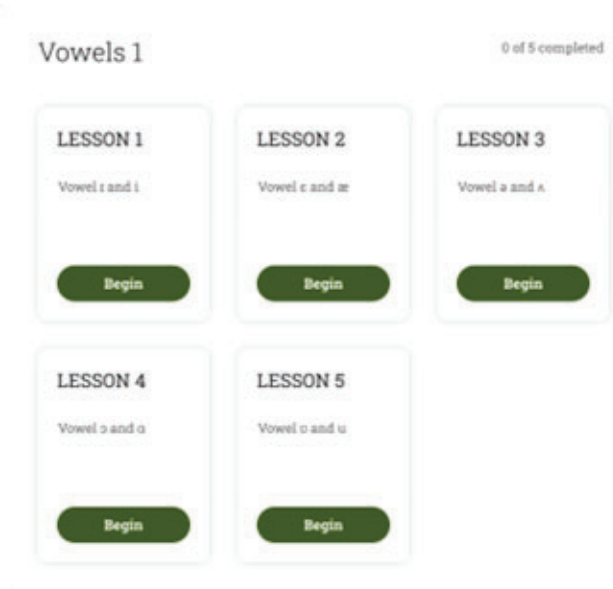
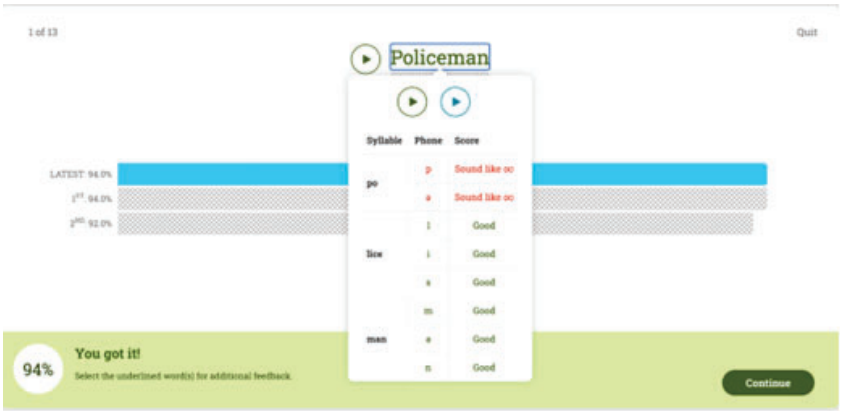


Figure 5 shows the different lessons within each unit presented in the “Speaking Skills” menu. For instance, Vowels 1 has five lessons, each one of them dedicated to one specific vowel.

The teacher will reproduce the native pronunciation of the word suggested by Speechace, which can serve as a reference and phonetic model for the students. Once the native listening is done, the students must record themselves trying to simulate the native example as accurately as possible. Students will be given a set percentage of accuracy before they can move on to the next word (for example, 80% similarity/accuracy must be achieved before continuing). This set percentage will be stipulated by the teacher. This will make the individual focus on the effort they have to make rather than on finishing the task as quickly as possible. In the correction process provided by Speechace, the aim is for students to reflect on their pronunciation, paying attention to the percentage provided, which indicates how close students’ oral output simulates a native pronunciation, and especially to the specific phonological error that occurs (Figure 6).

Figure 6

Feedback and assessment provided by Speechace



The figure shows the target word that Speechace provides for practicing, in this case, “policeman”. Three bars appear below the word. The blue bar corresponds to the student's last recording, while the gray bars below represent previous attempts. Similarly, the pronunciation accuracy percentage appears at the bottom of the screen. Clicking on the underlined words displays a drop-down menu that breaks down each phoneme in the word, highlighting mispronounced phonemes in red and comparing the correct pronunciation with the one captured by the system.

An actual example of this second activity with Speechace would be as follows: Students log into Speechace's official platform, then access to "Speaking Skills" –> "Vowels 1" where they can observe words to practice /ɪ /and /iː/ such as "policeman", "fish"; "fifty". The students listen to the native-like pronunciation provided and record their pronunciation to later revise the response elaborated by the system. Speechace's visual output and feedback will indicate students their match to native pronunciation (for example, 94% as in Figure 6) and will provide specific phoneme feedback (for instance, your /ɪ/ sounded as /iː/). The color-coded accuracy shows that green corresponds to well-uttered sounds and red with sounds performed incorrectly. Students are asked to repeat the process until they achieve a minimum of 80% accuracy so they can internalize the new oral habits. The role of the instructor in this activity will be essentially that of monitoring and controlling progress, apart from being a pronunciation model. Similarly, teachers would be able to track similarities in pronunciation and design future activities to deepen and further practice specific mistakes.

Once the phonetic knowledge in the first activity has been established and the second activity with Speechace has been completed, the third activity will begin. This activity will consists of two parts: the first on sentence-level repetition, and the second on collaborative work and peer assessment. In the first part of the activity, the student will have to select the sections "Simple Sentences," "Basic Sentences," "Beginner Sentences," or "Intermediate Sentences." Students will work from single words to sentences of varying difficulty depending on the section they are working on. Through continuous exposure to the language, feedback, and the constant repetition of phonemes, the goal is for students to become familiar with phonemes and pay special attention to their weaknesses, gradually hardening the task. Students must obtain a minimum of 85% accuracy before moving into the next sentence, inasmuch as this ongoing repetition forces them to focus on the activity and start adjusting their oral articulation. In the second part of the activity, and to add a collaborative environment and a twist in the activity, students must gather in small groups or in pairs after completing each sentence in order to check their peers' outputs. Students are supposed to listen to others' audios and argue about the errors that they identify in their classmates' recordings versus the errors that Speechace's feedback system marked. Finally, if they can think of any improvement strategies, they can exchange procedures and methods that have helped them improve their pronunciation, such as stress overreaction, breaking words into syllables, etc.

As an example of this third activity, students access harder levels on Speechace such as "Simple Sentences" or "Beginner Sentences" with instances like "Read your book after school". In these example sentences students will be able to put into practice several pairs of~~?~~

vowels they have been learning and to which they have been exposed through the previous activities, such as /æ/–/ʌ/ and /ɪ/–/iː/. As in the previous activity, Speechace's output and feedback will consist of full sentence marks, word-by-word explanation underlining vowel issues –for example, "read" is correctly pronounced as /iː/ but in "after" it sounded like /ʌ/ instead of /æ/–. This way, students will be capable of interiorizing right vowel use in sentence contexts, accelerating the reading speed when encountering these vowel sounds in context. Next, the student is expected to pair up, revise the other classmate's errors, pinpointing them and suggesting further strategies. Afterwards, the student should double-check the errors he observed versus the actual AI-identified errors. By comparing both their own and the AI-generated feedback and working cooperatively, students should realize which mistakes are often neglected by the human ear, build self-monitoring abilities and increase critical thinking by remaining skeptical towards AI.

It is essential to encourage students to approach and engage critically with new technologies like Speechace. Cultivating a healthy skepticism toward the platform's usage and feedback can empower students to question automated corrections, consider their own intuitions and incorporate peer feedback. This reflective approach may help mitigate the risks of technological overdependence, which many students currently face, by promoting more autonomous and informed language learning practices.

In the fourth and final activity, students will deal with a points-based competition in a whole-classroom setting where they will be assigned a random word or sentence that they have practiced or studied in class. As this is the final test, if they score more than 90% after pronouncing the word aloud with the Speechace tool, they will receive a point. If students do not score at least 90%, they will skip to the next person, thus turning the game into a kind of friendly competition. In the second round, the same is done with short phrases containing one or more key vowels, which adds to the difficulty of maintaining precise pronunciation in each context. To conclude and wrap up this activity, and since it is the last one, the instructor can engage in a brief oral reflection with the students, asking questions such as: Which vowel was easiest for you to pronounce? What strategies helped you improve? Do you think the Speechace feedback was useful? These questions can help the instructor to shed light on important issues such as which vowels need further reinforcement, whether the tasks are being efficient, etc. This activity serves to put into practice what has been learned in a dynamic of controlled pressure which encourages precise vowel pronunciation, while promoting concentration, speed, and immediate self-correction.

The following example serves to illustrate how the activity can be implemented: The teacher must assign a word or a sentence available on Speechace to the students –for instance, “Did you watch the movie again?” accessible in “Lesson 1” of “Beginner Sentences”– in order to achieve at least a 90% of accuracy in Speechace. If they do, they earn a point; otherwise, their turn is skipped. The objective is to gather as many points as possible, inasmuch as that indicates a well-articulated oral performance. To wrap up the learning process and as a follow-up critical reflection, the teachers will finish the activity with guided oral questions from which they can receive feedback about the activity. This feedback may be highly beneficial in designing or proposing future activities with Speechace. Thanks to this activity, coping with pressured situations will be reinforced, as well as class participation, public speaking, and pronunciation correctness.

In sum, the proposed sequence of activities aims to underline the ongoing challenges Spanish learners encounter when dealing with English vowels. Through the first three activities of this proposal, which include a combination of fundamental phonetic instruction with the guided use of Speechace, pupils are gradually exposed to more complex language structures obtaining valuable AI-driven feedback. The fourth and final activity, which is presented as a game, proves to be motivating and reflective. Overall, this proposal promotes more accurate pronunciation thanks to guided repetition and self-awareness but also encourages individual autonomy and greater engagement and participation in the classroom setting.

3.2.2 Target Group and Materials

The target audience for this teaching proposal is students in their 4th year of compulsory secondary education or their 1st year of Bachillerato with a B1+ level in English. However, the proposal can be adapted and tailored to any secondary school year by varying the content and expected outcomes. These students are typically 15-16 years old and have been exposed to an approximately B1 level of English according to CEFR throughout their education. This approach is designed for a class of 15-20 students, with fewer students being more effective due to the individual attention the teacher can give to each student.

The proposal is designed for an urban or semi-urban setting where the activities will be held in the school's regular classroom or in the computer lab, depending on the school's computer lab availability. If held in the school's regular classroom, the computers can be either the students' own or provided by the school.

Regarding the seating arrangement of the class, students will sit individually since the more space there is between them, the less noise pollution or interference there will be during the recording. For peer assessment activities or where interaction with the rest of the class is desired, the classroom can adopt a U-shape to facilitate communication.

With respect to the necessary resources and materials used to implement the teaching proposal, human resources, material resources, and economical resources have been considered.

Concerning human resources, the activities are designed to be carried out with secondary school students and the tutor in charge of the English class, who will be responsible for planning, structuring, and guiding the students through the activities. No support teachers or teaching assistants are deemed necessary for the implementation of this proposal.

Among the material resources, the digital screen, or failing that, the conventional whiteboard stands out. The use of the whiteboard will help with the initial explanation and covers the basic phonetic concepts that will lay the groundwork for what will be explained later. Likewise, access to the Speechace platform is required, as are electronic devices that serve as support for using the AI, in this case, computers. Laptop computers can be brought to class, or alternatively, the computer lab can be used. To ensure a more precise and optimal experience with the application, as well as more accurate correction, it is imperative to use headphones with microphones for recordings.

Finally, economic resources will also be required. The primary cost would be the Speechace subscription, a fee that can vary depending on the option chosen (monthly, annual, or volume). If the school in question does not have a license, they can use the free version or even allocate a portion of their English department budget, or if there is digitalization plan in place, the school can apply for funding to cover the cost. Furthermore, since most schools have computer labs and laptops, there is no need to allocate funds for technological equipment.

3.2.5. Types of Assessments

Regarding the assessment and evaluation system for the concepts addressed, two types are distinguished: formative assessment and summative assessment.

The former, focused on process assessment, aims to evaluate students' progress throughout the entire course and sessions. This assessment will be staged and qualitative. The teacher will make use of an individual evaluation sheet that will include factors such as active

participation in class, proper use of the Speechace tool, progressive improvement in the pronunciation of problematic vowels, the ability to self-correct based on feedback received, and reflection on the students' own learning. All these aspects will be assessed making use of a rubric with four levels of achievement, as figure 7 shows below.

Figure 7

Assessment rubric for formative evaluation

Criteria	Excellent (4)	Good (3)	Fair (2)	Poor (1)
Active Participation in Class	Consistently contributes and engages actively in all class activities.	Frequently participates and shows interest in class activities.	Occasionally participates; needs encouragement.	Rarely participates; disengaged.
Proper Use of Speechace Tool	Uses Speechace correctly and independently every time.	Uses Speechace correctly most of the time.	Uses Speechace with some errors or inconsistencies.	Struggles to use Speechace; frequent errors.
Pronunciation Improvement (Problematic Vowels)	Shows significant and consistent improvement in vowel pronunciation.	Shows noticeable improvement; occasional errors.	Some improvement; progress is slow.	Little or no improvement in vowel pronunciation.
Self-Correction Based on Feedback	Consistently self-corrects and applies feedback effectively.	Usually self-corrects and applies feedback.	Sometimes self-corrects; needs reminders.	Rarely self-corrects or ignores feedback.
Reflection on Own Learning	Provides insightful and thorough reflections on learning progress.	Provides clear reflections with some depth.	Provides basic reflections; lacks depth.	Provides little or no reflection.

On the contrary, the latter type of assessment, the summative assessment, will consist of a final, integrative task that will allow students to verify whether the objectives and necessary skills have been achieved. Activity 4 of the program could be used as a final assessment, since in Activity 4, the student is assigned a word from those studied and must pronounce it correctly on the first try, demonstrating phonetic acquisition of the language as well as knowledge of the corresponding phonemes.

For the purposes of this proposal, an initial type of assessment is not explicitly included, as it is assumed that students have already undergone initial assessment processes, either in other academic courses or in previously implemented units. Although these prior initial assessment processes may not have explicitly addressed pronunciation, they could have served

as a basis for an initial assessment so the teacher could gauge the students' starting points. Therefore, the tutor may likely already be aware of individual learners' difficulties. However, the second activity–focused on initial contact with Speechace and students' oral production–can serve to shed light on and implicitly diagnose students' issues, as it allows the teacher to identify the most notable errors.

This two-pronged approach in terms of evaluation will help achieve a fair and focused assessment in the classroom, as it takes into account not only the final result but also the effort and progress made.

In response to this difficulty on the part of Spanish students of English with respect to the aforementioned vowels, the presented proposal has Speechace as its core to palliate these challenges. To solve these continuing hurdles, Speechace's pedagogical implementation in a secondary-bachillerato classroom setting may mitigate the target students' oral inaccuracy, thus fomenting pronunciation awareness and, overall, mastering English pronunciation in an L2 classroom setting. To accomplish these objectives, the proposal is structured around four progressive and staged activities: theoretical instruction on phonetics, Speechace practice with isolated words, contextualized sentence-level practice with peer assessment and a final gamified points competition. The proposal requires school or personal computers, with individual seating for recording. Other key resources are the Speechace subscription, which can be obtained thanks to institutional budgets or digitalization plans. Concerning the evaluation, a formative and summative evaluation will be taken into account, which will assess not only the final result but also the progressive acquisition of knowledge by students.

4. Discussion and Possible Results

4.1 Expectations

Based on the foregoing implementation of the pioneering and AI-powered pronunciation tool Speechace into an ESL classroom setting in Spain, diverse expectations arise concerning its potential impact: improved pronunciation, learner autonomy, enhanced teacher insights and a blended learning situation.

The first expected outcome is improved pronunciation and oral proficiency. It is anticipated that students will generally enhance their pronunciation skills, reading speed, oral intelligibility, articulatory abilities and overall, oral proficiency. Research has corroborated the

effectiveness of computer-based speech corrective feedback for L2 learners. In their experiment, Neri et al. (2008) demonstrated that pronunciation quality in participants exposed to automatic speech recognition-based (ASR) feedback presented more improvements– such as reduction in pronunciation errors, improved articulatory accuracy and higher gains in low-performing students– than in those participants who were not trained using this methodology. Similarly, Neri et al.'s study suggested that computer-assisted pronunciation training "providing automatic feedback was effective in the task for which it was built, i.e., improving segmental quality on a selection of problematic phonemes. The ASR-based feedback seems particularly effective for learners who are generally lagging behind" (p. 240). This study indicates that large enhancements in oral skills can be obtained thanks to computer-assisted training like Speechace, particularly in the segmental quality on problematic phonemes in the case of slower L2 learners. These gains seem to surpass those achieved in learners who are in the absence of such a training tool.

Second, greater learner autonomy and motivation are other expected results. Speechace may trigger learner agency and ownership over their learning process, for Speechace enables them to study and practice at their own speed and independently and its feedback is neither judgmental nor biased. AI-driven tools like Speechace can motivate students into the learning process and arouse them to communicate orally in class, inasmuch as technology-assisted training can dwindle detrimental emotional responses that prove to be key in the evolution of oral skills such as tension or pressure. Vancová's (2023) meta-review of fifteen studies regarding pronunciation learning tools powered by AI was concluding, and it showed decreasing speaking anxiety and expanded motivation. These findings confirm a good experience with AI and learning in relation to motivational factors and speaking anxiety.

Third, other further projected outcomes are improved teacher awareness and instructional insight. As Pennington and Rogerson-Revell (2019) noted, educators are also beneficiaries of implementing Speechace in a classroom owing to the fact that the detailed feedback and comprehensive tracking provided by the tool allows them to create a more targeted and optimal instruction. These data-driven insights and awareness help educators to craft customized activities for the classroom in which they address personal needs.

Finally, another foreseeable consequence is the integration of blended learning. The advantageous results and outcomes of Speechace and overall, AI-driven tools in learning situations are clear. Nonetheless, the most meaningful benefits are expected to occur when merging traditional methodological instruction and AI instruction (Means et al., 2010). Speechace should be regarded as a complementary tool rather than a replacement option.

Mixed and blended learning methodologies that join face-to-face and in-person teaching are likely to be the ultimate way to maximize students' outcomes.

In summary, the expectations of including Speechace in an ESL classroom for Spanish speakers are diverse and enrich the learning situation. Among these expectations are improved pronunciation and oral proficiency, greater learner autonomy and motivation, teacher insights and blended learning. These possible expectations are supported and backed up by thorough research on AI in learning situations (Means et al., 2010).

4.2 Possible Limitations and Challenges

Regardless of the multiple beneficial expectations that emerge when implementing the learning proposal suggested previously with Speechace, several limitations and challenges must be acknowledged and regarded. These limitations are technological restrictions, digital illiteracy, lack of collaborative work, data privacy and uneven abilities to interpret feedback.

The first constraining limitation that is expected to appear in the didactic proposal developed in section 3 is that of technological restriction and accessibility, and more narrowly, a primary concern is that of network accessibility. Although the teaching proposal is based in Spain—and according to the Ministry of Education (2020), 96.8% of classrooms had Internet access in the 2019 academic year—there are still geographical areas where Internet access is very limited. Furthermore, it is not solely a matter of access, but also of good coverage and high internet processing speeds. These facts highlight the shortcomings of the Speechace teaching approach, which is its limited implementation in certain locations, especially in rural or under-resourced secondary schools. Institutions with fewer resources in more marginalized areas, or institutions in developing countries, would not be optimal candidates for this Speechace approach and learning proposal. Additionally, glitches, regular updates and software incompatibilities with the institution's devices can hamper the implementation.

Secondly, other likely limitations are digital illiteracy among teachers. Teachers may feel insecure or unprepared when using innovative technological advances or may not even possess the training required for this type of proposal. Failure to properly manage the platform and exploit its full potential can result in implementation falling short and failing to meet expected planning, goals, or even curriculum requirements. Blanco (2024) adds to this idea indicating that barriers in implementing technology-centered didactic proposals are limited training and capacity building, i.e., teachers do not have the needed digital skills to incorporate

ICTs into their teaching practices. To summarize, a teacher professional development strategy that adapts to a changing technological ecosystem is required.

In third place, there is the issue of the lack of collaborative work. Speechace, with its individualized nature and automatic feedback, may greatly hinder collaborative environments within the classroom in the suggested proposal. Although an attempt has been made to mitigate this strong individualistic bias through a peer review task at the end of Activity 3 of the proposal (see section 2), the lack of a meaningful collaborative environment can result in an absence of peer reflection or mutual scaffolding. The potential offered by collaborative learning activities is diminished because it is difficult to adjust Speechace– such a seemingly individualistic platform– resulting in students competing for the best grades rather than collaborating to learn and improve.

Data privacy and parental consent may be another pivotal limitation in the Speechace-based learning proposal. A vital issue in the accelerated development of AI is safeguarding the privacy of students, most of whom are underage, who are threatened by constant system breaches, vague policies regarding the ethical and moral use of AI, and constant surveillance. (Ismail & Aloshi, 2025). In an app like Speechace, where audio and voice analysis of minors are continuously collected, privacy is at risk. This poses a problem when it comes to parental consent or overzealousness, as parents may not agree with the platform's use (Zawacki-Richter et al., 2019). In consequence, schools must navigate through this problematic usage of AI to ensure students' security and privacy since "parents are essential stakeholders in student data privacy. Their engagement and consent form the backbone of ethical data practices" (McNulty, 2024, p. 1). This highlights the key role of parental involvement in the support of new pedagogical tools in the classroom and the ethical foundation of consent.

Finally, the last limitation that could be encountered in the proposed activities with Speechace is that of uneven ability to interpret AI feedback. In Section 2, Activity 3 dealing with collaborative work, students are expected to interpret, compare and comment on their classmates' feedback as a type of peer assessment. However, this practice presents underlying hurdles seeing that students with lower phonological awareness may find difficult to interpret the system's output– the phoneme-specific feedback – such as colour-coded accuracy. Even though in Activity 1 of the proposal an explanation of the basic foundations of phonology and an introduction to phonology will be given by the teacher; this may not be sufficient and may create imbalances in which the most disadvantaged students could remain passive. This is something to be considered because it can transform the collaborative part of the activity into a one-sided communicative exchange rather than into a meaningful cooperative process.

In sum, technological restrictions, digital illiteracy, lack of collaborative work, data privacy and uneven abilities to interpret feedback prove to be essential limitations to take into account when implementing Speechace, for they could hinder the whole learning process.

4.3 Comparison with Traditional Methodologies

The implementation of Speechace represents a radical change in the way pronunciation is taught in classes. This change could represent a paradigm in L2 teaching, overthrowing methodologies traditionally implemented in the classroom.

Regarding feedback, in traditional methodologies, pronunciation has been slightly instructed and most of the time has consisted of listen-and-repeat dynamics, teacher simulations, or sound imitations that happen in a group setting, provoking generalized feedback and imitated by the phonetic knowledge of the teachers (Yoshida, 2016). Through the innovative Speechace methodology, feedback is automated, individualized, personalized and in private settings. Pronunciation is heightened by this tailored and crafted way of correcting because it proves to be more consistent, time-saving, and swift.

In the same way, students' engagement has shifted from the traditional methodology and the Speechace methodology. As has been previously stated, Speechache motivates students to practice at their own pace and control their progress throughout all activities. This is contrary to the traditional method, in which the pedagogical approaches resulted in a passive role for the students with no autonomous or self-reliant behaviour or where even pronunciation was overlooked or completely neglected (Rubrecht, 2016).

While the new Speechace-based methodology has numerous advantages and benefits, everything indicates that the most optimal approach would be a joint one. One in which the best of traditional methodology and the best of Speechace work together. The humanistic nature of physical educators is irreplaceable and must remain vital to maximizing all AI activities.

4.4 Other Implications

The integration of Speechace has further implications that transcend basic pronunciation improvement. A successful implementation of Speechace may lead to the reconsideration of current educational curriculum policies, promoting a curriculum reform in

favor of pronunciation enhancement. Policymakers can see Speechace as a promising tool for addressing pronunciation in a simple way.

Likewise, pronunciation, more specifically phonetics and phonology, has traditionally been demonized in academia, even in higher education. The inclusion of Speechace could help create a positive culture around pronunciation, shifting away from the quick assumption that it is intimidating or difficult to master. Through the interactive resources Speechace offers and the gamification of learning, a phonetic demystification can be achieved.

Speechace presents itself as a catalyst for educational change. As has been previously showed, Speechace touches student engagement and motivation, institutional assessment and even pronunciation-related classroom culture and approaches. Notwithstanding the earlier-mentioned facts, the tool must be embedded in a critical way within a scaffolded and pedagogical proposal. Ultimately, Speechace takes a holistic and integrative approach that meets the growing global demand for English, thus emerging as an optimistic asset in the educational improvement of English pronunciation.

5. Conclusion

Throughout the present study an undeniable reality has been manifested: pronunciation teaching in an ESL classroom, and more narrowly, in secondary school education in Spain, has been traditionally relegated to the margins in favor of other linguistic components such as grammar or vocabulary.

Pronunciation, far from being just a complementary element, proves to be a fundamental cornerstone for effective communicative exchanges and linguistic intelligibility, factors that are central in the academic, professional and social environment to which students are immersed. These facts are far from the reality of Spanish classrooms. The educational situation reveals an imbalance between the theoretical recognition of pronunciation in curriculum design and pedagogical planning for students and its actual implementation. Although there are certain mentions and references to oral production, the standards tend to be vague and unclear. For this reason, in this curricular context, and considering the exacerbated rise of AI in our current globalized world, the implementation and development of activities focused on the acquisition of phonetic knowledge with Speechace as a central tool has been emphasized. Speechace thus emerges as a tool that can mitigate this problem and trigger improvements in students' pronunciation.

This analysis of the Speechace tool points to the potential of Speechace as a promising pedagogical resource with great educational value. This is due not only to its great adaptability to both the academic and personal levels of students, but also to its automated feedback. This feedback is highly relevant to students' learning process, as it uses a simple, visual, and segmented interface to help students achieve a didactic understanding of phonetics. Likewise, the ability to incorporate Speechace in a gradual and progressive manner is optimal for students, as it can range from the basic theoretical foundations of phonetics in the word level to more complex instances such as phrases and structures in an individualized and highly precise environment.

In general terms, the proposal to implement Speechace as a teaching tool is supported and grounded in three factors: the lack of greater curricular emphasis on pronunciation, the use of AI as an educational tool, and the adaptation of new technologies in a gamified classroom environment.

However, special mention must be made of the critical, ethical, and purposeful use of Speechace. Its effectiveness will largely depend on the teacher’s role and the extent to which it is integrated into well-structured and context-sensitive pegagogical approach. Speechace is not intended to replace educators; rather, it should be viewed as an enriching and procedural ally. Accordingly, this teaching proposal advocates a blended and integrated methodology that combines AI-driven technologies with human mediation, reflective practice, and the interpersonal nature of traditional teaching, in order to achieve personalized, dynamic, and effective instruction.

The use of AI in education is not without controversy. The various limitations and controversies that exist in relation to AI when implementing this proposal must be kept in mind. The excessive technocratization of the learning process –that is, trusting heavily on data-driven systems and making learning too robotic – the existing digital barriers and lack of resources, digital illiteracy, the almost nonexistent collaborative work, and ethical and moral issues surrounding the privacy and data protection of minors are some of these issues. These potential controversies do not negate or discredit the proposal, but they do call for a rethinking of certain issues and greater planning to compensate for these limitations and ensure fairness, accessibility, and safety for all Speechace users.

From a broader perspective, Speechace not only transforms the way students learn English pronunciation but also transforms school cultur, that is, the shared values, beliefs, and practices that shape how language learning is perceived and approached within the educational community**.** This online tool fosters greater recognition of pronunciation as a teachable and

accessible skill, challenges prevailing misconceptions, and prompts a reevaluation of how pronunciation has traditionally been perceived by students. Thus, phonetics, an element typically regarded as inaccessible or overly complex by many L2 learners compared to other linguistic competences, becomes a more approachable and standardized component within students' reach. Speechace, therefore, favors a paradigm shift that demystifies phonetic and phonological practice.

Ultimately, this work presents a path for critical reflection on the use of AI in the classroom to improve L2 pronunciation in Spanish secondary education. Speechace has demonstrated the potential for moving toward an educational system that is in sync with today's globalized and digital landscape, embracing AI as a powerful pedagogical tool. Nevertheless, Speechace’s success must align with the broader educational ecosystem to accomplish a thoughtful and well-integrated implementation. In this light, technology must be adopted in such a way that it is not an end, but the means for the educational process of something as humanizing and meaningful as the teaching of foreign languages.

6. References

Alnifasah, M. (2022). Technology review: Speechace. In J. Levis & A. Guskaroska (Eds.), *Proceedings of the 12th Pronunciation in Second Language Learning and Teaching Conference*, held June 2021 virtually at Brock University, St. Catharines, ON. https://doi.org/10.31274/psllt.14315

Bachler, R., Segovia-Lagos, P., & Porras, C. (2023). The role of emotions in educational processes: the conceptions of teacher educators. *Frontiers in psychology*, *14*, 1-14. https://doi.org/10.3389/fpsyg.2023.1145294

Blanco-García, Y., Serrano, R. M., & Casanova, O. (2025). Toward a transversal education model: a review of digital and artistic-musical competencies. *Arts Education Policy Review*, *2,* 1–15. https://doi.org/10.1080/10632913.2025.2459917

Bohn, O.S., & Munro, M. J. (2020). Second language speech learning: Theory, findings, and problems. In T. S. Cardoso & J. N. Y. Levis (Eds.), *The Routledge Handbook of Second Language Acquisition and Phonology* (pp. 69–85). Routledge.

Darling-Hammond, L., & Cook-Harvey, C. M. (2018). *Educating the whole child: Improving school climate to support student success.* Learning Policy Institute. https://doi.org/10.54300/145.655

Dennis, N. K. (2024). Using AI-powered speech recognition technology to improve English pronunciation and speaking skills. *IAFOR Journal Of Education*, *12*(2), 107-126. https://doi.org/10.22492/ije.12.2.05

Derwing, T. M., & Munro, M.J. (2017). Pronunciation fundamentals: Evidence-based perspectives for L2 teaching and research. *Language Learning & Language Teaching, 38*(3), 430–433. https://doi.org/10.1093/applin/amw041

Ghanizadeh, A., Razavi, A., & Jahedizadeh, S. (2015). Technology-enhanced language learning (TELL): A review of resources and upshots. *International Letters of Chemistry, Physics and Astronomy, 54,* 73-87. https://doi.org/10.56431/p-z6sj8g

Gilbert, B. J. (2008). Teaching pronunciation: Using the prosody pyramid. Cambridge University Press.

Himmayati, I., & Triyoko, H. (2024). Teaching phonetics and pronunciation in ELT; How important and which one to be taught? *Jurnal Teknologi Pendidikan: Jurnal Penelitian dan Pengembangan Pembelajaran, 9*(4), 556-565. https://doi.org/10.33394/jtp.v9i4.12938

Hui, X.X., Liu, Z.F. & Chi, Y.M. (2023) A review on learner autonomy with mobile-assisted language learning for EFL learners at the tertiary level. *Open Access Library Journal, 10,* 1-16. https://doi.org/10.4236/oalib.1110606

Isaacs, T., & Trofimovich, P. (2016). *Second Language Pronunciation Assessment: Interdisciplinary Perspectives* (pp. 3-11). Multilingual Matters.

Ismail, I. A. & Aloshi, J. M. (2025). Data privacy in AI-driven education: An in-depth exploration into the data privacy concerns and potential solutions. In K. Keeley (Ed.), *AI Applications and Strategies in Teacher Education* (pp. 223-252). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-5443-8.ch008

Jaimes, A., & Vázquez, A. (2021). The Role of Immediate Feedback in Improving Non-Native Speakers' Pronunciation Accuracy. *Applied Linguistics*, *42*(3), 345- 366.

McNulty, N. (2024, June 30). *AI and data privacy in schools*. Medium. https://medium.com/@niall.mcnulty/ai-and-data-privacy-in-schools-safeguarding-student-information-a0e8436a5f5e

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2010). *Evaluation of evidence-based practices in online learning: A meta analysis and review of online learning studies.* US Department of Education. https://www.ed.gov/sites/ed/files/rschstat/eval/tech/evidence-based practices/finalreport.pdf

Ministry of Education. (2020, May 15). El 96,8% de las aulas españolas contaba con conexión a internet en el curso 2018-2019. Ministerio de Educación, Formación Personal y Deportes. https://www.educacionfpydeportes.gob.es/prensa/actualidad/2020/05/20200515-estadisticacomunicaciones.html

Morales, B. (1997). La lingüística en el contexto de la inteligencia artificial. *Forma y Función*, *10,* 25–50.

Mutiara, A., Wakhda, S.C., Alfidariyani, I.M., & Indriani, L. (2024). The Effectiveness of Speech-Ace Website on Students' Pronunciation. *English Education:Journal of English Teaching and Research, 9*(1), 92-104. https://doi.org/10.29407/jetar.v9i1.22372

Neri, A., Cucchiarini, C., & Strik, H. (2008). The effectiveness of computer-based speech corrective feedback for improving segmental quality in L2 Dutch. *ReCALL*, *20*(2),225–243. https://doi.org/10.1017/S0958344008000724

Ningsih, Fitria. (2024). Analyzing students' English-speaking skills using Speechace: Insights from an AI-powered assessment tool. *Pedagogic Research-Applied Literacy Journal, 1*(3), 111-124. https://doi.org/10.70574/9w2prx09

Park, M. S. (2015). Second language pronunciation teaching: Insights from research. *Studies In Applied Linguistics And TESOL*, *15*(2), 45-47. https://doi.org/10.7916/d8f76r6j

Pennington, M. C, & Rogerson-Revell, P. (2019) *English Pronunciation Teaching and Research: Contemporary Perspectives.* Palgrave Macmillan. https://doi.org/10.1002/tesq.605

Po'latova, H. (2024). The importance of language in second language acquisition. *Journal of New Century Innovations, 48*(1), 151-156. https://newjournal.org/new/article/view/12019

Romero, M. (2024). *Castilla y León entra en la elite tras los informes PISA*. EsDiario. https://www.esdiario.com/castilla-y-leon/240619/136969/castilla-y-leon-educacion-elite-informe-pisa.html

Rubrecht, Brian. (2016). Falling on deaf ears: Questioning why pronunciation is overlooked in second and foreign language instruction. *The Journal of Internationalization and Localization, 3,* 196-212. https://doi.org/10.1075/jial.3.2.06rub

Seljan, S., Berger, N., & Dovedan, Z. (2004) Computer-assisted language learning (CALL). MIPRO. pp. 262-266

Shadiev, R., & Yang, M. (2020). Review of Studies on Technology-Enhanced Language Learning and Teaching. *Sustainability*, *12*(2), 420-524. https://doi.org/10.3390/su12020524

Solórzano, L. R., & Paredes, N. V. (2024). The benefits of Google's microphone use to improve the pronunciation of English language for non-native speakers. In G. Cevallos & J. L. Vera (Eds.), *Herramientas para mejorar la pronunciación en estudiantes del idioma inglés como lengua extranjera* (pp. 60-88). Rediem.

Stockwell, G., & Hubbard, P. (2013). Some emerging principles for mobile-assisted language learning. *The International Research Foundation for English Language Education, 2,* 1-15.

Traore, M., & Blankson, L. (2011). Using literature and multiple technologies in ESL instruction. *Journal of Language Teaching and Research, 2,* 561-568. https://doi.org/10.4304/jltr.2.3.561-568

Valencia, Y. S., & Sánchez, J. L. S. (2020). Aprendizaje de un segundo idioma apoyado en tecnologías digitales: una revisión sistemática. *Education In The Knowledge Society (EKS)*, *21*, 1-13. https://doi.org/10.14201/eks.18734

Vančová, H. (2023). AI and AI-powered tools for pronunciation training. *Journal of Language and Cultural Education, 11*(3), 12-24. https://doi.org/10.2478/jolace-2023-0022

Veiga-Pérez, C. (2017). Spanish teenager's pronunciation of English as a second language. *Revista de Educación de la Universidad de Granada, 24,* 273-292.

Wei L. (2023). Artificial intelligence in language instruction: impact on English learning achievement, L2 motivation, and self-regulated learning. *Frontiers in psychology*, *14,* 1-14. https://doi.org/10.3389/fpsyg.2023.1261955

Yoshida, M. T. (2016). *Beyond Repeat After Me: Teaching Pronunciation to English Learners*. TESOL Press.

Zainuddin, M. & Mohamad, M. (2024). Utilising Speechace to enhance speaking skills among English as a second Language pre-university students. *International Journal of Academic Research in Progressive Education & Development, 13*(2), 1206 - 1219. http://dx.doi.org/10.6007/IJARPED/v13-i2/21458

Zawacki-Richter, O., Marín, V.I., Bond, M. *et al.* (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators?. *Int J Educ Technol High Educ, 16*(39), 1-27 https://doi.org/10.1186/s41239-019-0171-0

Zhang, W. (2022). The role of technology-based education and teacher professional development in English as a foreign language classes. *Frontiers In Psychology*, *13,* 1-7. https://doi.org/10.3389/fpsyg.2022.910315