

ICT inclusion strategy for teaching speaking intonation to students with visual impairment in an EFL classroom

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Abstract

This article addresses qualitative research on Speaking Intonation for EFL students with visual impairments within an inclusive education context. This research aims to inspire educators to adopt innovative strategies that ensure equitable access to language learning content for students with visual impairments. Data gathering involved documental analysis, structured interviews, and reflective journals from pre-service teachers. Initial findings reveal the effective enclosure of ICT tools towards oral linguistic output modeling. In conclusion, pronunciation accuracy may be boosted through the incorporation of rapidly developing ICTs Information and Communication Technologies.

Keywords:

ICT, Inclusive Education, Visual Impairment, Speaking Intonation, EFL.

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Las TIC como estrategia para la enseñanza de la entonación oral a estudiantes con discapacidad visual en un aula de inglés como lengua extranjera

Resumen

Este artículo aborda la investigación cualitativa sobre la entonación oral para estudiantes de inglés como lengua extranjera con discapacidades visuales dentro del contexto de la educación inclusiva. Esta investigación tiene como objetivo inspirar a los educadores a adoptar estrategias innovadoras que aseguren un acceso equitativo al contenido de aprendizaje del idioma para los estudiantes con discapacidades visuales. La recopilación de datos involucró análisis documental, entrevistas estructuradas y diarios reflexivos de futuros docentes. Los hallazgos iniciales revelan la efectiva integración de herramientas TIC para modelar la producción lingüística oral. En conclusión, la precisión en la pronunciación puede mejorarse mediante la incorporación de las Tecnologías de la Información y la Comunicación, que están en un rápido desarrollo.

Palabras clave:

TIC, Educación inclusiva, Discapacidad visual, entonación oral, inglés como Lengua Extranjera.

As TIC como estratégia para o ensino da entonação oral a estudantes com deficiência visual em uma sala de aula de inglês como língua estrangeira

Resumo

Este artigo aborda a pesquisa qualitativa sobre a entonação oral para estudantes de inglês como língua estrangeira com deficiências visuais no contexto da educação inclusiva. Esta pesquisa tem como objetivo inspirar os educadores a adotar estratégias inovadoras que garantam um acesso equitativo ao conteúdo de aprendizagem do idioma para estudantes com deficiência visual. A coleta de dados envolveu análise documental, entrevistas estruturadas e diários reflexivos de futuros professores. Os resultados iniciais revelam a integração eficaz de ferramentas TIC para modelar a produção linguística oral. Em conclusão, a precisão na pronúncia pode ser aprimorada por meio da incorporação das Tecnologias da Informação e Comunicação, que estão em rápido desenvolvimento.

Palavras-chave:

TIC, Educação inclusiva, Deficiência visual, Entonação oral, Inglês como Língua Estrangeira.

Introduction

Information and Communication Technologies (ICT) have often been used to improve access to reading and listening materials. However, “speaking is the skill that the students will be judged upon most in real life situations” Brown & Yuke, 1983 as cited in Rao, 2019, p.8). Traditional teaching methods combined with technology do not provide enough opportunities for consistent speaking practice, leaving many students without the tools they need to develop this essential skill. This gap highlights the need for innovative strategies that focus on teaching speaking more effectively, once the issue of matter is especially connected with unique challenges to teaching communication skills (Rao, 2019).

Speaking skills are essential for social and professional interactions, and for students with visual impairment (VI), this may become a fundamental aspect to acquire a domain in the target language. Mestre (2017) notes that teaching pronunciation, intonation, and interaction is vital to building communicative competence. Moreover, this issue underscores the need to teach intonation as an integral part of English as a Foreign Language (EFL) instruction, especially for students who rely heavily on auditory cues. Intonation, then, is crucial for ensuring that messages are conveyed clearly and naturally. Misplaced intonation can lead to misunderstandings, such as mistaking a question for a statement.

Statistics from Simat (2016) indicate that in Colombia, 0.6% of students with disabilities are blind, and 7% have low vision. Despite the implementation of Decree 1421 (2017), which established a framework to support students with disabilities, Agudelo & Ospina (2021) found that many schools lack sufficient resources to meet these students’ needs. These shortcomings place additional pressure on educators to adapt their teaching methods. They further emphasize that while national policies promote inclusive education, the lack of proper tools and persistent attitudinal barriers within educational institutions often restrain the effective implementation of these frameworks, limiting opportunities for students with disabilities.

This study explores the challenges faced by students with VI in the EFL learning process by presenting case studies and innovative teaching approaches. Thus, encouraging educators to reflect on their teaching methods seeks to trigger inclusive classrooms through technology immersion in the mainstream classroom. The article tends to disclose not only the dynamic principles within the Language course but also to inspire educators to adopt a more inclusive mindset and scaffolding strategies. Hence, equity and equality may be addressed regarding specific opportunities to develop their speaking skill.

Methodology

This paper adopts a qualitative approach to explore strategies and tools for teaching intonation to students with VI. Bearing in mind, qualitative research allows scholars to shape the understanding of a phenomenon from cycling levels of stages (Carriльо et al., 2021). It describes an open-ended inquiry designed to uncover patterns and themes in natural contexts (Campbell, 2014). Creswell (2013) states that qualitative research focuses on the meanings individuals or groups assign to their experiences. This approach involves collecting non-numerical data to gain insights into various aspects of learning, teaching, and the educational environment. Also, Bowen (2009) highlights the importance of document analysis as a key qualitative research method that systematically examines printed and electronic materials to understand social phenomena. Thus, through the systematization of instruments, the variations of ICT applications may be adapted for students with VI, exploring how they might improve speaking. Treating documents as “social facts” helps to contextualize findings and highlight the broader implications of ICT in education. This study was framed within an action research approach (Stringer, 2013), since its cyclical nature of planning, acting, observing, and reflecting about ICT strategies and their adaptation to inclusive EFL contexts (pp. 5–6). Accordingly, this proposal addresses a qualitative-action design grounded in documental analysis, complemented by interviews and reflective journals, to triangulate diverse perspectives. These provide a comprehensive picture of

how ICT-mediated strategies for teaching intonation are experienced and implemented in inclusive EFL contexts.

This study draws on the analysis of ten studies, structured interviews with three private-school teachers in Bogotá, and reflective journals written by two preservice English teachers during practicum scenery. To select the ten studies, a systematic search was conducted in Scopus and ResearchRabbit using combinations of terms such as “teaching students with visual impairments,” “ICT in English,” “teaching EFL intonation,” “EFL with ICT,” “EFL in inclusive classrooms,” and “EFL for visually impaired students.”

After an initial search, approximately 50 titles and abstracts were identified; searches were limited to the last ten years, included publications in English and Spanish, and were restricted to the education and technology domain. Subsequently, it was shortlisted to 20 studies for full-text review. An analytic frame capturing topic, core concept, citation, paraphrasing, and reflection for each study, discarding papers that lacked relevance to the central theme, alignment with our research questions, or clarity of results, which allowed narrowing the corpus to 10 articles from 2017 to 2024. Then built a new table re-categorizing the evidence by title, objective, and results, which easily data organization, to then focus on the research questions presented previously, and continue with the writing of the results.

Participants and Setting

Structured interviews were conducted with three English teachers from private schools in Bogotá, Colombia (coded T1–T3). The participants were all coded with T tags (T1–T3) in order to maintain their anonymity. Sample participants were primary and secondary level teachers at an early stage working in urban contexts. Teachers were recruited using convenience sampling based on the following conditions: current English teachers in schools who had worked with students with VI and agreed to participate. The interview guide included 10 open-ended questions addressing teaching experience, the relevance of intonation, strategies, ICT use, obstacles, and inclusion. Interviews were carried out

in English, in person. Sessions were 20-30 minutes in duration, were audio-recorded with consent, and transcribed verbatim.

The present study included reflective journals of two pre-service English teachers in their eighth semester who did their professional practice in a public secondary school with an inclusive education environment located in the south of Bogotá, Colombia. Journals are highly regarded as important qualitative tools as they provide the ability to catch the participants' shifting cognition, emotion, and pedagogical choices as they are happening (Ortlipp, 2008; Creswell, 2013). These journals captured their evolving thought processes, emotional reactions, and pedagogical choices while teaching students with VI.

For this study, participants wrote reflective journal entries during one academic semester of their placements with students with visual impairments (VI). There were a different number of entries, but they were written consistently over the semester, and the volumes of the entries ranged from brief notes to larger narratives (approximately one to two pages in length). They were submitted completely, electronically, and without personal identifiers to maintain confidentiality. These practices encouraged teachers' reflection on planning, classroom activities, ICT use, and the difficulties experienced in supporting learners' development of oral intonation.

The journals generated narrative, open-ended reflections. During the analysis stage, axial coding was used. Ortlipp (2008) advocates for reflexive journaling as a way to expose emerging themes and patterns in research. Open coding initially revealed expressions of uncertainty, "it was difficult to encourage the class to notice intonation patterns because we only had the textbook and our voice as a reference. I felt limited because technology could have offered them other models and practice opportunities" (participant A, Journal). This finding is consistent with Zidane et al. (2023), who identify a shortage of teacher training and a lack of resources for literacy instruction as major barriers in inclusive EFL contexts. Another recurring theme was about self-doubt regarding improving instruction. One participant reflected, "I wondered whether the way I described the explanation was enough.

Without recordings or audiotapes, students might not have felt their progress, and I questioned the effectiveness of my teaching methods.” (Journal, Participant B). These reflections underscore Lutovac & Flores’s (2022) argument that the beliefs and emotions of pre-service teachers are a critical factor in shaping how they will actually practice their profession in the future.

Through axial coding, ideas were then grouped into higher-order categories such as (a) professional identity development, (b) pedagogical creativity and adaptation, (c) barriers and infrastructure, and (d) emotional responses to inclusion challenges. Through reflective diaries, it was obtained authentic insight into the lived realities of inclusive teaching. These findings complemented those from both interviews with teachers and analysis of teaching materials.

Data Analysis and Trustworthiness

Data was analyzed using thematic coding supported by Microsoft Excel spreadsheets to ensure systematic organization and categorization. In the initial stage, open coding enabled emerging ideas to be revealed between the interviews, reflective journals, and documentary sources. These codes were then compared and organized through axial coding into four categories aligned with the study’s objectives: (1) pronunciation and intonation accuracy, (2) motivation and autonomy, (3) teacher mediation and training, and (4) barriers and infrastructure. Triangulation of interviews, reflective journals, and documentary analysis enhanced credibility.

Triangulation of the three instruments reinforced the credibility of findings, as convergences across sources highlighted common themes, while divergences revealed unique perspectives. Data was organized using the Microsoft suite to ensure transparency and systematic categorization.

Results

Following documental systematization, a synthesis table was developed to reorganize the evidence by title, objective, and

results. This structure enabled straightforward comparisons, revealed common themes and gaps, and improved traceability.

Based on the network analysis and the systematic review of ten studies, the bibliometric modeling demonstrates specific thematic clusters that correspond to the main research themes established in this study. The relational network indicates how ICT-mediated pronunciation instruction (represented by studies from Ou, 2022; Larassati et al., 2022; and Mestre, 2017) becomes a central node connecting to inclusive education practices (Lintangsari & Emaliana, 2020; Carrillo, 2020) and assistive technology applications (Dahniar et al., 2022; Fansury et al., 2019). This interconnectedness validates the methodological approach of triangulating documentary analysis with interview and journal data, as the literature synthesis reveals convergent themes around pronunciation accuracy improvements, with software tools like MyET and Praat showing significant gains (47% to 87% accuracy increases), while audiobooks and reading aids enhance student autonomy and motivation in VI-inclusive contexts.

The dispersed network distribution of the studies reflects the emerging nature of research at the intersection of ICT integration and inclusive EFL pedagogy, particularly evident in the challenges identified across multiple studies.

An initial bibliometric modeling disclosed the four-category coding framework employed in this research, as structural barriers (infrastructure limitations, teacher training deficits) identified by Zidane et al. (2023) and Özer & Cabaroğlu (2018) connect to pedagogical innovations demonstrated by pronunciation-focused studies. The network analysis reinforces the study's qualitative-action research design by illustrating how teacher-mediated strategies (emotional-affective approaches from Carrillo, 2020; communicative methodologies from Ciria-López, 2017) bridge the gap between technological capabilities and inclusive practice implementation. This bibliometric mapping ultimately positions the current investigation at a critical convergence point where established ICT tools meet the specialized needs of VI learners in EFL contexts, justifying the mixed-method approach that combi-

nes systematic literature analysis with practitioner perspectives and reflective practice documentation.

Hence, initial findings portray that ICT tools, such as audio-books, pronunciation software like MyET, microlearning platforms, voice recordings through WhatsApp, and reading aids, play a significant role in enhancing speaking skills. Each tool offers unique benefits, fostering greater engagement, improving intonation accuracy, and supporting independent learning for students with VI.

Pronunciation software such as MyET emerged as one of the most effective tools for improving intonation and fluency. The software provides real-time feedback, enabling students to self-correct and refine their pronunciation (Ou, 2022). This visual-audio feedback helped students grasp intonation patterns more effectively and achieve noticeable improvements in their spoken English.

WhatsApp, used to record and share students' voice exercises, also showed significant benefits. Teachers noted that the ability to review and listen to their own recordings, as well as those of their peers, encouraged collaborative learning. This process enhanced fluency, vocabulary acquisition, and intonation, while also fostering a sense of community among learners.

Reading aids offered another practical solution, enabling students with VI to access printed information independently. Results suggest that these tools enhance vocabulary and auditory memory, both of which are critical for speaking skills. Additionally, they promote inclusivity by reducing reliance on external support, allowing students to engage more actively in their learning.

Henceforth, pronunciation and intonation accuracy display how MyET provided specific feedback on intonation and articulation, leading to significant improvements. Students displayed greater clarity in intonation, which enhanced their ability to convey meaning naturally and effectively. Also, motivation and autonomy are more likely to be generated by audiobooks, microlearning modules, and reading aids, heightening student engagement and independence. These tools gave students with VI greater control over their learning, boosting their confidence and fostering

a positive attitude towards English practice. Regarding teacher training and support, it was evident that there is a need for more robust scaffolding in teacher training. Many educators expressed difficulty in developing the skills and lack the confidence required to integrate ICT effectively. Thus, professional development programs focused on inclusive EFL teaching could help address these challenges and improve outcomes for students with VI.

Across the three teacher interviews, a consistent picture emerged of how intonation instruction is perceived, enacted, and constrained in inclusive EFL classrooms serving students with visual disabilities. All participants emphasized that intonation directly supports intelligibility and learner confidence, with one noting that “it’s important that it’s understood” and two stressing that its teachability and impact are level-dependent (stronger at intermediate–advanced levels). In pedagogical terms, teachers agree on the need to provide immediate, in-the-moment feedback and repetition to prevent disconnects between production and correction, complemented by context-based pattern recognition. ICT is viewed as a catalyst for exposing learners to varied prosodic models—through native-speaker audio, songs with clear contours, and curated recordings—yet its benefits are contingent on careful curation (e.g., adjusting playback speed, pre-editing materials) and the availability of alternative options when resources fall short. Reported learner barriers include socio-affective factors (low confidence, fear of ridicule) and L1 interference in prosody and structures, suggesting that effective intonation work requires both technical modeling and psychological safety in the classroom.

The interviews also highlighted structural conditions shaping method choice and efficacy. Limited institutional infrastructure and connectivity frequently force teachers to blend ICT with analog practices, constraining systematic adoption even when attitudes toward technology are positive. Teachers identified training needs in two domains: (1) practical decision-making around when and how to deploy ICT for intonation (selection, adaptation, and accessibility of audio materials); and (2) assessment literacy to combine live formative feedback with simple pre–post measures (e.g., pitch-focused listening tasks) for monitoring progress.

Viewed together, the interviews support the study's documentary evidence and reflective journals: ICT-supported intonation instruction can enhance prosodic awareness, autonomy, and inclusion, but its actual impact depends on classroom-level scaffolds (feedback routines, curated audio), teacher preparation, and baseline access. These findings justify a methodological focus on mixed, context-sensitive strategies that integrate ICT with immediate corrective feedback and structured, accessible listening tasks aligned with learners' proficiency levels.

Additional barriers related to unequal access to resources were also mentioned in the interviews. Teachers described feelings of frustration among students who struggled to keep pace with peers in better-equipped settings. These gaps in resources and support underscore the importance of investing in ICT infrastructure and teacher training to ensure that everybody in the classroom has equal opportunities to succeed. Addressing these limitations through improved training and investment in ICT infrastructure is essential to empower students with VI to achieve communicative competence and equitable participation in EFL classrooms.

Discussion

Considering the axiological principles addressed in this project, there is a need to reflect on the fact that speaking nuances seem to be evolving due to several factors. Larassati et al. (2022) argue that integrating pronunciation, intonation, and interaction into language education creates a more holistic approach to communication. Developing these skills not only helps learners build grammatically correct sentences but also equips them to navigate conversations effectively. This comprehensive foundation boosts confidence and adaptability, preparing students for real-world challenges. Mestre Segarra (2017) emphasizes that intonation is key for conveying meaning, emotion, and emphasis in spoken language. Each language carries unique intonation patterns that can change the meaning of a sentence entirely based on delivery. Ciria-López (2017) notes that failing to address intonation in EFL instruction often leads to misunderstandings. Bearing in mind that mastering these variations is essential for effective communica-

tion, a shift from controlled activities to integrated, context-driven interactions allows learners to apply intonation patterns naturally in real-life situations.

Lintangsari & Emaliana (2020) note that the absence of visual input fundamentally shapes how students with VI acquire and process information. Unlike sighted learners, students with VI depend more on auditory, tactile, and other sensory inputs to understand the world around them. This reliance requires adjustments to teaching approaches to capitalize on their sensory strengths and support their unique learning pathways.

However, traditional EFL materials often rely heavily on visual aids, limiting their effectiveness for students with disabilities (Carrillo, 2020). Özer & Cabaroğlu (2018) point out that many techniques still focus on engaging the visual sense, creating a gap in pre-service teacher training in terms of methodologies tailored to students with VI. Tools offering auditory and tactile feedback are essential to fill this gap.

Resources like audiobooks, pronunciation software, and voice recording tools provide accessible and interactive alternatives to visual-dependent methods. In accordance with Fansury et al. (2019), this study evidences the importance of using audiobooks for EFL students, demonstrating how audiobooks provide flexibility, and allow students with VI to learn at their own pace by focusing on listening comprehension, pronunciation, and intonation. Dahniar et al. (2022) discuss a reading aid that uses a camera and Raspberry Pi to convert text into MP3 files. While primarily designed for reading, this device supports intonation practice by enabling repeated listening to intonation patterns. Students can work at their own pace improving their skills in challenging areas without external pressure. Supporting the findings of Zidane et al. (2023), teachers identified that the challenges of integrating ICT in classrooms involve both personal and structural factors that are interconnected. In Colombia, maintaining devices such as Raspberry Pi is especially difficult due to budget constraints and lack of technical assistance, affecting long-term use. These challenges bring to light the urgent need for better policies, investment in

assistive technologies, and teacher support to promote inclusion and effective ICT use in education.

Teachers' narratives offered additional perspectives, shedding light on how pedagogical decisions impact students' learning. Lutovac & Flores (2022) argue that understanding the beliefs and experiences of pre-service teachers is critical for shaping their future practices, and these narratives contribute to this understanding. Addressing these challenges, such as limited infrastructure and technical support, insufficient teacher training in inclusive and ICT-based methodologies, the predominance of visual materials, resistance to inclusive practices, pedagogical difficulties in teaching intonation, and persistent inequities in access to resources, requires collaborative efforts. Educators, institutions, and developers of educational technologies must cooperate to design accessible tools, provide professional development, and promote policies that ensure equitable opportunities for students with visual impairments in EFL contexts.

Implications of this study underscore the need to proceed from broad discussions about inclusive teaching towards specific actions that teachers and institutions can implement. One pragmatic conclusion is to develop and modify listening materials that focus on the practice of intonation in a purposeful manner, for instance, using guided listening, interactive audiobooks, or screen-reader-compatible apps. Moreover, research on the viability of accessible software tools application in resource-limited settings (e.g., public schools) and its scalability is another possible option. Another relevant aspect refers to teacher-education programs that need to integrate training focused on the creation of communicative intonation activities, enabling the effective implementation of ICT. Additionally, other research might investigate how the provision of multimodal feedback (auditory, tactile, or haptic) may affect intonation learning among learners with VI in the same way, paving the way for inclusive and evidence-based pedagogy.

Limitations

There were significant variations in the results of this research compared to previous studies. Ou (2022) found significant improvements in pronunciation, intonation, and fluency through the use of MyET in a screen-based setting. This study targeted different context: VI-inclusive classrooms, where visual interfaces may not be practical due to the limited resources. This software can still be accessed with the help of screen readers. In this specific setting, success depends on having accessible file formats, available devices, and sufficient teacher time.

Similarly, the Raspberry-Pi study by Dahniar et al. (2022) provides an innovative solution for access, but it focuses exclusively on reading rather than speaking. The device's function is to convert printed text into audio, and it does not track pronunciation or intonation, representing a notable gap in this research. The authors demonstrate that structural barriers such as a lack of technical support and budget constraints directly limit crucial intonation exercises. These findings emphasize a different set of priorities: the initial investment must facilitate basic access like headsets and audio formats, as well as teacher training to empower educators so that they use existing technology effectively

Finally, Özer & Cabaroğlu (2018) was a useful reference for understanding the teaching of English to students with visual impairment their primary focus is on vocabulary instruction. The study details auditory strategies and the basic use of assistive technology to expand students' vocabulary, while also identifying structural barriers such as a lack of accessible materials, limited time, and a lack of teacher training. This perspective offers valuable input for designing inclusive resources and instructional planning tools, but it does not directly address speaking production or intonation; accordingly, it serves more as a reference framework on conditions and strategies for lexical work with students with visual impairment whereas this study is focused on how to turn that access and those adaptations into systematic classroom practices for speaking and intonation.

Conclusions

This study is a meaningful first step towards further research in the field of inclusive education and highlights the urgent need to incorporate the ability to adapt technological tools within the pedagogical praxis of teachers. In summary, this study evaluates the extent to which the findings of other research on ICT implementation can improve the learning process for EFL students with VI. The unique needs of students who primarily rely on auditory input can be met by a flexible and engaging approach to language acquisition offered by ICT technologies.

This research builds on the findings of previous studies by identifying the ongoing benefits of using ICT in EFL education while also pointing out important drawbacks. Studies reveal that ICT tools contribute to enhancing pronunciation, autonomy, and increased engagement. However, there are significant obstacles such as accessibility, insufficient teacher training, and unequal distribution of resources. By integrating insights from these studies, this paper reinforces the importance of adopting strategic approaches to overcome these barriers and maximize the potential of ICT in inclusive education.

This study evidences that ICT deployment can significantly improve the learning process for EFL students with VI, especially in the teaching of speaking intonation. However, the extent of these improvements will depend on how key challenges are resolved, including infrastructure limitations, teacher training, and access to technology.

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