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PRONUNCIATION ANALYSIS SOFTWARE IN TEACHING ENGLISH AS A FOREIGN LANGUAGE

Abstract:

The article examines three pronunciation analysis software tools — FLOW Speak, PRAAT, and ELSA Speak – to determine their effectiveness in teaching pronunciation of English as a foreign language. The primary objective is to compare the selected pronunciation analysis software tools addressing the key research question: Which of the selected pronunciation analysis software applications is the most suitable for teaching pronunciation of English as a foreign language? The analysis utilizes Hubbard's (2019) General Courseware Evaluation Framework as a basis for comparative analysis.

Keywords:

Analysis of Education, Higher Education, English, Computer Software, Analysis

JEL Classification: I21, L86, Z00

1 Introduction

Thanks to the influential shift from classical to computer-based pronunciation teaching (CAPT), the slow transition and replacement of traditional views on teaching led to more creative opportunities that evolved around computer-based language teaching. The increasing popularity of computer-driven teaching has highlighted the need to identify effective pronunciation learning and teaching tools. Continuous technology integration played a critical role in revolutionizing the previously ineffective approaches toward more enriched resources, which can serve as a helpful aid for educators and facilitators to develop and train pronunciation skills.

2 Literature review

Warschauer (1996) describes computer-assisted language learning (CALL), which has significantly influenced the teaching of English as a foreign language (TEFL) for many years, providing several enhancements for educational settings. Designed software aimed at both beginners and advanced learners, prioritizes user flexibility by offering engaging and interactive opportunities that cater to diverse needs. These programs utilize technology to teach, assess, and develop skills that encompass all aspects of language learning. Using multimedia elements is practical as they greatly enhance the overall interactive experience of these programs.

In teaching English as a foreign language, the software can interact on two bases: tutorial software and tool-oriented software. Hubbard (2019, pp. 2–3) argues that tutorial applications – courseware have a peculiar structure and design for guiding students and hold the closest resemblance to the traditionalist approach to teaching. These programs offer targeted language exercises and may utilize features commonly associated with CALL, such as feedback, assessment, and gamified progression toward the predetermined goal of the user. On the other hand, tool-oriented applications, such as multimedia resources and digital platforms, do not have a direct instructional structure but rather serve as support for various language learning activities.

Hubbard (2019) continues to follow the advancement of technology. In matters of education, it has introduced new methodologies, such as Mobile-Assisted Language Learning (MALL), and proceeds to explain the individual programs that fall under this category. According to Hubbard (2019), Duolingo can be classified as tutorial software because it has a structured instructional design with a clear teaching presence. However, Quizlet is primarily considered a tool-oriented software, as it functions as a resource for learners to create their own flashcards and study materials. However, its classification can shift depending on the “culture of use”. By how teachers create and structure sets with specific learning objectives, they can achieve a much more tutorial-like presence (Burcl, 2023).

According to Warschauer (1996), there is a large amount of software that was created to support the EFL standards:

- The behavioral approach is represented by Drill and Practice software, which emphasizes repetitive drill exercises in grammar, pronunciation, and vocabulary.
- Next, the software enhances communication skills through intensive reading exercises that improve clarity and reduce anxiety. Unlike the behavioristic method, it avoids drills and promotes creativity, boosting students' confidence in expressing ideas.

- Another significant type of software is an interactive environment that allows users to simulate various objects, offering them the freedom to explore and engage with language independently. This contextualized approach greatly aids in developing critical thinking skills by providing an immersive experience through simulation.
- The all-in-one approach is a common aspect of CALL methodologies and the most widespread variant. It accommodates all learner groups and prevents biases toward specific subjects. Typically, it includes multimedia tools that integrate skills.

Martins, Levis and Borges (2016) outline the advantages of CAPT, including differentiation, practice opportunities, and instant feedback through visual and auditory aids, which often surpass those of traditional methods. While current automatic speech recognition mechanisms may struggle with non-native pronunciation, they may still make significant progress in pronunciation training. Furthermore, learners can engage with diverse input from various regional accents and voices, aligning with the principles of the communicative approach. The next software release will feature ongoing updates to enhance pronunciation learning contexts, thereby improving TEFL's effectiveness through advanced feedback systems and adaptive learning. Current research indicates that CAPT's growing significance lies in its ability to enable learners to achieve clear pronunciation, a vital part of effective communication in a globalized standard (Martins, Levis and Borges, 2016).

3 Methodology

3.1 Objectives

The primary objective was to compare the selected pronunciation analysis software tools used in TEFL, addressing the key research question: Which of the selected pronunciation analysis software applications is the most suitable for teaching pronunciation of English as a foreign language? Comparative analysis was done by a teacher and a student teacher of English Phonetics and Phonology. The analysis was employed to evaluate the chosen pronunciation analysis software, guided by the principles of Hubbard's (2019) general courseware evaluation framework. The software's capabilities, strengths, and limitations in the context of pronunciation teaching needed to be compared and assessed.

3.2 Sample

PRAAT

PRAAT is a simulation-based program, as it, by default, gives the user the ability to explore, customize, and create a homebrew derivation, as the source code is licensed under the General Public License, which is fully functional, published, and publicly available (Boersma and Heuven, 2001). The name "PRAAT" is derived from the Dutch word for "to speak". It serves as a symbol of PRAAT's purpose, which is to be used as a tool for pronunciation assessment, speech synthesis, and speech editing. These are the essentials of this software, but there is an entire universe of possibilities to implement the program, with a plethora of options to customize it fully. The scripting language's availability enables many users to utilize it in the most unexplored ways. One of the primary objectives of this software was to eliminate the need for multiple pieces of equipment, thereby maximizing the benefits of PRAAT's algorithm by streamlining both speech analysis and spectral analysis processes. The wide range of tools compensates for the program's

outdated user interface. Users can manipulate speech using various settings. They can inspect the vowels and consonants using a spectrogram and the principle of segmentation (Machac and Skarnitzl, 2009), which allows them to recognize the individual distinctions of pronunciation in foreign languages, such as vowel length, the presence or absence of rhoticity, and stress patterns.

FLOW Speak

FLOW Speak is a relatively new AI tool in the pronunciation teaching industry, focusing on teaching pronunciation while offering comprehensive feedback options for its users. The lesson system focuses on language skills, primarily targeting speech and pronunciation quality. Embedded AI algorithms are necessary for making the entire learning process a fully customizable experience while still maintaining a well-balanced engagement with the tool itself (Sussman, 2024). Learners receive immediate visual feedback on their pronunciation through a color-coded system. A semaphore of colors helps users swiftly navigate and recognize their potential pronunciation mistakes. This helps learners interact with their speech mannerisms and realize the pronunciation mistakes that could lead to breaking the old habit of incorrect usage. Chugani (2024) acknowledges the importance of FLOW Speak in education as it is designed to fit into a traditional classroom environment, enriching the learning experience. Pinpointing the ability to examine individual student progress reports is a much-appreciated feature.

ELSA Speak

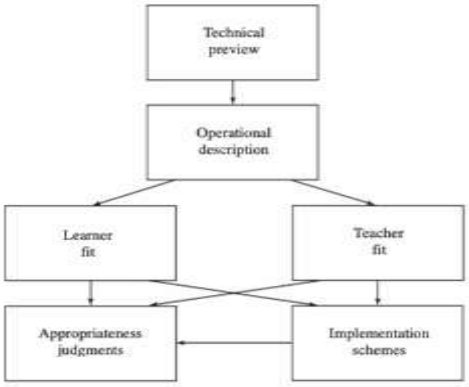
The primary purpose of ELSA Speak is to help learners eliminate inconsistencies between English pronunciation and their native language. Akriono and Isnaini (2024) proceed to define recent developments in integrating artificial intelligence into pronunciation training. The contribution of ELSA Speak, which is widely regarded as an effective tool, is immense. Additionally, it streamlines the process of acquiring proficiency in English by providing responsive feedback through speech recognition. Students are allowed to experience the interactive approach of the program, which identifies their pronunciation errors in real time, focusing on correct articulation and reducing the clutter that is borrowed from their first language. ELSA Speak is fundamentally a mobile-based app, which is beneficial for portability. According to reports by Akriono and Isnaini (2024), students greatly enjoy the introduction of gamification into the educational process. This results in a more engaging and streamlined experience using ELSA Speak and can be considered an influential factor in achieving higher focus and consistency in practice. ELSA’s other notable project is Speech Analyzer, a web-based solution for evaluating individuals' pronunciation.

3.3 Data Analysis

The criteria for the comparative analysis of pronunciation assessment software were formulated by Bacikova, Janovska and Orosova (2019) and are considered an operational variable. They are used in any research and must be physically measurable and testable. In practice, this means that any conclusion drawn from our comparative analysis must be fully reproducible and substantiated while keeping in mind Hubbard’s (2019) framework, which is necessary for conducting the analysis and must later align with the aims of our research. This ensures overall consistency between the core assumptions of the analysis and the final synthesis of the individual parts being evaluated (Miri and Shahrokh, 2019).

Therefore, the best example of using comparative methods in the research of individual software is to utilize Hubbard's (2019) General Courseware Evaluation Framework (Figure 1). It is the most suitable structure for directly comparing software connected to CALL and its sub-methods, such as CAPT. It consists of six sequential phases of analysis, which cannot be omitted as this would reproduce unwanted results. Therefore, we followed these individual steps and reflected them in comparative analysis to ensure that there was no bias regarding the validity of the research.

Figure 1: Courseware Evaluation Framework: Core Components



Source: Hubbard (2019, p. 12)

Every aspect of Hubbard's scheme in Figure 1 underwent evaluation criteria. We insisted on synchronizing open-ended feedback with a quantitative approach to visualize individual features more effectively. The scaling system was adopted for each sequence of the Courseware Evaluation Framework. This is reinforced by Miri and Shahrokh's (2019) approach, which aims to provide replicable data for further research. We established a set of criteria based on the needs of the research. There are five main segments of criteria, each addressing the most important components of the pronunciation analysis software in a 5-point scale (1 – poor, 2 –below average, 3 – average, 4 – good, 5 – excellent). The last two phases of the framework must be calculated separately, as they involve collecting the score from the previous steps of the analysis.

1. Technical Preview

In the initial phase, the courseware must be inspected based on its purpose of use and functionality to determine whether it is suitable for the current needs of both the coursework and students.

2. Operational Description

Following the completion of the first phase, it is essential to examine the chosen software thoroughly, analyze its content, and observe its behavior until a firm grasp of its fundamental functions and the type of material it presents is achieved.

3. Teacher Fit

The purpose of this phase is to assess the individual features and their interaction with methodical counterparts. This step helps to determine the range of skills students need to utilize the software efficiently.

4. Learner Fit

It is important to assess how well the content, skills, and language level align with the student's needs and whether they are consistent with the course syllabus. This learner-based phase is a necessary step to fuse interests with the existing "culture of use" – focusing on the student's interactions with digital technologies.

5. Implementation Schemes: This is calculated as the average of the results from the previous steps. The ever-present issue of integration in the educational process can be addressed by exploring all the possibilities of implementing software in the classroom and curriculum. To fully realize the courseware's potential, it is essential to address the limitations of eventual adaptation into practice, including proper usage and correct execution.

6. Appropriateness Judgement: This will be calculated as an average of the results from the previous steps. The last phase of the framework involves intercepting the individual parts and synthesizing them into informed decisions on whether to use the courseware, considering factors such as quality, teacher match, learner match, usefulness, and time efficiency. Hubbard (2019) explains that no courseware will be the perfect match, as it must be assessed based on its behavior toward students' learning priorities.

4 Results

Each software mentioned was tested, compared, and evaluated to establish a comprehensive report on its performance.

1. Technical Preview

PRAAT

PRAAT's commendable spectral analysis is second to none when it comes to conducting various speech-based experiments in the field of Phonetics and Phonology. However, its inferior user interface reduces accessibility for inexperienced users. **4 (GOOD)**

FLOW Speak

The unity of AI algorithms and personalized feedback form an ideal partnership for pronunciation teaching. **5 (EXCELLENT)**

ELSA Speak

Mobile-based applications for teaching and improving pronunciation have an English-only focus, which is somewhat limiting. **4 (GOOD)**

2. Operational Description

PRAAT

Due to the concept of a sandbox, this program allows users to customize their environment according to their needs. This ability to adapt to various scenarios and conditions makes it a robust tool. Its execution of spectral analysis is helpful for experienced users, but it lacks significance for inexperienced users. **3 (AVERAGE)**

FLOW Speak

Provides AI-driven, personalized feedback that points out errors in pronunciation by implementing a color-coded feedback system (green, yellow, red) and progress tracking. **5 (EXCELLENT)**

ELSA Speak

ELSA Speak offers welcomed features, including the gamification of exercises, real-time feedback, and various role-play scenarios powered by AI. On the other hand, the Speech Analyzer is beneficial for generating detailed reports and complex summaries of pronunciation and accuracy, with a focus on articulation and error correction. **5 (EXCELLENT)**

3. Teacher Fit

PRAAT

The program serves as a potent tool for teachers and students, uniquely simulating phonetic differences with spectrograms and spectral analysis. However, it demands significant skill to operate, making it challenging for both students and teachers and necessitating additional training for those unfamiliar with it. While capable of performing intricate tasks, its technical complexity limits effectiveness in seminars. **3 (AVERAGE)**

FLOW Speak

Direct interaction with CAPT methodologies can be seen in the ability to provide progress reports and personalized feedback. It can also be used to monitor students' performance and growth. It is the most accessible tool among the software, as it requires minimal technical prowess, accompanied by its AI-driven feedback system, which makes it a practical companion.

5 (EXCELLENT)

ELSA Speak

ELSA Speak's appeals to AI-driven feedback and gamification are examples of effective engagement tactics to maximize overall attentiveness and motivation in users. It requires minimal technical skills, and its strength lies in its being a mobile-based app. Aside from alignment with CAPT, it underperforms in the matter of providing in-depth phonetic analysis that the teacher might require during Phonetics and Phonology seminars. **4 (GOOD)**

4. Learner Fit

PRAAT

PRAAT's connection to the English Phonetics and Phonology course is substantial. Its ability to provide various visualizations of simulated scenarios is key to discovering and eliminating pronunciation errors. However, its difficulty in use and lack of a transparent user interface make it highly unfit for inexperienced users. **3** (**AVERAGE**)

FLOW Speak

FLOW Speak addresses students' needs through its design of an intuitive interface, personalized AI-driven feedback, and flexibility for home and classroom use. It also aligns with the TEFL syllabus by focusing on pronunciation, intelligibility, and accuracy. FLOW Speak is highly recommended for students, especially those with little to no prior pronunciation analysis software experience, due to its user-friendly approach. **5 (EXCELLENT)**

ELSA Speak

ELSA Speak suits students' needs with its gamified and interactive approach, as well as its structure, which prioritizes real-life communication skills and scenarios. However, it is not aligned with the syllabus, as it is mainly used for fluency rather than detailed phonetic analysis. Students rated it moderately. **4 (GOOD)**

5. Implementation Schemes

PRAAT

(4+3+3+3)/4 = **3.25 (Average to Good)**

FLOW Speak

(5+5+5+5)/4 = **5 (Excellent)**

ELSA Speak

(4+5+4+4)/4 = **4.3 (Good to Excellent)**

6. Appropriateness Judgement

FLOW Speak

Conclusion: FLOW Speak is the most suitable software and tool for Phonetics and Phonology seminars, as it offers advanced functionalities, is easy to use, and strongly aligns with the needs of both teachers and learners.

Strength: The most user-appealing program of the compared software. Its strength lies in the AI-driven personalization of tasks and feedback.

Weakness: An instrumental training app for pronunciation. For inexperienced users, the presentation of data is optimal. Lacks a detailed presentation of the results of speech analysis.

PRAAT

Conclusion: PRAAT is a significant candidate for the Phonetics and Phonology seminar due to its range of analytical capabilities; however, its technical demands and outdated, overly simplified interface may limit its optional deployment for such seminars.

Strength: It is a robust simulation tool for conducting numerous linguistic experiments

Weakness: Overwhelming learning curve for daily use by inexperienced students.

ELSA Speak

Conclusion: ELSA Speak is a robust tool for practicing pronunciation and improving fluency. Its overall improvement lies in learner engagement through the introduction of various gamification elements. However, its limited focus on phonetic analysis makes it less suitable for the Phonetics and Phonology course.

Strength: Gamification elements make learning fun and enjoyable.

Weakness: Focusing on a broader audience while neglecting detailed phonetic analysis.

Table 1: The Results of Comparative Analysis of Pronunciation Analysis Software

PHASE	FLOW Speak	PRAAT	ELSA Speak
Technical Preview	5	4	4
Operational Description	5	3	5
Teacher Fit	5	3	4
Learner Fit	5	3	4
Implementation Schemes	5	3.25	4.3
Appropriateness Judgements	5	3	4

Source: Authors

Based on the analysis, it can be concluded that FLOW Speak is the most suitable pronunciation analysis software for the English Phonetics and Phonology course, making it an asset in teaching English as a Foreign Language. It mediates functionality, usability, and overall alignment with the educational goals of the seminars.

5 Discussion

The research objective – to compare pronunciation analysis tools and assess their strengths and limitations in English as a foreign language pronunciation teaching has been fulfilled through the comparative analysis. There is still room for further exploration and experiments, as the chosen tools are still in continuous development, introducing new features with every seasonal update. This profoundly impacts the educational industry, as it makes the entire process more flexible and dynamic, free from archaic perspectives on teaching.

FLOW Speak has been assessed as the **most suitable** software for the English Phonetics and Phonology classes. The results of the comparative analysis have shown a score of 5 (Excellent) across all phases of Hubbard's framework, including its advanced functionalities, such as AI-driven feedback, progress tracking, and a user-friendly approach typical of CAPT methodologies. Additionally, FLOW Speak's potential for learning management system integration ensures scalability for broader educational use, which directly coincides with the course's goal of enhancing pronunciation through technology.

ELSA Speak, with its comparative analysis score of 4 (Good), is a valid competitor for pronunciation training focused mainly on fluency. However, its English-only focus and lack of spectral analysis when it comes to phonetics make it less suitable for the course's analytical requirements, which emphasize understanding acoustic differences.

PRAAT, with a result of 3.5 (Good) in the comparative analysis, excels in providing the most detailed feedback and performance information. Formant analysis can be interpreted as a direct demonstration of its capabilities. This program is explicitly valued for its ability to accomplish custom analytical tasks. Furthermore, its technical prowess is overshadowed by an outdated interface, which can hinder the process of mastering the program. For a course with many inexperienced users, PRAAT's steep learning curve limits its practicality for deployment, despite its analytical advantages.

6 Conclusion

The significant transition from paper-based to computer-assisted pronunciation teaching signifies a vibrant evolution in methods, progressively replacing traditional practices with more innovative opportunities, as emphasized by Fraser (2006) and Euler (2014). Thus, it was imperative to identify tools that actively contribute to modern pronunciation learning and teaching. Tools such as PRAAT, FLOW Speak, and ELSA Speak, which prioritize providing feedback, are pivotal for today's pronunciation instruction and should be standardized across varying educational levels, as noted by Chugani (2024).

The integration of technology in teaching pronunciation will herald a transformation in behaviors through these valuable tools. Educators and facilitators can aid in developing essential pronunciation skills, not only for effective communication but also to adapt to evolving standards. This research underscores the significance of computer-based learning and instruction in English as a foreign language, impacting not just the students but the entire educational curriculum and classroom environment.

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