

BOOSTING ESL, SPEAKING AND VOCABULARY SKILLS WITH NLP: PRACTICAL TOOLS FOR THE MODERN CLASSROOM

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ABSTRACT: Every learner encounters difficulties expressing their thoughts clearly, particularly those acquiring English as a second language. This study investigates the effect of Natural Language Processing (NLP) anchoring techniques on specific speaking sub-skills—pronunciation accuracy, fluency, and speaking confidence—crucial for effective communication. 100 ESL learners aged 16–25 participated in a six-week, mixed-method quasi-experimental study comparing two naturally formed groups: a control group (n = 50) using traditional instruction and an experimental group (n = 50) using NLP-supported tools.

The experimental group employed Google Speech-to-Text and ELSA Speak for pronunciation drills, Anki with contextual flashcards for vocabulary retention, and ReadLang for interactive reading practice. The control group followed a conventional curriculum with textbook exercises and teacher-led drills—pre- and post-intervention assessments measured vocabulary retention, speaking proficiency, and confidence levels.

Results demonstrated that the NLP-supported group achieved a 36% increase in vocabulary retention compared to 7% in the control group and a 39% improvement in speaking proficiency compared to 16%. Additionally, confidence ratings increased by 25% versus 10% in the control group. Qualitative feedback from self-reflection logs and surveys revealed reduced anxiety during speaking tasks, increased learner autonomy, and higher learning engagement.

These findings suggest that targeted NLP anchoring techniques can produce measurable gains across multiple domains of speaking performance. The study highlights the value of integrating technology to supplement rather than replace traditional instruction. Future research should investigate the long-term retention of these gains and explore their application across different proficiency levels, educational contexts, and learner demographics.

KEYWORDS: NLP, speaking skills, vocabulary acquisition, speech recognition, pronunciation, student motivation

Introduction

Pedagogical research acknowledges that learners’ emotional states and contextual differences influence second language acquisition (Carbo, 1981). Recent advancements in Natural Language Processing (NLP) are transforming ESL education, with tools like speech recognition and vocabulary apps becoming integral to learner success. Such technologies have been linked to improved vocabulary retention, pronunciation, fluency, and learner autonomy (Celaj & Jani, 2024; Nation, 2001). Despite promising trends, gaps remain in our understanding of which speaking sub-skills NLP tools enhance and how these gains translate pedagogically. This study addresses that gap by asking:

1. To what extent do NLP anchoring techniques improve pronunciation accuracy and speaking fluency compared to traditional instruction?
2. Do these techniques also boost learners’ speaking confidence and motivation?

We conducted a quasi-experimental, mixed-method study with two groups of ESL learners to measure pronunciation accuracy, vocabulary retention, fluency, and confidence changes. Clear research questions guide our methodology and structure. This study argues that NLP-powered tools significantly enhance ESL speaking outcomes by offering real-time feedback, reducing learner anxiety, and promoting independent learning.

Literature Review

Advances in language-related technologies are increasingly shaping how second languages are learned, especially in ESL environments. What was once considered supplementary resources—such as speech recognition and vocabulary-building tools—have now become essential to how learners interact with language, both inside and outside the classroom. Their growing presence in the classroom has been linked to practical benefits such as improved vocabulary retention, more fluent speaking abilities, greater learner independence, and heightened motivation. This review draws on recent

research to explore how the power of NLP tools are used in practice, particularly their effectiveness in supporting vocabulary growth, pronunciation skills, spoken interaction, learner confidence, and integration into everyday teaching (Celaj & Jani, 2024).

NLP in ESL Vocabulary Acquisition

It is a perennial challenge in vocabulary learning for ESL students due to the inherent shortcomings of conventional practices, which are often centred around memorizing lists of unrelated words with a low degree of contextuality. As a result, this method often leads to low long-term retention, low learner motivation and interest, and low transfer of passive vocabulary into active productive use in speaking or writing (Nation, 2001). Learners may come across the same words in reading yet find it difficult to retrieve or use them in communication settings, which in turn demonstrates a mismatch between our recognition vs productive competence. In addition, grammar and reading comprehension have often taken precedence in the classroom over systematic vocabulary instruction, resulting in inadequate student exposure and practice. Research shows that dialogic reading—when teachers actively engage learners in discussing storybook content—can significantly enhance vocabulary acquisition (Rodríguez, 2013).

Natural Language Processing (NLP) tools provide a practical solution for overcoming these barriers through personalized, interactive, and context-aware vocabulary acquisition experience. For example, ReadLang and LingQ use NLP to give vocabulary in the context of authentic reading passages, which helps to increase semantic depth and foster incidental learning. Likewise, spaced repetition algorithms enabled by NLP-based monitoring and analysis of learner performance ensures that vocabulary is revisited at intervals best tailored to reinforcing memory and retention. They also enable multimodal learning using integrated text, audio, and visual cues, which has been shown to enhance recall through dual coding and sensory reinforcement (Paivio, 1971; Salmerón et al., 2018).

Furthermore, NLP-driven applications adapt to individual learner progress and difficulties, promoting a tailored learning experience that traditional instruction cannot easily provide. NLP tools provide real-time feedback, an interactive and gamified approach to practice, and contextualized exposure to vocabulary, which in turn increases motivation in learners and smoothens the transition from passive reading to active usage, thus facilitating a more effective, engaging, and durable word-blanketing process.

NLP for Pronunciation and Speaking Skills

Traditionally, fluency and pronunciation in speaking skills have depended on teacher intervention and feedback to improve. NLP tools now perform this function through a real-time analysis of learner speech using automatic speech recognition (ASR). Tools like Google Speech-to-Text and ELSA Speak evaluate you in terms of ‘phoneme accuracy’ – pronunciation of individual sounds, intonation, and rhythm – and provide feedback on your accuracy in real-time. For instance, in a study by Liakin, Cardoso, and Li (2017), ESL learners who used pronunciation software for six weeks demonstrated intervention-induced statistically significant gains in fluency and intelligibility over a control group subject. ASR tools allow learners to be autonomous, providing them with opportunities to self-correct their own mistakes repeatedly, thus developing phonemic awareness even without the presence of teachers (McCrocklin, 2016). This independence is particularly advantageous for adult learners, especially in terms of addressing fossilized errors. Moreover, Derwing and Munro (2015) noted that immediate feedback with explicit pronunciation instruction yields improved intelligibility, a process increasingly enabled through mobile NLP platforms. Research by Neri et al. (2008) also suggests that ASR-enhanced feedback systems might improve learners' pronunciation, as it found that learners using ASR systems produced more accurate 'segmental' and 'rhythmic' pronunciation—definitions of these terms are shown in above.) In a traditional classroom, the speed of feedback cycles and learning is limited, but using phonetic visualization tools allows that feedback to happen instantly.

Learner Confidence and Motivation

One of the key benefits of incorporating Natural Language Processing (NLP) tools into ESL programs is their influence on student confidence-building and motivation. Traditional language classrooms tend to put learners into high-stakes situations where the fear of making mistakes in front

of peers inhibits participation. Dewaele and MacIntyre (2014) have shown that anxiety of this type is one of the most substantial human factors inhibiting language production in the oral modality. NLP tools mitigate this anxiety by offering a safe space to practice where learners can repeat exercises as often as needed without the risk of embarrassment. Under such low-stakes conditions (Burston, 2015), language forms can be tested with little risk, leading to the experimentation required to nurture fluency and communicative competence.

Many students view NLP-based tools as helpful partners rather than strict evaluators. Reinders and Wattana (2014) observed that using AI tools in ESL classrooms led to clear gains in speaking frequency, confidence, and openness to communication. Feedback from learners often describes these tools as “safe,” “non-judgmental,” and less intimidating than being corrected in real time. These emotional benefits matter, especially for learners guiding their own progress or combining self-study with traditional instruction. Alongside reducing anxiety, language learning apps powered by NLP spark motivation through smart design. Features like gamified tasks, feedback in real time, and progress tracking give learners clear signs of growth. For instance, ELSA Speak uses badges, scores, and streaks to turn routine drills into personal challenges. This reflects what Peterson (2012) noted about digital tools encouraging independence and persistence—learners set their own goals, monitor their efforts, and reflect on their progress.

One of the most motivating aspects of learning a language is seeing your progress. Natural Language Processing (NLP) tools help with this because they adjust to your level and make improvements more visible—something that traditional methods do not always do well. They also give you more control over how and when you study, which plays a significant role in keeping up motivation over time, a point supported by Deci and Ryan (2000). Feeling in control of the learning process and receiving regular, constructive feedback can significantly affect how language learners approach their studies. Going through these kinds of experiences often helps learners develop a growth mindset, which naturally builds confidence, eases anxiety, and boosts motivation.

These psychological shifts do not just lead to short-term improvement—they also play a key role in helping learners stay engaged and retain vocabulary over time, as Zimmerman (2002) suggests in his research on self-regulated learning. For many ESL students, these tools help break down emotional barriers, creating the space for confidence and motivation to take root and drive steady, lasting progress.

Classroom Integration of NLP Tools

Grammar tools can support independent learning but are far more effective in classrooms where teachers actively guide their use. Chen and Li (2020) point out that the teacher's role is to help students understand how to use these tools in the proper context and make sense of the feedback they get.

Using tools like Grammarly alongside teacher feedback has been found to help students write with better grammar, think more about their writing, and reflect more deeply on how they learn (Wang, 2021).

Helping students learn to use digital tools well means showing them how to think with purpose. Instead of using tech just because it is available, it should be woven into how learning is structured. Reinders (2010) pointed out that tools work best when they are not left to stand alone but used as part of planned activities—like guided peer reviews, modelled examples from teachers, live demos, and space to reflect on the feedback AI gives. That way, students will understand what the tools are telling them and how to grow from them.

Liu and Jackson (2008) emphasized how important it is for students to build digital literacy so they can think critically about the NLP tools they use. Learners who are not guided properly might accept automated feedback without question. In that case, these tools become surface-level helpers instead of meaningful tools for deeper learning. Mobile and informal learning opportunities are most effective when classroom integration is intentional and scaffolded, helping learners bridge formal and informal practices (Godwin-Jones, 2018).

Kukulska-Hulme and her colleagues (2021) highlight that what makes AI tools effective in language learning is not just how advanced they are but how well they are woven into the everyday ways students and teachers interact in the classroom.

Teachers need to strike a balance—giving students room to practice independently with digital tools while creating space for real conversations and group work. That way, learners build their

language skills and the confidence to use them with others. Also, teachers should stay mindful of NLP issues like data privacy, an over-reliance on automated feedback, and the potential biases embedded within these systems. A prominent analysis notes that many NLP models are released with impressive performance improvements—but without any evaluation of bias, highlighting the need for ethical auditing during model development (Blodgett et al., 2020).

Methodology

Methodology Design

The study assessed students' performance before and after the implementation of a language-support tool and compared the outcomes to a control group that did not engage with the tool. The primary aim was to determine whether such tools enhance English as a Second Language (ESL) learners' speaking confidence and contribute to vocabulary development.

The quasi-experimental design compared two naturally formed groups—those learning through traditional methods (Control Group) and those exposed to NLP-enhanced tools (Experimental Group)—without random assignment. The study gathered measurable improvements in test scores and self-reported learner feedback by conducting both quantitative and qualitative analysis. This mixed-methods approach ensured a more holistic understanding of NLP's impact on language learning outcomes, confidence, and engagement.

Participants

One hundred ESL learners, aged 16–25, participated and were primarily of Italian and Spanish nationalities. They all attended the same language institute and exhibited beginner to intermediate proficiency. The homogeneity of L1 backgrounds (Italian and Spanish) allowed examination of L1's influence on pronunciation and vocabulary learning—especially since both L1s share phonological features with English which could impact acquisition. Participants had diverse educational backgrounds (high school to vocational training), allowing analysis across different learner profiles.

Sampling Rationale

We used purposive sampling, a non-probability method selected to include learners whose L1 backgrounds (Italian/Spanish), age, and proficiency aligned with our research goals. Purposive sampling enhances study rigor by targeting individuals rich in contextual information, while supporting credibility, dependability, confirmability, and transferability of qualitative and mixed-method data. Though bias risk exists, this approach ensured meaningful analysis within constrained resources.

Group Assignment & Proficiency Assessment

Participants were naturally grouped into control (n=50) and experimental (n=50) groups based on class schedules, following a quasi-experimental design (random assignment was not feasible). All students completed the institute's standardized placement test, supplemented with a brief speaking assessment to verify comparable proficiency across groups.

Ethics & Consent

Approval was granted by the institute's ethics board. Minors (under 18) provided parental consent, and adult learners gave written informed consent. Participants were briefed on confidentiality, voluntary participation, and their right to withdraw at any stage.

Duration

The study lasted for 6 weeks. During this period, both the experimental and control groups were taught the same curriculum objectives, but they used different teaching methods.

NLP Tools Used (Experimental Group)

The experimental group used the following NLP-powered tools to enhance their language learning:

- Google Speech-to-Text: Used for daily pronunciation and speaking practice, allowing students to convert spoken language into written text for feedback.
- ELSA Speak: Provided phonetic analysis and real-time feedback on students' pronunciation to improve their speaking accuracy.
- Anki: A flashcard app enhanced with NLP-generated contextual examples, helping students retain vocabulary through spaced repetition.
- ReadLang: Supported contextual reading by letting students translate and save unknown words, reinforcing vocabulary through meaningful input.

Control Group (Traditional Instruction)

The control group followed a conventional ESL learning approach without the aid of NLP tools. Their learning activities included:

Vocabulary Instruction:

Learners were taught new vocabulary through textbook readings, word lists, and written exercises. Vocabulary practice primarily involved rote memorization, dictionary definitions, and usage examples provided by the teacher.

Pronunciation Practice:

Pronunciation was taught through teacher modelling and repetition exercises. Students engaged in choral reading, drills, and teacher-led correction during speaking tasks. No digital feedback or phonetic analysis was available.

Speaking Activities:

Students participated in daily speaking tasks such as pair discussions, role-plays, and question-answer sessions. Feedback was provided by the teacher during or after class but was limited in frequency and depth compared to automated tools.

Engagement Monitoring:

Student participation was observed by the instructor. Learners also completed weekly self-reflection logs and Likert-scale engagement surveys, just like the experimental group.

Table 1: Instructional Methods Used in Experimental vs. Control Group

Category	Experimental Group	Control Group
Vocabulary	Anki: Flashcards with NLP-generated context. ReadLang: Contextual translation and word saving	Textbooks: Word lists, definitions, and example sentences.
Pronunciation	Google Speech-to-Text: Converts speech to text for feedback. ELSA Speak: Real-time pronunciation evaluation.	Teacher modelling: Repetition drills and choral reading. Feedback provided during class activities.
Speaking Practice	ASR Tools: Daily speaking tasks with instant feedback and self-correction opportunities.	In-class discussions: Role-plays, Q&A sessions with delayed feedback from teacher.
Feedback	Automated: Real-time, personalized feedback from tools.	Manual: Teacher-led correction during or after class.
Monitoring	Self-reflection: Weekly logs and Likert-scale engagement surveys.	Observations: Teacher-monitored participation with weekly learner surveys.

As shown in Table 1, the experimental group benefited from interactive, real-time NLP tools, while the control group followed a more traditional, teacher-led approach. This distinction helps contextualize the instructional differences that influenced the outcomes discussed in the following sections.

Instructional Activities

Vocabulary: Weekly quizzes assessed vocabulary acquisition. Anki and ReadLang were used daily for practice in the experimental group.

Pronunciation: Bi-weekly pronunciation tests were administered to assess articulation improvements. ELSA Speak and Google Speech-to-Text supported phonetic training.

Speaking Practice: Both groups participated in daily 15-minute speaking tasks, but the experimental group used ASR tools for feedback.

Qualitative Engagement: Teachers observed learner participation and noted progress, and students submitted weekly self-reflection logs.

Data Collection Methods

Pre and Post-Tests

Standardized speaking and vocabulary tests were administered at the beginning and end of the study to measure participants' progress and learning gains over time.

Vocabulary Quizzes

Weekly vocabulary quizzes were given to both groups. The results were compared to evaluate vocabulary retention and acquisition trends.

Engagement Surveys

Learners completed weekly surveys using Likert-scale questions. These surveys assessed their motivation, stress levels, and engagement with the tools and learning tasks.

Error Tracking

Writing and speaking errors were recorded throughout the study. Data was collected using Grammarly and teacher feedback to compare error patterns and improvements between groups.

Justification of Methodology

The use of control and experimental groups allows for causal inference regarding the effectiveness of NLP tools. The pre-test/post-test design ensures that observed improvements are linked to the intervention. Additionally, combining quantitative metrics (test scores) with qualitative feedback (reflections and surveys) provides depth and validity to the findings.

The selected NLP tools reflect commonly accessible, free or low-cost technologies, making this study relevant to real-world ESL settings. The six-week duration was sufficient to observe meaningful trends in performance and engagement without disrupting curricular pacing.

Results

Vocabulary Improvements – NLP Tools vs. Traditional Methods. This diagram shows the difference in vocabulary test performance before and after the intervention. Students in the experimental group, who used NLP tools, showed a much greater improvement in scores than those in the control group.

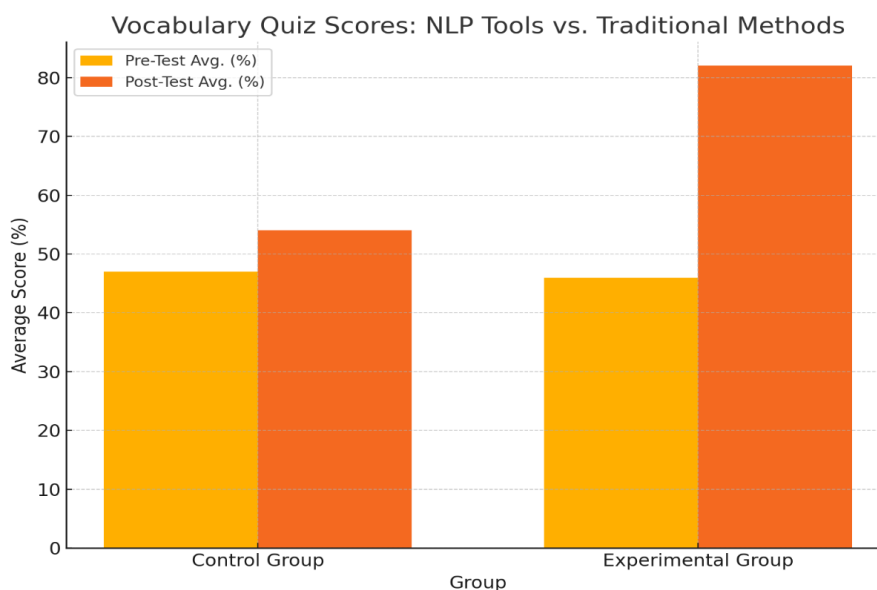


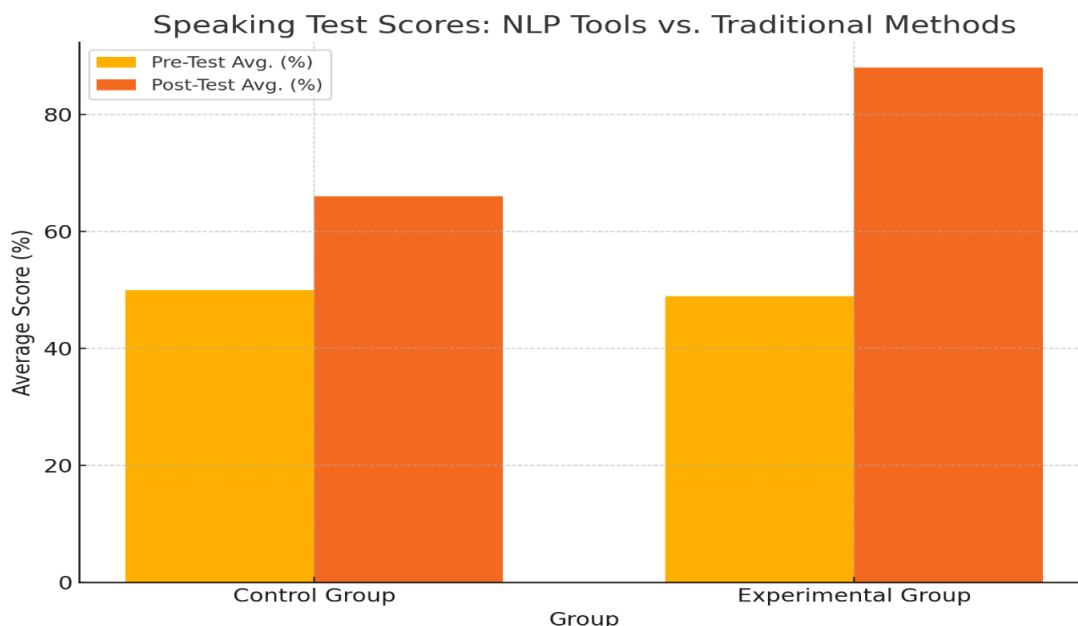
Table 2: Vocabulary Quiz Scores Before and After Intervention (one hundred Students)

Group	Number of Students	Pre-Test Avg. (%)	Post-Test Avg. (%)	Improvement (%)
Control Group	50	47	54	+7
Experimental Group	50	46	82	+36

Students using NLP tools learned and retained vocabulary more effectively due to the use of spaced repetition and contextual learning. The NLP tools helped highlight word usage in context and provided interactive learning experiences.

Speaking Test Score Improvement

This comparison reflects the increased speaking performance in both groups. The experimental group had access to tools like Google Speech-to-Text and Elsa Speak, which provided real-time correction and phonetic feedback.



Group	Pre-Test Avg. (%)	Post-Test Avg. (%)	Improvement (%)
Control Group	50	66	+16
Experimental Group	49	88	+39

The group using NLP tools got to practice speaking regularly and received instant feedback, which helped them communicate more clearly, pronounce words better, and feel more confident when talking.

Self-Reported Confidence Increase

Before and after the activity, students rated how confident they felt. The results showed a transparent boost—after using the NLP tools, they felt more capable of using English.

Group	Pre (%)	Post (%)	Increase (%)
Control Group	58	68	+10
Experimental Group	60	85	+25

Learners felt more confident because NLP tools let them practice without fear of being judged. The tools gave steady feedback and created a safe space to try things out, helping them build independence and trust in their skills.

Engagement and Motivation:

- NLP-supported activities scored higher in engagement (mean rating of 4.5/5) compared to traditional tasks (3.2/5).
- Students described the tools as "fun," "motivating," and "less stressful than live correction."

Discussion

The study confirms that NLP tools, including Google Speech-to-Text for improving pronunciation, ELSA Speak for accent reduction, Anki for vocabulary retention, and ReadLang for reading comprehension, significantly improve ESL learners' speaking skills, vocabulary retention, and confidence. Over six weeks, the experimental group using these tools outperformed the control group across all metrics.

The NLP group demonstrated remarkable progress, with vocabulary scores rising by 36% compared to 7% in the control group, thanks to contextual learning and spaced repetition. Speaking proficiency saw an impressive 39% improvement, supported by real-time feedback and phonetic analysis from ASR tools, aligning with findings from Liakin et al. (2017). Confidence levels also rose by 25% in the experimental group, with learners describing the tools as engaging and low-pressure—echoing studies by Reinders & Wattana (2014). These results highlight the value of integrating NLP tools into ESL classrooms to enhance both performance and learner motivation.

Importantly, this study reinforces the idea that technology alone is not a solution, but when combined with clear pedagogical planning, NLP tools enhance both cognitive and emotional learning outcomes. Your expertise in pedagogical planning is crucial in ensuring the success of these tools. The intervention's success depended not just on tool availability, but on structured activities, regular assessments, and learner reflection—elements that grounded the tools within a supportive instructional framework.

Conclusion

Over six weeks, this study explored how Natural Language Processing (NLP) tools can support ESL learners in improving their speaking skills, expanding vocabulary, and building confidence. Learners who used NLP-based tools like Google Speech-to-Text, ELSA Speak, Anki, and ReadLang showed more substantial progress than those who followed a more traditional learning path. These tools allowed students to practise pronunciation independently, receive instant feedback, and learn new words in meaningful contexts. More importantly, they helped reduce anxiety around speaking and made the learning experience feel more encouraging and self-directed. The results highlight how NLP can be a powerful addition to the language classroom—not a replacement for teachers but a practical aid that boosts participation and speeds up learning. Further studies could look at how these benefits hold up over time and how best to weave these tools into everyday teaching across different groups of learners.

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