REVISTA X

APPS FOR DEVELOPING PRONUNCIATION IN ENGLISH AS AN L2

Aplicativos Para o Desenvolvimento da Pronúncia em Inglês como Segunda Língua

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ABSTRACT: The goal of pronunciation teaching should be to enable learners to develop intelligible pronunciation and, in order to do this, it is important to teach perception and production of the most relevant segmental and suprasegmental features of pronunciation, considering specific groups of learners (CELCE-MURCIA *et al.*, 2010). Technology has played an important role in pronunciation teaching, and the applications developed for pronunciation instruction enable learners not only to engage in pronunciation activities, but to have access to a greater variety of input and immediate feedback. Having this in mind, this study aimed at analyzing the content, the pronunciation teaching steps, the features, and usability resources of pronunciation apps. In order to guide the analysis, a framework was developed based on literature related to the areas of pronunciation teaching and of Mobile Assisted Language Learning (MALL). The results showed that there is a tendency for the apps analyzed to focus more on segmentals. All of them offer description and analysis, listening discrimination, and controlled practice of the pronunciation features, as well as feedback. However, they were limited in terms of guided and communicative practice, of Automated Speech Recognition (ASR), and of variety of input.
KEYWORDS: Pronunciation teaching; MALL; Pronunciation apps.

RESUMO: O objetivo do ensino de pronúncia deveria ser o desenvolvimento de uma fala inteligível e, para isso, é importante ensinar a percepção e produção tanto de segmentos quanto de suprassegmentos da pronúncia, levando em consideração os grupos específicos de estudantes (CELCE-MURCIA *et al.*, 2010). A tecnologia tem tido um papel importante na área de ensino de pronúncia, e os aplicativos desenvolvidos para pronúncia possibilitam que aprendizes possam não apenas praticar a pronúncia, mas também ter acesso a uma variedade de insumo linguístico e a feedback imediato. Com isso em mente, este estudo buscou analisar o conteúdo, o método de ensino, os recursos e a usabilidade de aplicativos desenvolvidos para ensino de pronúncia. Para guiar a análise, um framework foi desenvolvido baseado na literatura a respeito de ensino de pronúncia e de Mobile Assisted Language Learning (MALL). Os resultados mostraram que há uma tendência nos aplicativos de focar nos aspectos segmentais. Todos os aplicativos analisados oferecem apresentação, prática de escuta e prática controlada, bem como feedback. No entanto, eles se mostraram limitados em relação à prática guiada e prática comunicativa, ao recurso de reconhecimento de voz e à variedade de insumo linguístico.
PALAVRAS-CHAVE: Ensino de pronúncia; *MALL;* Aplicativos de pronúncia.

INTRODUCTION

Pronunciation is one of the core skills of speaking which is necessary for successful communication to take place, and the lack of instruction might result in lack of confidence to speak, or difficulties to understand and be understood in the Second Language (L2). A realistic goal in pronunciation teaching is to enable learners to "surpass the threshold level so that pronunciation will not detract from their ability to communicate" (CELCE-MURCIA *et al.*, 2010, p. 9), and also to make their communication more intelligible. In order to reach that goal, learners must be provided with opportunities to practice perception and production of the most important segmental and suprasegmental features of pronunciation (CELCE-MURCIA *et al.*, 2010; KELLY, 2001) through activities that include presentation, listening, and practice focused on both form and meaning, all of them followed by feedback (CELCE-MURCIA *et al.*, 2010).

Since the 1960's, studies have investigated how technology can be applied in order to enhance language learning (BAX, 2003; CHAPELLE; JAMIESON, 2008; GRUBA, 2006; LEVY; HUBBARD, 2005). As technology, once restricted to computers, has not only evolved but gone mobile, the field of Mobile Assisted Language Learning (MALL) emerged. In MALL, mobiles are devices which are portable and personal, and

these features added to their connectivity enable learners to practice the L2 at the most suitable time and place for them. This may not only increase the time engaged in language learning activities, but also allow learning to happen in more naturalistic settings, which could lower the barriers between what happens in the classroom and in students' lives (STOCKWELL, 2013). The applications, or apps, which focus on language learning seem to be helpful to support pronunciation instruction, providing practice of receptive and productive skills of pronunciation and offering immediate feedback, in an environment which allows for comfort and unlimited attempts toward confidence (GUO, 2014).

Regarding the development of L2 pronunciation through mobile devices, studies (ARAGÃO; PAIVA; JUNIOR, 2017; GONZALEZ, 2012; GUO, 2014; PAIVA 2017, 2018; SALBEGO; TUMOLO, 2020; SARAN; SEFEROGLU; CAGILTAY, 2009; SUN *et al.*, 2017) have shown that mobile phones and general language learning apps have the potential to develop L2 pronunciation. However, as the apps proliferate, it becomes essential to understand how they differ from one another, what their features are, and what pedagogical benefits may be derived from their use (KUKULSKA-HULME; LEE; NORRIS, 2017). Thus, this study aims at that understanding by investigating four apps - *English Pronunciation Tutor, EnglishPronunciation, Elsa,* and *Juna* - available for developing pronunciation in English as an L2.

In so doing, this study contributes to the area of pronunciation teaching, which is still considered overlooked by language teaching materials and classroom practice (ALBINI; KLUGE, 2011; SILVEIRA, 2004; STANLEY, 2013).

Pronunciation instruction

Pronunciation has had different roles throughout the language teaching methods (CELCE-MURCIA *et al.*, 2010; KANG; KERMAD, 2018; SILVEIRA, 2004), and today it is generally agreed that the goal of pronunciation teaching should aim at intelligibility (ALVES, 2015; CELCE-MURCIA *et al.*, 2010; SILVEIRA *et al.*, 2017), given that aiming at native-like pronunciation is incongruent with empirical evidence (SILVEIRA *et al.*, 2017).

In order to reach that goal, learners must have opportunities to practice perception and production of the most relevant aspects of segmental and suprasegmental features, once the inaccurate use of any of them has the potential to inhibit successful communication. By relevant aspects, Celce-Murcia *et al.* (2010) explain that not all aspects of L2 pronunciation should be approached to every group of learners, being the teacher responsible for deciding what is pedagogically meaningful for the given group.

Regarding connected speech in English, for instance, C to V linking, V to V linking, consonant assimilation, and palatalization should be all highlighted, as they frequently occur in spoken English language. Also, concerning word stress, only three levels of word stress should be taught instead of six, as not all levels are discernible and, therefore, are not useful for pedagogical purposes (CELCE-MURCIA *et al.*, 2010).

Celce-Murcia *et al.* (2010) claimed that despite the Communicative Approach having stated intelligible pronunciation to be the goal of pronunciation teaching, no set of strategies or methodology for doing it was included. The authors, then, proposed a framework for teaching pronunciation, which is grounded on the principles of the Communicative Approach. The framework recommends a division of the pronunciation lesson into five steps which start by providing learners with analytical information and awareness raising of the pronunciation features, followed by listening discrimination, and three different types of practice: controlled, guided, and communicative.

More specifically, the steps are: 1) description and analysis - oral and written illustrations of how the pronunciation feature is produced and when it occurs within spoken discourse; 2) listening discrimination – focused listening practice with feedback on learners' ability to correctly discriminate the pronunciation feature; 3) controlled practice - oral reading of minimal-pair sentences, short dialogues, etc., with special attention paid to the highlighted pronunciation feature in order to raise learner's consciousness; 4) guided practice - structured communication exercises, such as information-gap activities or cued dialogues, which enable the learner to monitor for the specified pronunciation feature; and 5) communicative practice - less structured, fluency-building activities (e.g., role play, problem solving) that require the learner to attend to both form and content of utterances.

The authors emphasized that each step plays a key role in the acquisition of new pronunciation features. As pronunciation learning is a complex and nonlinear process (LIMA JR; ALVES, 2019), the complete framework is meant to be applied throughout several lessons and every step can be revisited whenever necessary. In addition, they asserted the importance of systematic feedback in all stages. According to Celce-Murcia *et al.* (2010), feedback for description and analysis is provided on the placement of articulatory organs. Regarding listening discrimination, learners are made aware if they have correctly identified the target sound. Once the goal of controlled practice is accuracy, feedback may occur at any time and it may be delivered by the teacher or peers. During guided and communicative practice, as the goal of the activity is communication, feedback tends to be delayed until the end and may also be delivered by the teacher or other learners.

Within the framework, the presentation of phonetic transcription for pronunciation instruction is also considered depending on the group of learners, as it may allow them to comprehend the elements of pronunciation visually and aurally, and to promote their learning autonomy (CELCE-MURCIA *et al.*, 2010; MARTINS, 2015). In order to investigate whether resources for pronunciation instruction follow the pronunciation teaching steps proposed by Celce-Murcia *et al.* (2010), it is necessary to examine whether description and analysis; listening discrimination; and controlled, guided, and communicative practice are enabled by these materials, as well as whether feedback is provided in every step.

Once the goals of pronunciation instruction and a framework for its development have been briefly presented, the potential of apps and their features to enhance pronunciation development are presented next.

MALL and L2 pronunciation

Technology permeates many aspects of our lives, including language learning resources to be used to access information, get exposure to a target language, seek entertainment, communicate and interact, manage learning, and contribute for learners to feel more motivated and engaged (STANLEY, 2013). As technology has gone mobile, Mobile Learning (ML) has become a reality. Kukulska-Hulme and Shield (2008, p. 3) define ML as "learning mediated via handheld devices and available anytime, anywhere", being both formal and informal. Stockwell (2013) claimed ML occurs predominantly out of class environments, but acknowledged it may happen in both contexts. Likewise, Kukulska-Hulme, Lee, and Norris (2017, p. 217) affirmed that "although mobile learning offers certain benefits in the classroom, the use of mobile devices also potentially extends learning beyond the classroom setting".

Mobile Assisted Language Learning (MALL) is the area of research concerned with ML practices that focus on language learning. Among the possibilities for the use of mobile devices for language learning, several apps have been developed, focusing on general or specific language skills/aspects. Regarding the ones developed for pronunciation, they may present a set of MALL features proposed by Stockwell and Hubbard (2013), and the ones relevant for the development of L2 pronunciation are presented next.

Pronunciation apps may present many features designed to assist the development of pronunciation. One is the exposure to a variety of input on demand (LEVIS, 2007), as learners may have access to different varieties of English, regional accents, and male/female

voices at their fingertips, at the most suitable time and place for them. In this sense, they allow the use of many pronunciation models which are needed to increase communicative flexibility and respect for accent diversity (CELCE-MURCIA *et al.*, 2010; LEVIS, 2007).

The apps may have a feature that allows the selection of users' L1, making them customized to the learner and compensating the L1 effect on the development of L2 pronunciation. This way, exercises and materials most relevant for the learner with that specific L1 may be provided, taking into consideration possible cross-linguistic influences which may hinder intelligible pronunciation, for instance.

In addition, the apps may include a feature that provides a proficiency test in order to identify users' main difficulties, or simply to allow for the selection of the level of difficulty and aspects of L2 pronunciation for practicing. This contributes as a priority-setting feature. According to Munro and Derwing (2015a p. 393), "the common one-size-fits-all approach in which practice is offered in 'everything' is unhelpful to teachers and students who need to focus their attention on issues that will genuinely improve their communication skills". Therefore, the possibility of selecting user's L1 and also different levels of lessons when using the apps are important aspects to be taken into account regarding pronunciation apps.

Moreover, the multimodal environment of apps may allow for the presentation of the selected pronunciation features in a variety of ways, for instance, through the use of textual information, illustrations, learner-friendly diagrams, and videos. The media must be well designed, otherwise the apps may be ineffective. For Pires and Tumolo (2020), apps may sometimes display pictures which are not relevant to the activity proposed, confusing the learners. Similarly, Kukulska-Hulme, Lee, and Norris (2017) have revealed the incongruity of meaning between the modes of language and visuals in a commercial vocabulary app, with one-fifth of the images being unclear, decontextualized, and potentially confusing for users. Considering a minimal-pair pronunciation activity, for instance, a picture which does not easily relate to the given word may be a problem for the learner. Also, not only is the choice of pictures important, but also their quality, given that a blurry picture or in an inadequate format may also affect understanding (CHINNERY, 2006). All this points out to the need for including images relevant to the activity, congruence between language and visuals, pictures easily relatable to words, and clear and adequate pictures. With this embedded feature, pronunciation apps may better assist learners' to develop their pronunciation.

Another important feature of the apps is the voice. According to Mayer (2009, p. 256), "a machine-synthesized voice – although perceptually discernable – may not

convey as much sense of social presence". In the same way, Hinks (2015) affirmed that the greatest research challenge at present is to improve the naturalness of the sound and pronunciation. As the voice present in pronunciation apps can often sound quite artificial, developers have been wary of using it as a teaching model, preferring recordings of natural voices. Therefore, the choice and quality of videos, illustrations, pictures, and voices must be included in any analysis of pedagogical resources developed for pronunciation instruction.

The Automated Speech Recognition (ASR) can be considered another relevant feature of pronunciation apps; with it, learners may practice pronunciation and receive immediate feedback, that is, feedback just in time for learning. There may be different types of feedback provided by the apps, from "right/wrong", to "amount of % correct" or "% amount of native likeness", sounds such as clapping hands, or even visual feedback for showing an approximation of intonation contour, for instance. As previously discussed, feedback is required in all steps of the framework for teaching pronunciation (CELCE-MURCIA *et al.*, 2010), and, according to Gonzalez (2012, p. 86), "app users should always know why they have made the mistake and, if possible, be given suggestions for improvement".

The availability of the push feature in pronunciation apps (STOCKWELL; HUBBARD, 2013) may also encourage learners to engage in language learning activities outside the classroom context (SARAN; SEFEROGLU; CAGILTAY, 2009). An example of it is the fact that some apps are able to send notifications inviting or reminding of lessons during any time of the day, whether at random or at pre-set times chosen by the user. The short duration of each module, lasting from thirty seconds to ten minutes, can also be appealing to students (STOCKWELL; HUBBARD, 2013; KUKULSKA-HULME; SHIELD, 2008), allowing them to engage in pronunciation activities in small amounts of time, anytime, anywhere, without previously planning it (CHINNERY, 2006; KUKULSKA-HULME; SHIELD, 2008).

In addition to the features previously discussed, which result from research in the field of MALL, an analysis of pronunciation apps must also be concerned with their usability, that is, the ease of using them. Apps must be clear and self-explanatory, developed in a way so that the user is able to use it without effort and doubts. Krug (2008) affirmed that every doubt during use may distract the learner from the target task. The author also mentioned the importance of having a balanced amount of information on the screen, which must also be well hierarchized, so the user is not overwhelmed and is able

to guide him/herself during the use. For this reason, the usability of pronunciation apps must also be taken into consideration in any analysis of these pedagogical materials.

In sum, a broad analysis of pronunciation apps must look into its content, that is, whether it includes the most relevant segmental and suprasegmental features of pronunciation, and also into the pronunciation teaching steps adopted by it. In addition, it must be concerned with the features and usability resources incorporated by them in order to promote pronunciation development. Investigating which of these aspects are included in the apps *English Pronunciation Tutor*, *EnglishPronunciation*, *Elsa*, and *Juna*, is the purpose of this study.

METHOD

This section provides the method used for the study. It presents, first, the steps and criteria for the selection of the apps; second, the description of the framework developed for the analysis; and third, the description of the analysis, including the scoring procedure.

Selection of the apps

A search was carried out on App Store and Google Play, which are currently the two most popular app stores, with the following key-words: *English pronunciation*, *learn pronunciation*, *and English accent*. A number of 250 apps were found - this number is not related to 250 different apps, however, as some of them were available on both App Store and Google Play. Among all apps found in the search, the ones under the following categories were excluded: a) reference apps, e.g. dictionaries and translators; b) apps not designed specifically for pronunciation instruction; c) apps with only the International Phonetic Alphabet (IPA); d) apps developed for learners of a specific L1; and e) apps with problems after installed.

Four apps remained and were selected to be analyzed, namely: *English Pronunciation Tutor*, *Elsa*, *EnglishPronunciation*, and *Juna*. All of them have been developed for pronunciation instruction and are either free - that is, with access to all of its content for free - or freemium, meaning that may provide a free trial - usually a week, or a month, requiring the payment after this period, or they may offer some of its content available for free, being necessary to pay in order to have full access of the content. The apps were downloaded and installed. Considering this research proposed to analyze all features available in the apps, full access to their content was purchased when necessary. Finally, it is important to mention that all data were collected from the apps in the period

between May and October, 2019. The table below displays information regarding the accessibility and availability of the apps:

Table 1: Apps.

	App Store	Google Play	Free	Free trial	Free limited access
English Pronunciation Tutor	x	x			x
Elsa	x	x			x
EnglishPronunciation	x	x	x		
Juna	x	x		x	

Source: The authors (2021).

Development of the framework for analysis

A framework was developed for this study with the purpose of analyzing pronunciation apps, based on literature regarding the teaching of pronunciation, MALL, and usability (ALVES, 2015; CELCE-MURCIA *et al.*, 2010; CHINNERY, 2006; GARRET, 2011; KELLY, 2001; KRUG, 2008; KUKULSKA-HULME; SHIELD, 2008; MAYER, 2009; SILVEIRA *et al.*, 2017; STOCKWELL, 2013; STOCKWELL; HUBBARD, 2013). It is divided into three categories, namely: 1) Content; 2) Pronunciation teaching steps; and 3) Features and usability. The questions in the framework are available as appendix 1, together with the results for each app analyzed.

The first category, Content, refers to the pronunciation features to be taught, that is, the segmental and suprasegmental features of pronunciation, (CELCE-MURCIA *et al.*, 2010; KELLY, 2001) with the focus of unveiling which pronunciation features are incorporated by the apps to promote pronunciation development. The second category, Pronunciation teaching steps, refers to whether the apps follow (or not) the steps expected to be taken in order to teach the selected pronunciation features. The third category, Features and usability, refers to the MALL features and usability of the apps (CHINNERY, 2006; GARRET, 2011; KRUG, 2008; KUKULSKA-HULME; SHIELD, 2008; STOCKWELL, 2013; STOCKWELL; HUBBARD, 2013). It was included to

allow for the investigation of which features of MALL and of usability resources are incorporated by the apps to promote pronunciation development.

Data analysis

Each item in the framework developed for this research received a score of 0 (when the app did not present the item) or 1 (when it presented the item). This way, a chart with the score obtained by each app in the three categories (Content, Pronunciation teaching steps, and Features and usability) is presented, providing information on the performance of every app in each of these categories. A chart is also provided for all the four apps analyzed, allowing the reader to compare all performances. As all items included in the framework developed for this analysis are considered relevant to the teaching of pronunciation in general, they were equally weighed in this research. When considering specific groups of learners, however, these aspects may be weighed differently, according to the learner's own difficulties and goals.

Notes and screenshots were taken as evidence regarding each of the items in the three categories of the framework in order to carry out the qualitative analysis. This way, it was possible to look into how the pronunciation features were included in the apps, the sources for presentation and practice for such features, if and how the apps provided feedback, as well as into the features and usability resources incorporated by them.

RESULTS

This section provides the analysis for the four pronunciation apps. Each app is analyzed considering, first, the Content, that is, the segmental and suprasegmental features focused; second, the Pronunciation teaching steps; and third, the Features and usability of the apps.

English Pronunciation Tutor

English Pronunciation Tutor (EPT), in terms of content, enables the user to practice all segments of English, individually and in contrast, as well as to attend to the differences resulting from the positional variation in some of them. The only suprasegmental feature covered by the app is the stress in words and sentences, however. For this reason, the app scored 63% under the category Content.

Concerning the Pronunciation teaching steps adopted by the app, all units in the app offer description and analysis of the pronunciation features in varied ways, by using textual information, narration, and visual representations. Listening discrimination is also present in all lessons, as users are able to raise awareness of the pronunciation features presented and, in some lessons, may also discriminate sounds in the *Listening Quiz* section. Controlled practice of pronunciation is present in all lessons as well, through *Practice* and in some lessons through *Speech Recognition*, sections where users are able to record their production of words and sentences.

Having said that, it is possible to conclude that the app does not go beyond the third step of the framework for teaching pronunciation adopted in this study, as it focuses mainly on accuracy and does not provide guided or communicative practice of the pronunciation features. Even though feedback is provided by the ASR feature, it has limitations, such as not recognizing varieties which deviate from the native-like form, or ignoring external noises. Hence, the app scored 29% in the Pronunciation teaching steps category.

The app scored 57% in the third category - Features and usability. Some features incorporated by the app to promote pronunciation development are, for instance, the use of illustrations in order to explain the articulation of the organs and to illustrate words containing the targeted sounds. Some variety of input is provided by the app, and its lessons are within the time recommended for MALL materials. Concerning the usability of the app, its quantity of information per screen is balanced and well hierarchized, and the app presents clear icons and directions for the user, who should be able to navigate it without effort. Figure 1 illustrates the score obtained by *EPT*.

Figure 1: *English Pronunciation Tutor.*
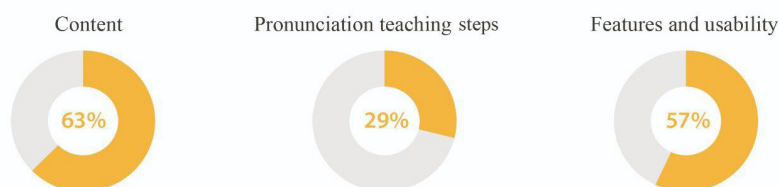
Source: The Authors (2021).

Elsa

The content available in *Elsa* presents all segmental and suprasegmental features expected to be included in pedagogical resources for pronunciation instruction. Therefore, the app scored 100% in this category.

Elsa provides the user with description and analysis related to the characteristics of all sounds, and the suprasegmental features of connected speech, word stress, and sentence stress. However, it lacks explanation regarding prominence and the relationship between intonation and meaning. Listening discrimination and controlled practice are available for all features of pronunciation covered by the app, but *Elsa* does not provide its users with opportunities for guided or communicative practice, since it focuses on accuracy. Feedback is available in *Elsa* and, despite some limitations, it can be effective, once it is able to ignore noises, to tell the users what the mispronunciation is and to provide them with guidance on what to do in order to improve production. For this reason, *Elsa* scored 58% in the category Pronunciation teaching steps.

As for the features and usability resources incorporated by the app, *Elsa* scored 93% in this category. The app provides some variety of input, asks for the users' L1, provides a proficiency test, and allows users to select the level of proficiency during the exercises. The presentation of pronunciation features is done through a variety of ways, such as with the illustrations, videos, and narration. In addition to this, *Elsa* has the push feature, and its lessons are within the recommended time for MALL materials. These features incorporated by the app are relevant, as they contribute to prevent the so-called one-size-fits-all approach (DERWING; MUNRO; 2015b) commonly found in pronunciation instruction digital materials. Thus, the app may assist learners who want to develop their English pronunciation, as it enables them to focus on specific goals and needs they may have. *Elsa*'s score in each category analyzed can be seen below.

Figure 2: *Elsa.*

| Content | Pronunciation teaching steps | Features and usability |
| 100% | 58% | 93% |

Source: The authors (2021).

EnglishPronunciation

As *EnglishPronunciation* (EP) content includes all segmental and suprasegmental features of pronunciation expected to be included in pedagogical resources for pronunciation instruction, the app scored 100% in this category.

The app offers description and analysis for all features of pronunciation. For the segmentals, this is done through the use of illustrations, videos, text, and narration, whereas for the suprasegmentals only textual information is provided. Listening discrimination is also available for all features present in the app, as users have opportunities to raise awareness of the pronunciation features through listening. Controlled practice is available for lessons regarding the segmental features, once users are able to record their production and get feedback from the app. However, this practice is not available for any of the suprasegmental features. Guided and communicative practice, which should enable learners to engage in activities that focus on meaning and exchange of information, developing their pronunciation communicatively (CELCE-MURCIA; BRINTON; GOODWIN, 2010), are not present. The app provides feedback through ASR; however, this feature presented limitations, as many times the app failed to recognize words and sentences, or recognized something different from what had been produced. For instance, the app recognized "sit" instead of "cd" and "for by them" instead of "forbidden". This type of limitations in ASR feature leads to incorrect feedback, which may have a negative impact on learners' pronunciation development. For the reasons aforementioned, *EnglishPronunciation* scored 45% in the Pronunciation teaching steps category.

Concerning Features and usability, the app presented half of the possible items, having scored 50% in this category. The app offers some variety of input, allows its users to choose the level of the lessons they would like to take, and uses different media such as illustrations and videos to present the pronunciation features. Finally, the information presented throughout *EnglishPronunciation* is well hierarchized, and the icons and directions for the users to navigate through the app are clear, thus providing a good use flow for its users. In sum, EP scored 100% for Content, 45% for Pronunciation teaching steps, and 50% for Features and usability, as illustrated on Figure 3.

Figure 3: EP.
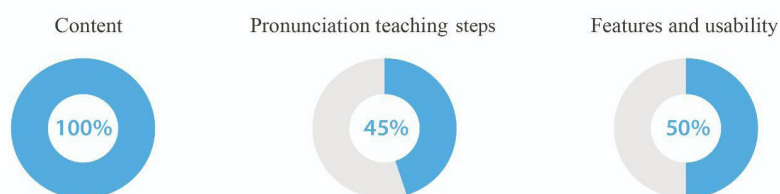
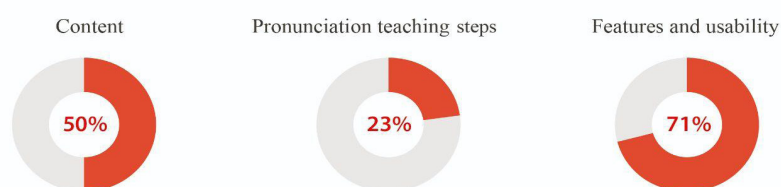**Source:** The authors (2021).

Juna

Juna enables its users to work with all the sounds of English language individually, in contrast, and in different positions within words. The app focuses exclusively on segmentals, as it is described on the App Store and on its official website. The score obtained by *Juna* under Content, then, was 50%, as it does not cover any of the suprasegmental features which are expected to be included in pedagogical resources for pronunciation instruction.

Description and analysis, listening discrimination, and controlled practice of the segmental features are available and, thus, *Juna* goes up to the third step for teaching pronunciation adopted in this study. Therefore, the app only enables practice focused on accuracy, with no opportunities to focus on meaning and exchange of information, which would be the goal of activities within guided and communicative practice (CELCE-MURCIA *et al.*, 2010). The ASR in *Juna* provides feedback on user's production, and this feature is also able to ignore noises, possibly encouraging learners to use the app anywhere, without previously planning. However, limitations have been found in what concerns this feature. For instance, there are times that the app identifies and transcribes the accurate production, but provides negative feedback without indicating the cause for the mispronunciation, nor providing instructions on how to improve the production. This may lead L2 learners to confusion. For this reason, the app obtained a score of 23% in the category of Pronunciation teaching steps.

The score obtained in the Features and usability category was 71%. The app offers some variety of input to its users and is embedded with a feature that allows them to select the level of activities in certain lessons, thus, being able to focus on pronunciation aspects most relevant to them. The illustrations and animations used by the app are relevant to

what has been proposed and may contribute to L2 pronunciation development. Finally, regarding the usability of the app, the quantity of information is balanced throughout the lessons, well hierarchized, and the app presents clear icons and directions for the users, who may probably navigate it without effort, focusing on developing their pronunciation instead of trying to understand how the app works. The score obtained by Juna is shown on Figure 4.
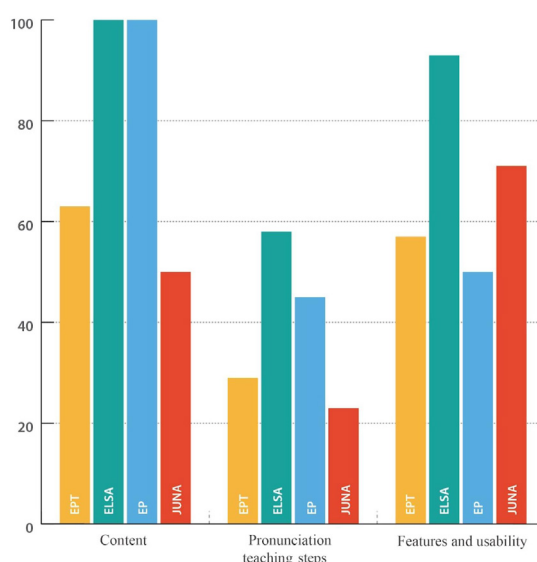
Figure 4: Juna.

Content   Pronunciation teaching steps   Features and usability

50%   23%   71%

Source: The authors (2021).

The following chart presents the scores for all the four apps analyzed:

Figure 5: General score.

Source: The authors (2021).

Next, as part of the analysis, a discussion is provided for all the four apps analyzed.

Discussion

With the results obtained from each analysis, it is possible to say that all of the apps present the phonemes individually and in contrast, and work with their positional variation, as recommended by literature on pronunciation teaching (CELCE-MURCIA *et al.*, 2010; MARTINS, 2015). However, only *Elsa* and EP present all the pronunciation features which should be included in pedagogical resources for pronunciation instruction (CELCE-MURCIA *et al.*, 2010). Therefore, the apps would assist learners to develop their intelligibility, which is the goal of pronunciation instruction (ALVES, 2015; CELCE-MURCIA *et al.*, 2010; SILVEIRA, 2004), if they provided balanced content concerning all pronunciation features, once each of them may influence oral communication.

The four pronunciation apps analyzed in this study provide description and analysis, listening discrimination, guided practice, and feedback. In spite of this, they do not go beyond the third step of the framework for teaching pronunciation communicatively (CELCE-MURCIA *et al.*, 2010), once they do not provide guided or communicative practice, focusing on meaning and exchange of information. If the apps offered this type of practice instead of practice focused on accuracy only, they would also be an efficient tool to support learners develop fluency, also considered crucial for intelligible pronunciation. This limitation may be because the apps themselves were not developed with this purpose, or due to technological constraints, which may be easily overcome with the advancement of technology. Perhaps in the near future the apps will allow learners to interact with each other or with the teacher in order to practice pronunciation communicatively, or even include artificial intelligence technology, so that the learner may interact with the app itself. In the meantime, the use of such apps could be combined with other activities that can be delivered through mobile devices and other apps, such as *WhatsApp, Instagram, Facebook, Siri, Google Assistant,* and *Alexa*, in order to engage in communicative practice. This way, the apps analyzed in this study could have their use supplemented by activities focused on expressing meaning and exchange of information, such as cued-dialogues, simple information-gap activities, strip stories, storytelling, debates, and interviews.

In relation to the description and analysis as well as feedback provided by the apps, they are usually more detailed regarding the segmental lessons. The listening discrimination and guided practice of segmental lessons also outnumber the ones related to the suprasegmentals, when they are approached by the apps. It is possible to identify, hence, that there is a trend in the apps to focus more on segmentals, a practice which

permeated throughout many language teaching methods (CELCE-MURCIA *et al.*, 2010). Even though scholars affirm that pronunciation instruction is moving away from a segmental/suprasegmental debate towards a more balanced view nowadays (CELCE-MURCIA *et al.*, 2010), it seems that it is not the case of the apps analyzed in this study. Therefore, pronunciation apps might follow the conclusions of research and provide balanced practice regarding all features of pronunciation, once all of them may affect intelligible pronunciation (CELCE-MURCIA *et al.*, 2010).

Feedback was provided by all the apps since they are embedded with an ASR feature. Nevertheless, the ASR feature has limitations. For instance, none of the apps recognize varieties which deviate from the native norm, and some are not able to ignore external noises, making it difficult for someone to use anywhere, as it is proposed by MALL (CHINNERY, 2006; STOCKWELL, 2013). Furthermore, the ASR feature sometimes identifies a correct production of the user, that can be visualized by the transcription, but provides incorrect feedback through sounds and/or images. There are also times when ASR is simply not able to identify what was said by the user. This limitation may cause the app to provide incorrect feedback to the learner. As pointed out by Levis (2007), the negative consequence of wrong feedback may confuse learners and hinder learning. This may be the case when learners receive incorrect feedback by the ASR. Once they may not be able to understand the cause of the mispronunciation or to consider the ASR may be providing incorrect feedback, they may feel frustrated about their performance and feel insecure about using the app or even speaking in the L2.

Some features of MALL adopted in this study are provided by the pronunciation apps analyzed, such as the variety of input through different narrators (LEVIS, 2007), with male and female voices. However, the lessons within the apps do not bring phonological variations beyond North American English or British English. All the apps analyzed in this study make use of images, illustrations, animations, videos, textual and aural information, being most media relevant for what it has been proposed (KUKULSKA-HULME; LEE; NORRIS, 2017). Also, most voices found in the apps sound natural, thus, conveying the idea of a social presence for the users (MAYER, 2009), which may motivate learners to use the apps for developing their pronunciation.

Bringing more phonological variations than it is usually found in traditional L2 classrooms, allowing learners to focus on their main difficulties and goals, as well as encouraging them to take at least a short pronunciation lesson every day are features that may contribute not only for developing learner's autonomy, but to increase their motivation and reduce the anxiety which may be related to speaking and pronunciation in an L2. Therefore, pronunciation apps that include some or all of these features may

be considered an effective pedagogical resource for promoting the development of L2 pronunciation, which seems to be the case of the apps analyzed in this research. Even though the purpose of this study was not to evaluate what the best pronunciation app is, the results obtained here may guide teachers and learners who may be interested in using pronunciation apps on choosing which one would best fit their needs and interests, according to which aspects of Content, Pronunciation teaching steps, and Features usability resources are incorporated by each of them. Considering a group of learners who may need practice regarding segmental features only, *English Pronunciation Tutor* and *Juna* may be sufficient. However, if one wishes to go beyond segmental level, *EnglishPronunciation* and *Elsa* would be the most relevant apps. When the case is to provide learners with more options to make the practice more individualized such as by taking proficiency tests, and receiving feedback which guides the learner towards a better performance, *Elsa* may be the app to choose from. However, these pedagogical decisions tend to vary, according to the group of learners and the learning goals which have been established. Finally, the framework developed for this analysis may also assist in the analysis of other apps which were not included in this study or that have not been launched yet, thus contributing for teachers to make informed pedagogical decisions regarding the use of apps for pronunciation instruction.

FINAL REMARKS

This research aimed at analyzing the content, pronunciation teaching steps, and the features and usability resources of four pronunciation apps. With the results obtained from the analysis, it seems that all of the apps work with the phonemes individually, in contrast, and with their positional variation. However, not all of them present all the relevant segmental and suprasegmental features which should be included in pedagogical resources for pronunciation instruction (CELCE-MURCIA *et al.*, 2010). All the apps analyzed include the presentation, listening discrimination, and controlled practice of the features of pronunciation, as well as feedback. However, none of them offer opportunities to practice pronunciation with focus on meaning, considered crucial to achieve the goal of pronunciation instruction, that is, intelligibility (ALVES, 2015; CELCE-MURCIA *et al.*, 2010; SILVEIRA *et al.*, 2017).

Despite their limitations, the apps analyzed seem to be a helpful pedagogical resource for working with presentation, awareness raising, listening, controlled practice, and providing feedback regarding pronunciation features.

Considering the importance of L2 intelligible pronunciation, this study may enlighten the discussions within the areas of pronunciation teaching and MALL, and its results may also contribute for language teachers to make informed choices regarding the use of apps to promote learner's L2 pronunciation development and, as a consequence, achieve successful communication in the L2.

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APPENDIX 1 - FRAMEWORK FOR APPS ANALYSIS AND APPS SCORES

	EPT[1]	Elsa	EP[2]	Juna
Content				
1.1 Does the app work with the consonant system and consonant contrasts?	1	1	1	1
1.2 Does the app work with positional variation (initial, medial, and final stops; flap; syllabic consonants; clusters)?	1	1	1	1
1.3 Does the app work with vowel system and vowel contrasts?	1	1	1	1
1.4 Does the app work with positional variation (vowel length; r + l coloring; nasalization; vowel reduction)?	1	1	1	1
1.5 Does the app work with connected speech (C to V and V to V linking; consonant assimilation; palatalization)?	0	1	1	0
1.6 Does the app work with levels of stress within a word and hierarchy of stress within an utterance?	1	1	1	0
1.7 Does the app work with prominence (new or important information/ special emphasis/contrast)?	0	1	1	0
1.8 Does the app work with the relationship between intonation and meaning?	0	1	1	0
2. Pronunciation teaching steps				
2.1 Does the app present phonetic transcription?	1	1	1	1
2.2 Does the app present description and analysis of segmental features?	1	1	1	1
2.3 Does the app present description and analysis of connected speech?	0	1	1	0
2.4 Does the app present description and analysis of word and sentence stress?	1	1	1	0
2.5 Does the app present description and analysis of prominence?	0	0	1	0
2.6 Does the app present description and analysis of intonation and meaning?	0	0	1	0
2.7 Does the app provide listening discrimination of segmentals?	1	1	1	1
2.8 Does the app provide listening discrimination of connected speech?	0	1	1	0
2.9 Does the app provide listening discrimination of word and sentence stress?	1	1	1	0
2.10 Does the app provide listening discrimination of prominence?	0	1	1	0
2.11 Does the app provide listening discrimination of intonation?	0	1	1	0
2.12 Does the app provide controlled practice of segmental features?	1	1	1	1
2.13 Does the app provide controlled practice of connected speech?	0	1	0	0
2.14 Does the app provide controlled practice of word and sentence stress?	1	1	0	0
2.15 Does the app provide controlled practice of prominence?	0	1	0	0
2.16 Does the app provide controlled practice of intonation?	0	1	0	0

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[1] *English Pronunciation Tutor*
[2] *EnglishPronunciation*

2.17 Does the app provide guided practice of segmental features?	0	0	0	0
2.18 Does the app provide guided practice of connected speech?	0	0	0	0
2.19 Does the app provide guided practice of word and sentence stress?	0	0	0	0
2.20 Does the app provide guided practice of prominence?	0	0	0	0
2.21 Does the app provide guided practice of intonation?	0	0	0	0
2.22 Does the app provide communicative practice of segmental features?	0	0	0	0
2.23 Does the app provide communicative practice of connected speech?	0	0	0	0
2.24 Does the app provide communicative practice of word and sentence stress?	0	0	0	0
2.25 Does the app provide communicative practice of prominence?	0	0	0	0
2.26 Does the app provide communicative practice of intonation?	0	0	0	0
2.27 Is the app equipped with ASR in order to provide feedback (score, rewards, % of correct answers, right/wrong)?	1	1	1	1
2.28 Does the ASR recognize different language varieties?	0	0	0	0
2.29 Does the ASR ignore noises?	0	1	0	1
2.30 In case of mispronunciation, does the ASR indicate the type of mis-pronunciation?	1	1	1	1
2.31 Does the app provide the learner with feedback on what to do in order to repair the mispronunciation?	0	1	0	0
3. Features and usability				
3.1 Does the app provide variety of input (different accents, male/female voices)?	1	1	1	1
3.2 Does the app ask for the users' L1?	0	1	0	0
3.3 Does the app provide a test in order to identify users' level or main difficulties?	0	1	0	0
3.4 Can the user select the level of difficulty?	0	1	1	1
3.5 Does the app make use of illustrations, pictures, and videos at any stage?	1	1	1	1
3.6 Is the media used relevant to what is proposed?	0	1	0	1
3.7 Does the media have good quality?	1	1	1	1
3.8 Does the voice sound natural?	1	1	0	1
3.9 Does the app have push feature?	0	1	0	0
3.10 Is all the app available offline?	0	0	0	0
3.11 Is the length of each lesson within the recommended time for MALL materials?	1	1	1	1
3.12 Is the quantity of information per screen balanced?	1	1	0	1
3.13 Is the information per screen well hierarchized?	1	1	1	1
3.14 Does the app have a good use flow, presenting clear icons and directions for the user?	1	1	1	1