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Improving pronunciation through SpeechAce in Secondary Education

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IMPROVING PRONUNCIATION THROUGH SPEECHACE IN SECONDARY EDUCATION

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ABSTRACT

ICT tools, which can serve to improve students' pronunciation, are fast becoming a key instrument in Secondary education. Recently investigators have examined the effects of ICT tools to improve pronunciation, which is an increasingly key aspect in applied linguistics. However, pronunciation has been forgotten in many ways for EFL learners, and accuracy and fluency have been mainly treated as primary aspects. Nowadays, more emphasis is given to the role that phonetics and phonology play in pronunciation teaching. Furthermore, Automatic Speech Recognition for Error Detection (ASR) is another important aspect of interest within the field of linguistics. Only by combining phonetics, phonology and ASR could EFL students learn pronunciation. SpeechAce is the most convenient tool that integrates all these aspects: listening to an English native speaker, inmediate feedback (with phonetic transcriptions) and practice with Automatic Speech Recognition. Hence, it is important to be aware of the methods teachers use to teach pronunciation, because it can influence the results that students obtain. Therefore, this paper will examine how pronunciation could be improved in Secondary education with the use of the ICT tool SpeechAce, whose benefits and the way of implementing it will be explained in the pages that follow. Moreover, the importance of phonetics and phonology and ASR to develop pronunciation will be analyzed.

Key terms: SpeechAce, pronunciation, Automatic Speech Recognition for Error Detection (ASR), ICT tools, EFL learners.

RESUMEN

Las Tecnologías de la Información y la Comunicación (TICs) se están convirtiendo en un instrumento clave en Educación Secundaria que puede favorecer la mejora de la pronunciación de los estudiantes. Investigadores recientes han examinado los efectos de las TICs en la mejora de la pronunciación, aspecto cada vez más importante en el área de la lingüística aplicada. Sin embargo, la pronunciación ha sido olvidada de muchas maneras en lo que a los estudiantes de una Segunda Lengua Extranjera se refiere, ya que han sido la precisión y la fluidez los aspectos considerados primordiales. Hoy en día, se le ha dado más importancia al papel que juegan la fonética y la fonología en la enseñanza de la pronunciación. Además, el Reconocimiento Automático del Habla para la Detección de Error es otro elemento crucial en el campo de la

lingüística. Combinando la fonética, la fonología y el Reconocimiento Automático del Habla para la Detección de Error es como los estudiantes de una lengua extranjera podrán aprender pronunciación. SpeechAce es la herramienta más adecuada que integra todos estos aspectos: escuchar a un hablante nativo inglés, corrección inmediata (con transcripciones fonéticas) y práctica del Reconocimiento Automático del Habla para la Detección de Error. Por esa razón, es importante ser consciente de los métodos que los profesores utilizan para enseñar pronunciación, ya que puede influir en los resultados que los estudiantes obtienen. Por lo tanto, este trabajo examinará cómo puede ser mejorada la pronunciación en Educación Secundaria con el uso de un tipo de herramienta TIC como es SpeechAce, cuyos beneficios y la manera de implementarla se presentarán en las páginas siguientes. Además, se analizará la importancia de la fonética, fonología y Reconocimiento Automático del Habla para la Detección de Error para poder desarrollar una correcta pronunciación.

Palabras clave: SpeechAce, pronunciación, Reconocimiento Automático del Habla para la Detección de Error, herramientas TIC, estudiantes de inglés como Segunda Lengua Extranjera.

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1. INTRODUCTION

Pronunciation is a key component in a language, and it plays a significant role in students´ ability to achieve communicative competence, as Morley points out (1991, p. 488). This paper will seek to examine whether pronunciation has been taught effectively in EFL classrooms, if teachers are aware of their teaching pronunciation methods and how pronunciation could be improved with the use of ICT tools in Secondary education.

Recent developments in teaching pronunciation in Secondary school have heightened the need to find useful techniques in EFL pronunciation teaching classrooms, apart from helpful technological tools to improve pronunciation in Secondary education. SpeechAce is a recent tool becoming more and more common among business and universities around the world. It includes Automatic Speech Recognition for Error Detection (ASR), a key aspect to provide immediate feedback (Cheung et al., 2017).

The central purpose of this study is to find the most effective way to teach pronunciation in Secondary education, especially in 3rd of E.S.O, by using technological resources. This work therefore attempts to provide an important opportunity to advance on the understanding of phonetics and phonology in the educational field, apart from the importance of Automatic Speech Recognition for Error Detection (ASR). This paper will provide a hypothetical implementation of *SpeechAce* in Spanish EFL classrooms, which means a future empirical classroom observation that would allow to measure interaction among the participants.

This work has been divided into two main parts. The first part begins by laying out the theoretical dimensions of the research, including an account of research studies of history and ways of pronunciation teaching in Secondary Education and on the importance of phonetics, phonology and Automatic Speech Recognition for Error Detection (ASR) in the classroom. Moreover, the main objectives, descriptions and benefits of *SpeechAce* will be explained. The second part presents how this tool would be implemented in an EFL classroom, including the number of participants, instruments and procedure of the experiment. At the end of this work, the expected results and discussion on the analysis will be presented.

2. LITERATURE REVIEW

The purpose of this section is to review the literature on pronunciation. It begins by providing a historical overview about the way pronunciation has been treated throughout history and its importance in the educational field. The second part moves on to describe different ICT tools to teach pronunciation. This section will finish with an explanation about the innovative tool called SpeechAce.

2.1. History of pronunciation

It is essential to go back in history to understand the way pronunciation has been taught. Thus, this section will provide many different approaches and methods that included pronunciation teaching.

Before focusing on the effectiveness and how to teach pronunciation, it is necessary to do go back in history to be aware of the way pronunciation has been taught during history.

According to Celce-Murcia, Brinton, & Goodwin, (2010, p. 2), pronunciation approaches used in the teaching of languages are generally divided into two groups, such as Intuitive-imitative approach and Analytic-linguistic Approach. The first one, used before the nineteenth century, consists of listening to the "rhythms and sounds of the target language, without previous knowledge" (p. 2), whereas the Analytic-Linguistic Approach uses the "phonetic alphabet, articulatory descriptors and other aids to supplement listening and imitation" (p. 2). The analytic approach consists of listening and imitating skills, while the latter approach appeared not to substitute the Intuitive approach but to complement it.

At the end of the nineteenth century, pronunciation was still taught through memorization, due to the influence of the Grammar Translation method. It was around 1890 when phoneticians such as Henry Sweet, Wilheim Viëtor, and Paul Passy established the International Phonetic Alphabet (IPA), which served to have a written method of transcriptions that reflected the speech sounds (Esteve, 2015, p. 10). It is at the end of ninetheen century and throughout the twentieth century when the Direct method was developed. According to Hummel (2014, p. 109), it appeared in reaction to the Grammar Translation method. The Direct method focused on oral skills, correct pronunciation and teaching grammar inductively (Hummel, 2014, p. 109).

In the twentieth century (precisely in 1940s and 1950s), new methods emerged, such as Audiolingualism in United States (p. 3). As in the Direct method, there are some features that Audiolingualism has in common; for instance, there are some words that students should repeat through language and repetition drills, but in this case, students are provided with some phonetics knowledge with transcriptions. There minimal pairs are used to practise pronunciation. There is also a focus on oral communicative skills and repetition of grammatical patterns and less emphasis on vocabulary, as in the case of the Direct method (Hummel, 2014, p. 110).

In 1960, Total Physical Response was developed by James Asher, which consists of allowing learners to wait until they feel ready to speak (Hummel, 2014, p. 2014, p. 114). In that way, students will feel relieved and they will not suffer stress when speaking a language. As cited in Hummel (2014, p. 114), Asher (1969, p. 16-17) pointed out that it is not possible to achieve fluency in listening, writing, reading and speaking skills. For that reason, it is essential to focus on the listening skill to attain listening fluency, and to develop the speaking skill afterwards.

Another method developed in the twentieth century by Charles A. Curran is Community Language Learning (CLL), in which students will have to "say something in their native language that students wish to be able to say in their target language" (p. 7). Then, the teacher divides the sentence into various parts, the student repeats each part, until they can utter the full sentence fluently. The last step of this method is to record the student.

Apart from these methods, there is a very common method often used from 1980 until nowadays called Communicative Language Teaching, in which fluency and accuracy in the target language are complementary principles of the language, since this method focuses on the authenticity of the materials to convey meaningful purposes (Hummel, 2014, p. 115). The Communicative Approach is based on some techniques such as listening and imitating, reading phonetics transcriptions and recording the speech (Gea n.d., p.13).

Another approach related to communicative language teaching which emphasizes what learners can do with language is called Task-Based Language Teaching (TBLT). It focuses on meaning, apart from doing real world activities with students (Hummel, 2014, p. 116). Brumfit (1984) indicates that TBLT method

facilitates fluency rather than accuracy (cited in Ellis, 2003, p. 31). This is, therefore, a main difference between Communicative Language Teaching and TBLT, which considers fluency not a complementary principle of the language but an essential one. In 1996, Willis identified that there can be separate phases in a task performance, such as pre-task, task and language focus (cited in Ellis, 2003, p. 33). In the first step, students are given some useful words, whereas in the last step they are aware of the lingusitic features required to do the tasks and they focus on the "transcripts of fluent speakers doing the task" (Ellis, 2003, p. 33). Although when practising TBLT method a considerable number of oral tasks are done, pronunciation is not practised enough. Many researches such as Tonkyn (2012), Hummel (2014) and Nunan (2016) indicate that TBLT focuses not only on meaning by on lexis and grammar, leaving aside pronunciation practise (cited in Gurzynski-Weiss, Long & Solon, 2017, p. 2017). All in all, TBLT research has not given attention yet to phonological aspects, such as those refered to L2 pronunciation to see if communicative competence is totally achieved, as Gurzynski-Weiss et al. affirm (2017, p. 216).

All things considered, it can be argued whether these methods really focus on pronunciation and if they are truthfully useful to improve pronunciation. Previous studies have reported that several attempts have been made to study the level of accuracy and fluidity, but not pronunciation itself. Despite the lack of pronunciation teaching in previous studies, there are other ways of teaching pronunciation; for instance, with the help of technological devices. Only by using innovative tools will pronunciation be improved. Their efectiveness will be evaluated in the next part.

2.2. The importance of teaching pronunciation

It has been perceived that pronunciation has received little attention by educators, although it is an essential aspect of applied linguistics. Besides, Munro (2005, p. 379) asserts that "the study of pronunciation has been marginalized within the field of applied linguistics" (cited in Gurzynski-Weiss et al., 2017, p. 217).

Several studies investigating how not to teach pronunciation, as Fraser´s work (1999, p. 2), have revealed that "drilling phonemes, minimal pairs and stilted dialogues" are some of the main reasons why pronunciation is not effective in the

classroom. Fraser found that teaching pronunciation through phonetics and phonological patterns is not enough to raise student´s awarenss of how to pronounce English properly (1999, p. 2).

As Fraser argues, "much more important is for teachers to have insight into the kinds of problems learners face in pronouncing English, and tools to provide for their needs at different stages" (Fraser, 1999, p. 2). This means, that once student´s errors are percevied, then it is time for implementing innovative tools which may help students improve pronunciation.

Therefore, it is not a matter of looking for the best method but how to implement all the materials that teachers have, by adapting the tools teachers´posses and also by focusing on the sort of problems that have been ignored throughout history.

Communication should not be interrupted by the mispronunciation of some words; however, sometimes teachers pay the least attention to these aspects that are crucial for not breaking communication process. Fraser (1999, p. 4) observes that one of the major problems encountered in students is the pronunciation of "j" such as in "jam" and the letter "z", like in zoo.

As noted by Hudson (2013), the most common errors made by Spanish-speaking students are, first , vowel sound positions because there are 12 types of vowels in English in comparison to Spanish, that only contains 5 vowels; secondly, the schwa /ə/ sound can be difficult for students because it is a weak vowel and does not require any stress, fact that can be sometimes hard for Spanish speakers because they stress almost each syllable; Spanish speakers tend to pronounce silent /r/ as rhotic, when it should be pronounced as non-rhotic. Morevoer, the difference between /b/ and /v/, and /ʃ/ and /s/ is sometimes not noticed by Spaniards, apart from not differencing the sound /z/ with the sound /s/. Knowing kow to pronounce /h/ and silent /h/ is another common mistake among Spanish students. Aspiration of /b, t, k/ is often omitted, and /d, b, v/ are not always voiced for Spaniards. Finally, there are other sort of frequent errors that Spanish students may have, such as sentence stress and falling intonation, sometimes substituted by raising intonation and by the fact of stressing every syllable, as it has been mentioned before.

Esteve (2015, p. 16) investigated some weaknesses of Spanish students, for instance, homophones (read/red), initial consonants clusters (stone, spring,

skate) whose beginning is pronounced with an "epenthetic e", no distinction between minimal pairs (boy/toy), or even pronunciation of "-ed" endings such as "convinced" or "wanted".

Once the most outstanding difficulties Spanish students show in pronunciation and the importance of teaching pronunciation have been highligthed, it is time to find the most appropriate way to teach pronunciation. For that reason, pronunciation should be taught both with the help of a tool, for example SpeehAce, and considering all these aspects that might have an influence in connected speech. It is important to point out that *SpeechAce* is the innovative tool proposed in this paper, and that is bound to be the most appropriate to teach pronunciation to EFL learners.

All things considered, Macdonald (2002) affirms that pronunciation is an aspect that should be included in the language curicula to increase the "learners´pronunciation mastery" (cited in Moedjito, 2016: 38). A study done by Breitkreutz, Derwing, and Rossiter (2001), reported that most teachers agreed with the fact of incorporating pronunciation teaching in the educational field (cited in Moedjito, 2016: 38). However, the question is how to implement pronunciation in the educational field. It can be said that technology could help to incorporate pronunciation properly in the classroom. In the next section, several ICT tools to teach pronunciation will be explained.

2.3. ICT tools to teach pronunciation

Over the past decade most research in technology has emphasized the use of ICT tools in the classroom. Nevertheless, although the use of technology could enhace classroom teaching and learning, as Ghavifekr et al. (2014); Lefebvre, Deaudelin & Loiselle (2006) report, teachers have some difficulties when they need to adapt technological devices to their classroom (cited in Ghavifekr, Kunjappan, Ramasamy & Anthony, 2016, p. 38). Moreover, some teachers are unaware of how to implement technology in the classroom.

The most important downsides found by Ghavidekr et al. regarding the use of ICT tools in the classroom are mainly that some schools may not have direct access to technology, since it can be a barrier to integrate technology in the classroom (2016, p. 42). Another drawback that can be encountered in education when using ICT tools is the limited scope of technical support, which may interfere

in the learning process. These are some factors that could lead teachers to reject using ICT tools in the classroom. Similarly, Becta's survey (2004) indicates that technical faults might discourage them from using ICT in their teaching because of the fear of equipment breaking down during a lesson (cited in Ghavidekr et al. 2016, p. 42). The use of ICT tools is somehow a matter of time, motivation and instruction of teachers, and about having enough knowledge to integrate these tools into classroom, apart fom being updated with the last technological devices.

Apart from the disadvantages of ICT tools, several studies have revealed that there can be a positive effect not only in teachers but in students. Passey (2000) maintains that using technological devices in the classroom can improve "confidence, motivation and self-esteem particularly for children with special educational needs and disaffected students" (cited in BECTA, 2003), as well as fostering the learner autonomy and cooperation among students. Teachers can also be affected using the ICT tools in many ways. Becker (2000) highlights the positive feelings that the teacher can experiment when using technology to teach (cited in BECTA, 2003). Similarly, BECTA 2004 found that with technology, there will be "less paperwork, with associated reductions in tasks such as filing and photocopying", apart from a reduction of teacher´s workloads. Teaching pronunciation through technological tools can enhance the acquisition of a second language, as well as some guidelines about the tool and phonetics and phonology.

We live in a technological era that should make an appropriate use of ICT tools in an EFL classroom. For that reason, the integration of ICT tools in the classroom can be benefitial for students in many ways, but by choosing the appropriate tool to teach pronunciation. There is a great deal of ICT tools that can be implemented in the classroom to improve pronunciation, although the most important is SpeechAce, the one that this paper will cover.

Ghavidekr et al. carried out several investigations about teaching and learning with ICT tools, by highliting the most common technology tools used in schools, such as "computer, Laptop, LCD, digital photocopy machine, digital Audio and Video devices, digital camera, scanner, DVD player and multimedia projector" (2016, p. 39). It is the computer and the multimedia projector what can actually facilitate the use of SpeechAce in the classroom. As for the possible instruments to improve pronunciation, it can be said that iPads can be useful too. In her study,

Lys (2013, p. 98) claims that students are "actively engaged" in speaking tasks. However, its usefulness when practising pronunciation can be discussed.

There are other tools that can be used to teach pronunciation in the classroom as in the case of blogs, although its usefulness can be discussed. In his recent work, Tíscar (2014, p. 26) explores the usefulness of blogs when teaching pronunciation. He indicates that students can find there, uploaded contents related to intonation, stress and pronunciation. However, none of the students visited the blogs to solve doubts or practise pronunciation at home.

Singing can be another tool to improve pronunciation, but it does not include neither phonetic transcriptions nor ASR, as in the case of SpeechAce. Although Carlsson (2015) points out that singing can help students with pronunciation by drawing attention to some phonemes, it does not provide immediate feedback as in the case of SpeechAce. Students will be able to listen to certain phonemes and repeat them, but they do not know the exact way to pronounce them. Therefore, SpeechAce seems to be the most useful tool because it provides students with a phonetic feedback.

Tritch (2018) maintains that some important tools to teach pronunciation in the classroom are Iowa Phonetics, YouGlish, TedTalks, Youtube videos, and Google tools. Despite the detailed descriptions of vowels and consonants offered by Iowa Phonetics, it does not give the chance to practise full sentences as in the case of SpeechAce. Similarly, YouGlish is not considered as appropriate as SpeechAce because there is a lack of phonetic trasncriptions. In the same vein, TedTalks and Youtube videos could be benefitial for listening and speaking pronunciation, and to stimulate fluency, but they neither teach selected word stress nor show phonetics transcriptions, which are necessary to know how to pronounce certain words.

To promote phonetic and transcription awareness, Lecumberri, Maidment, Cooke, Ericsson & Giurgiu (2003, p. 983) created the Web-Based Transcription Tool, where students can add transcription tasks and they receive immediate feedback. Despite working with phonetic transcriptions, this tool does not offer ASR to hear a native speaker´s voice or even their own voice recorded. Further development of this tool will focus on receiving more information about specific errors, audio feedback and including more in detail feedback about words and

individual sounds (Lecumberri et al., 2003, p. 989), aspects that are already included in SpeechAce.

Apart from the ineffectiveness of these tools and the inadequate use of certain tools in schools, it is the lack of teacher´s instruction one of the main obstacles in the educational field nowadays. Despite the entire range of tools that include phonetics and phonology knowledge, a recent innovative toll called SpeechAce came out to the market and can be used as a complementary tool to improve pronunciation within EFL Secondary learners.

As it will be shown in the next section, it can be said that SpeechAce is the most complete tool because students can practise full sentences and paragraphs, and each English vowel and consonant sound. Students can listen to their own audio and they are provided with immediate feedback. Moreover, teachers can adapt and create updated content for their class, by adding the pronunciation words they may find useful for students.

Having discussed many different ICT tools to improve pronunciation, the next section of this paper addresses SpeechAce to illustrate the reasons why this tool is the most appropriate to teach pronunciation in the EFL classroom.

2.4. SpeechAce

SpeechAce is an "speech recognition software" founded in Settle in 2014 by a group of professionals (engineers and educators) who are non-native speakers of English.This tool teaches correct American English pronunciation and it shows "syllable and phoneme level mistakes" (Cheung et al., 2017).

It was mainly founded because Cheung, who is from Hong Kong, needed fluency for business, so he decided to create a tool to practise English outside the English classroom (Peterson, 2015). He considered that some of the tools that were before SpeechAce were not very complex, such as Rosetta Stone, which only specifies whether the word is pronounced correctly or incorrectly. Although instant feedback is received, and it compares your pronunciation with a native´s one, it does not focus on the phonetic feedback, syllables or emphasis (Rosetta Stone, 2018).

For that reason, it was Cheung who began to write an "iPhone app", by using speech recognition technology. It not only recognises the voice of a person, but also indicates which words or, above all, syllables have been wrongly pronounced

(Peterson, 2015). Moreover, SpeechAce is an opportunity to explore English sounds individually and to imitate a native´s pronunciation. The access to SpeechAce can be done through two ways: first, by trying the tool in the browser, or secondly, trying it throughout Moodle. Accessing through the browser includes the opportunity to practise pronunciation of vowels, consonants, simple and complex sentences already established by SpeechAce creators, whereas if the access is done through Moodle, the teacher can create its own content, by uploading the materials that are considered appropriate for students. In the tool itself, that section is called "My courses". However, SpeechAce not only allows teachers to share their own materials, but to create quizzes including those materials as it is indicated in the following figure (1), although no questions have been added yet:
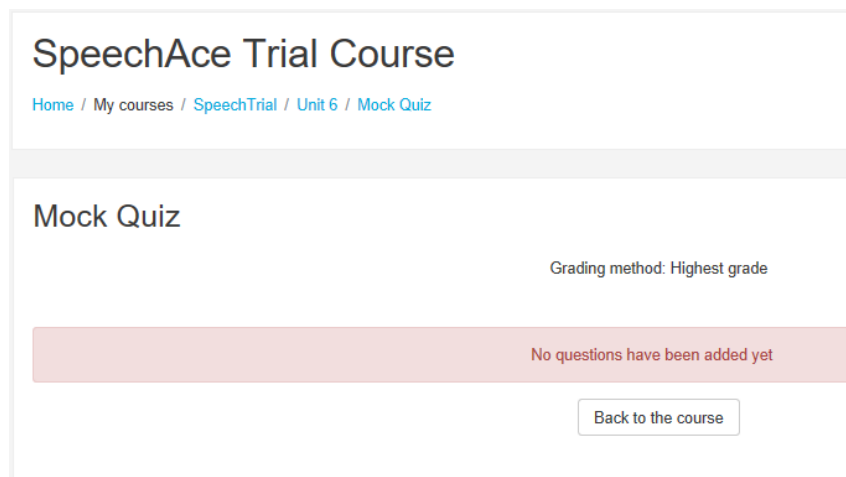

Figure 1. SpeechAce Trial Course: quizz.

After having released SpeechAce, the creators implemented the tool in the educational field. They thought it was a very helpful way to complement daily instruction and continue with the classroom content. It can also be adapted to various levels, what gives you the chance to adapt the system to the learner´s needs. Peterson (2015) maintains that it was Abhishek who encouraged Christine Knorr, the Academic Director at Washington Academy of Languages, to include SpeechAce into the English curriculum at City University of Seattle.

There any many ways in which SpeechAce can be implemented in class, for instance, by doing group activity in the computer room, where the teacher uploads the vocabulary of the respective unit to the platform (Peterson, 2015). So it is the teacher´s role to select the vocabulary students will practise by using SpeechAce, as the following figure (2) illustrates:
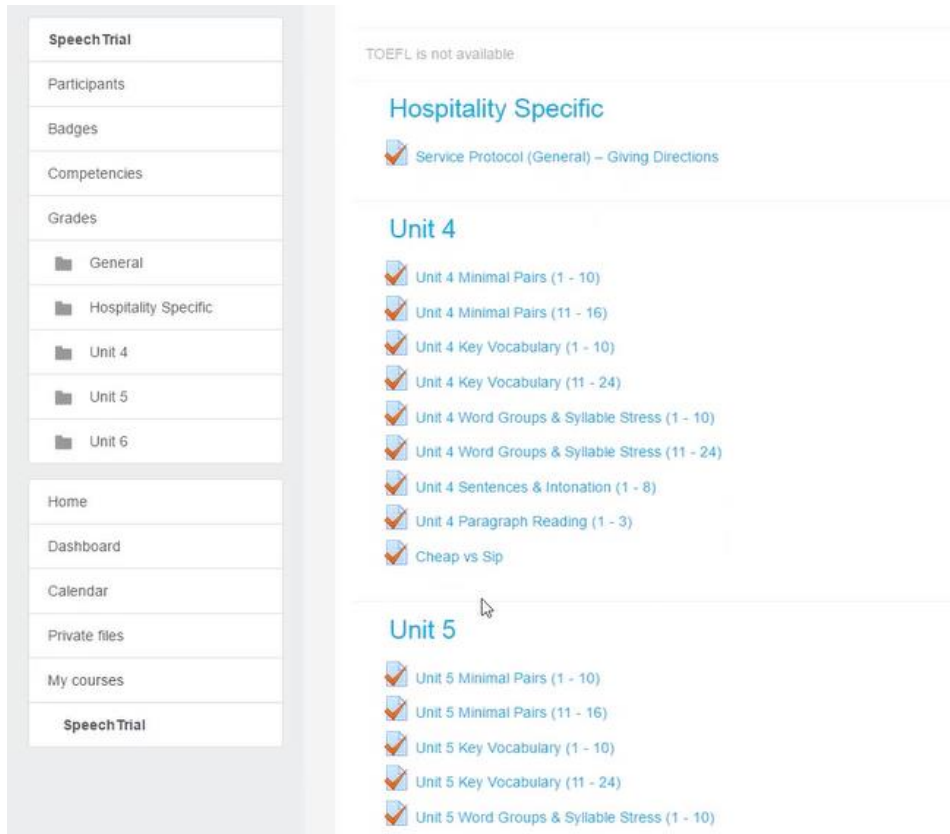

Figure 2. Units that the teacher uploades to SpeechAce.

Thus, they will practise listening and speaking skills because when students use this tool they first listen to a native speaker´s pronunciation of the word, and then, it is time for students: they pronounce the word while it is being recorded. Then, immediate feedback is received by SpeechAce, where a phonetic transcription of which words were well and badly pronounced appears, as it is indicated in figure 3:

Syllable	Phone	Score
	p	Good
pri	r	Good
	aɪ	Good
va	v	Good
	ə	Good
cy	s	Good
	i	Sound like k

Figure 3. Phonetic transcription (feedback).

As Peterson notes, students can check their pronunciation "syllable by syllable and sound by sound" (2015). Students have also the opportunity to listen to their recordings, and if the student does not understand anything, then it is the teacher´s turn to solve any doubts that students may have.

Cheung et al. (2017) remind us that some of the main benefits that this tool possesses are that it is a Speech Recognition Software founded in 2014 by engineers who are non-native English speakers. Their main aim was to teach correct American English pronunciation. As shown before, it provides instant feedback on the pronunciation of words, syllables and sounds. Students are given some phonetic transcriptions that could serve to check which phoneme should be use in each syllable. Therefore, Peterson (2015) states that "mistakes are presented to the user in an appealing visual format along with supplementary feedback on stress, intonation and speaking rate", what contributes to develop fluency in English language. Students are provided with "constructive feedback", that may be benefitial for students when attempting to imitate an-English native

speaker. Moreover, not only feedback of simple words is given, but also feedback of each word within a complex sentence, by presenting the syllable selected, the phoneme and the score obtained, as it is shown in figure 4:

I'm gathering my supplies within easy reach, so no contaminated surface is touched during the task.

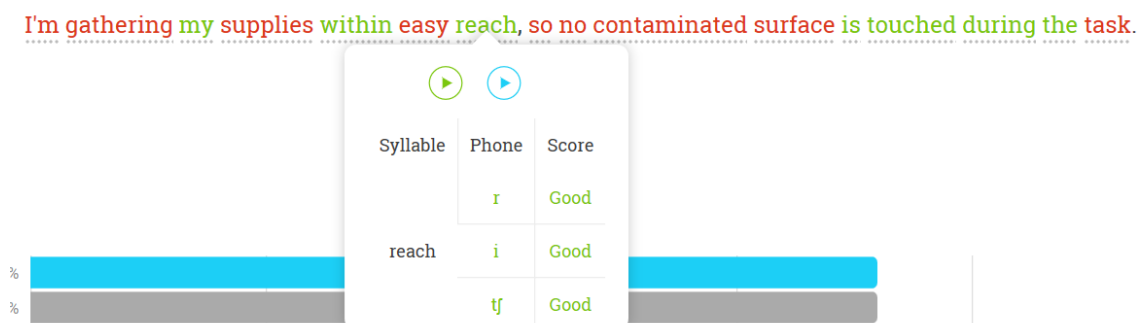| Syllable	Phone	Score
	r	Good
reach	i	Good
	tʃ	Good

Figure 4. Feedback of complex sentences.

SpeechAce is catalogued, by Peterson 2015, as a very convenient tool that can be used either in the classroom or at home from personal laptops, which allows students to practise pronunciation on their own too. Interestingly, it is a tool that considers students' needs because it offers a huge amount of activities; for example, practise not only specific vocabulary (vowels and consonants included), but simple and full sentences (see figure 4). Besides, it offers an enormous range of topics such as healthcare, hospitality and citizenship. There are also levels which go from beginner to intermediate, and it can be heard in both female and male voices. SpeechAce offers the chance to read poems, sentence by sentence, with the pertinent feedback and phonetic transcription to improve pronunciation. Therefore, students are given the opportunity to practise pronunciation exercises through different Learning Management Systems such as Blackboard, Canvas, Moodle, Sakai and WebCT, commonly used in education.

SpeechAce has been already used in the educational and business fields. One of the first centers in using that was Mit Media Lab (School of Architecture), that offers many academic programs such as studies in Media Arts and Sciences (School of Architecture + Planning, n.d.). City University of Seattle also implemented SpeechAce in the classroom, apart from Naples Eastern University. SpeechAce has been also used in many tourist enteprises such as Sheraton Hotels & Resorts and Westin Hotels & Resorts, apart from some transports companies such as Hero MotoCorp, which is the "largest two-wheeler manufacturing company in India", as Hero MotoSports (2018) notes.

Although this tool does not have a rapid spread in Europe, Peterson (2015) exposes that it is now spreading quickly from Seattle to Vietnam, Australia and Japan. Regarding the number of people who used SpeechAce, some representatives from the educational field have shared their opinions concerning SpeechAce. For example, J. Aiello, an Instructor at University of Naples, affirmed that "the greatest proportion of students listed SpeechAce as their favorite part, based on their appreciation of the native speaker model and accompanying phonetic transcription" (Cheung, 2017). Therefore, it can be observed that it is the phonetic transcription the way of feedback that students appreciate, apart from the opportunity to hear an English native speaker saying the pertinent word. Furthermore, Victoria, a German English teacher, gave her opinion about SpeechAce asserting that it is the best tool to teach pronunciation. Based on her experience as an English teacher and after having tried many different tools, she believes that SpeechAce is the best choice to teach English pronunciation.

Considering the different opinions of people who used this tool, it can be deduced that SpeechAce seems to be the most convenient tool for EFL learners. It combines three crucial aspects that help improving pronunciation: listening to an English native speaker, inmediate feedback (with phonetic transcriptions and word stress) and practice with Automatic Speech Recognition, which provides immediate feedback to students by giving them the chance to detect their own errors.

2.5.   Automatic Speech Recognition for Error Detection (ASR)

As shown before, SpeechAce includes Automatic Speech Recognition for Error Detection (ASR), which plays a vital role in teaching pronunciation and in giving immediate feedback to students.

Strik, van Doremalen & Cucchiarini (2010, p. 3), argue that "achieving sufficient accuracy in the stages of Speech Recognition and Error Detection is essential to be able to provide useful corrective feedback". To better understand the importance of ASR and the corrective feedback in pronunciation of other languages such as Dutch in the Netherlands, an analysis of three groups of inmigrant people was done by Neri, Cucchiarini & Strik in 2006. One of the groups used ASR, whilst the rest of the groups received traditional instruction. The results were positive because students felt highly-motivated with the tool, and

they noticed their pronunciation problems, as well as acquiring some phonetic knowledge at the same time. ASR formed the central focus of a study by Elimat & AbuSeileek (2014, p. 24), in which the authors found that this sort of technology gives teachers the opportunity to detect individual problems that students may have. To determine the steps that ASR might include, Neri, Cucchiarini, and Strik (2003) suggest in first place, speech recognition; secondly, scoring, then error detection and diagnosis, and finally feedback presentation (cited in Elimat & AbuSeileek, 2014, p. 24).

Several studies investigating ASR have been carried out to explore its effectiveness. Hincks (2005) observed that using ASR feedback in the experimental group was much more effective in terms of improving pronunciation than the feedback provided by the teacher to the control group, the one who received regular instruction (cited in Elimat & AbuSeileek, 2014, p. 27). Moreover, Seferoglu (2005) and Kim (2006) also investigated ASR, by demonstrating that using visual feedback technology and providing feedback that may be like a native speaker is helpful for EFL students (cited in Elimat & AbuSeileek, 2014, p. 27). Similarly, Verdugo (2006) proved the effect that using ASR with two groups of people might have. As pointed out in Elimat & AbuSeileek (2014, p. 28), the experimental group was taught pronunciation through ASR, whereas the control group received traditional instruction in terms of intonation patterns. The results obtained from the preliminary analysis revealed an increased quality of intonation and students became more and more aware of intonation itself. For that reason, Elimat & AbuSeileek indicate that ASR allows students to "produce more output in a low-anxiety environment" (2014, p. 28), which may be benefitial for students who are afraid of speaking in public. ASR can be adapted to distinct levels and stages, and it should be an active tool cautiously implemented in the educational field (Elimat & AbuSeileek, 2014, p. 38).

Another benefit of using ASR in the classroom is that students are exposed to hear many different English native speakers, as Eskenazi (1999, p. 63) shows. This system also allows students to practise sounds in front of the teacher until they feel comfortable enough, apart from avoiding negative feedback.

To select the most appropriate technological tool that may help teachers to teach pronunciation in the classroom, Yoshida (2018, p. 196) suggests that there are four essential criteria. First, appropriateness to learning objectives, which

means whether students will achieve their pronunciation goal. Then, quality and accuracy (concerning phonetics and phonology sounds) and practicality of use. The latter means if it is easy to learn and if it is not problematic when using it. Finally, the cost, wich should be the minimum.

One of the main benefits that SpeechAce offers, which includes ASR, is that the teacher does not need to provide individual feedback as in traditional teaching. Eshani & Knodt (1998); Neri, Cucchiarini, Strik, & Boves (2002) indicate that the ASR system, and obviously SpeechAce, provide automatic feedback which serves students to realise about their problems in situ (cited in Elimat & AbuSeileek, 2014, p. 22). Naturally, students are given the chance to work individually at home with some materials uploaded by the teacher to the platform.

Overall, there seems to be some evidence to indicate that SpeechAce is the most adequate tool to teach pronunciation in Secondary education because it encapsulates all these aspects. This tool not only gives students the chance to find the balance between fluency and accuracy, but it includes many features such as segmental features (consonants, vowels, phonetic transcriptions) and suprasegmental features (intonation, rhythm, word stress), as Moejdito (2016) notes.

2.6. The role of phonetics and phonology

As discussed in the previous section, SpeechAce is an innovative tool which requires some previous knowledge of phonetics and phonology before being implemented in the classroom.

Moyer (2013) describes pronunciation and accent as "fundamental to communication, for without a reasonable degree of phonological fluency, spoken interaction will falter" (p. 9) (cited in Gurzynski-Weiss, et al., 2017, p. 2018). For that reason, it is important to combine phonetic transcriptions with an ICT tool to enhance pronunciation. Likewise, Fabre, Torres, Andrade, Ortiz & Alvarez (2017, p. 85) identified that having some knowledge about phonemic features can improve English pronunciation. It is the teacher´s duty to teach phonetics and phonology to students via innovative tools, by fostering communicative competence to achieve proficiency in English (Fabre et al. 2017, p. 86). Thus, EFL learners will have the chance to study phonetical features that could serve them to communicate with native speakers in a real context, and to particularly

use language in "real-world/meaningful communication contexts" (Gurzynski-Weiss, et al., 2017, p. 2018).

To achieve communicative competence and a certain degree of language proficiency, students should have some previous phonemic knowledge. Hence, the student´s communicative abilities will be strengthened, especially the abilities of EFL learners, who do not usually interact with native speakers of English. However, Dalton (2002) claims that when it comes to teach pronunciation, the teacher just teaches what they feel comfortable with, as reading, writing and listening, without focusing on an essential part to achieve a certain degree of proficiency in a language: pronunciation (cited in Wei, 2006., p. 3). They totally forget about phonetics and phonological knowledge, which are necessary to make students feel comfortable when they must speak a language.

Having explained the theoretical framework of pronunciation, covering its history, the role of ASP, phonetics and phonology, and the best tool to teach pronunciation as it is SpeechAce, it can be deduced that the main objective of this research project is to investigate the effectiveness of implementing SpeechAce to improve pronunciation in Secondary Education. SpeechAce includes ASR in its mechanism, and it deals with a variety of phonetic and phonological exercises which can lead to improve pronunciation. For that reason, this paper examines the significant contribution that ASR and phonetics and phonology make to the understanding of the topic. Taken together, these aspects suggest that there is a direct connection between ASR, phonetics and phonology, and SpeechAce. Consequently, and based on the evidence presented above, we pose the following research questions:

- RQ1: Are ASR, phonetics and phonology and pronunciation itself crucial aspects to improve pronunciation in the classroom?
- RQ2: How effective is the implementation of SpeechAce in EFL Secondary classrooms?

3. METHODOLOGY

3.1. Participants

The sample of this study will consist of 60 EFL Spanish students (36 females and 24 males) from "Salesianos Los Boscos" high school in Logroño. The members of each group will be 18 males and 12 females. All the participants will be aged between 15 and 16 years old, from 3rd of E.S.O. "Salesianos Los Boscos" has been intentionally selected to conduct the study because my internship period was developed in this school.

In the case that there were students with Asperger syndrome, Attention Deficit Hyperactivity Disorder (ADHD) or disabilities, they will not be excluded from the experiment and they will receive equal treatment from their classmates. In the case of students with Asperger they will find SpeechAce tool very visual, which will be benefitial for them to acquire the phonemic knowledge and to perceive in which part of the word or sentence they made the errors.

Two groups of students will be studied: the control group and the experimental group. The first group will receive traditional instruction, whereas the other group will be taught pronunciation throughout the ICT tool called SpeechAce, with the ASR system already incorporated. Participants of the experimental group will be exposed to this experiment for 35 weeks, whilst the control group will be exposed to regular instruction by using Youtube videos, audio recordings and printed materials prepared by the teacher. The experiment will last 39 weeks because Christmas and Eastern holidays are not counted. In those dates, students will have to do some pronunciation exercises for homework. All the participants will study the same material, and the teacher will be the same for both groups (in this case, myself).

3.2. Instruments

The main instruments that will be used in this study are two: Flipgrid and a questionnaire. Flipgrid will be directed to students. They will have to do a pronunciation test developed by the teacher to measure students´performance before and after applying the experiment. In this test, students will have to record themselves before and after the experiment. It will consist of 17 words extracted from the textbook used in the school, which includes some of the vowels and consonants studied. Hence, there will be two sentences to practise rising and

falling intonation. As shown in the instructions (see appendix 1), they will have 90 seconds to record everything. To record themselves, students will be given a Flip code to access to the Flipgrid platform, where they will have many attempts before recording the 90 second video. Flipgrid is a social learning environment where students can learn from their peers, promote cooperative learning, listen to themselves and learn from their pronunciation mistakes (Flipgrid, 2018). With this instrument, students share a short video in response to the video uploaded by the teacher, in which the instructions of the activity appear. Students will have to repeat the same video after the implementation of SpeechAce took place. In this way, the level of students´pronunciation can be measured before and after the experiment. The improvement of students will be measured throughout a rubric adapted from the Common European Framework of Reference (CEFR) (see appendix 1).

Regarding the second instrument, the teacher will have to fill in a questionnaire before and after the experiment (see appendix 2). It will consist of two sections. The first section of the questionnaire (pre-test) will be devoted to the teacher´s opinion about the methods, tools, materials and techniques used to teach pronunciation. In the second section of the questionnaire, the teacher will be asked about the most common pronunciation errors that Spanish students may have. As for the second section of the questionnaire (post-test), the teacher will be asked to write down the most common pronunciation errors that students of 3rd of E.S.O made in the experiment, as well as registering the main differences between the experimental and the traditional group. Finally, there should be a short of reflection about the obtained results to detect the appropriateness of the test.

3.3. Procedure

This research will take place during the whole academic year 2018-2019 so that students could develop their skills and improve their pronunciation. The implementation of the tool will start in the middle of October, so that the teacher can provide students with some knowledge of phonetics and phonology in September and October. As it is true that students are more stressed at the end of the third trimester, the implementation of this tool will finish one week before the final exams start, so that they can devote their time exclusively to exams. The

second trimester seems to be the longest one because it includes periods from December to February. Thus, more lessons related to practise pronunciation will be done. In this way, there will be enough time to implement the tool in the classroom during the second and third trimesters by practising the knowledge of phonetics and phonology acquired in September and October. The independent variables of this study are both groups: the control and the experimental one. The dependant one is referred to the implementation of the tool, when students are performing the words or sentences throughout SpeechAce.

Prior to undertaking the investigation, the teacher should fill in a questionnaire. The design of this questionnaire will be based on the previous methods, techniques, materiales and strategies that the teacher used to employ in the past. The questionnaire has two sections. In the pre-test section, the teacher will have to do a sort of reflection about the materials and techniques used by him/her to teach pronunciation (in this case, myself). Moreover, an analysis of possible students´pronunciation errors should be indicated, and about the importance of pronunciation according to teachers. In the second section of the questionnaire, the teacher should reflect the main differences observed of both groups (common errors included), apart from evaluating the usefulness of this questionnaire to consider the teacher´s opinion.

Regarding students, before implementing the experiment they should do a pronunciation test through Flipgrid to be sure that both groups are being evaluated under the same circumstances (see appendix 1). First, the teacher will make a video by explaining the instructions of the activity. Then, students will be asked to record themselves throughout Flipgrid. In this way, the usefulness of implementing SpeechAce in an EFL classroom can be evaluated.

Following this, the implementation of the tool will start. To successfully perform the experiment, students are required to have a computer per person. In case they do not have one, they should go to the computer room. If there is no availability in the computer room, students should perform the activity in the classroom with the teacher´s computer, where the whole class will be involved. Then, the activity will be conducted three days per week (during 35 weeks), so that students do not feel stress when learning pronunciation; otherwise, students would not be efficient enough at doing the task. At least, one day of the week students will have to work individually, as it is a work which requires

concentration. Working in pairs or in groups of four people as maximum will be allowed. Students will work pronunciation two or three hours per week, depending on the learner´s needs. Besides, they will have to work pronunciation not only in the classroom, but at home too. Students will be provided with EFL lessons five days per week. Apart from pronunciation, the rest of skills would be covered in the classroom. For that reason, listening, reading, speaking and writing will be practiced in each classroom.

During the implementation of this tool from mid October until the end of May, students will begin by practising vowels, consonants and basic sentences. Little by little, students will have to practise simple sentences, until they finish practising complex sentences and poems, which is connected to the vocabulary uploaded by the teacher to the platform. As mentioned above, the teacher is–responsible for observing and registering the results of the experiment in the questionnaire, that should be filled at the end of June, with the observed results by the teacher. The tool contains activities that will be developed within two levels: beginner and intermediate, as the level of 3rd of E.S.O seems to be intermediate one. Thus, students will start by exploring pronunciation in a beginner level, to achieve an intermediate level by the end of the course. Table 1 specifies more in detail the organization of this tool during the 2018/2019 course:

COURSE 2018/2019 (35 weeks)			
WEEKS	*LEVEL*	*CONTENTS*	*TYPE OF EXERCISE*
1st-5th	Beginner	Phonetics and phonology instruction *Students*: pronunciation test *Teacher:* questionnaire	Questions and pronunciation test of certain words
6th-7th		Vowels (ɪ/i, ɛ/æ, ə/ʌ, ɔ/ɑ, ʊ/u)[1]	Simple words
8th-9th		Combination of certain vowels (ɪr/ɛr/ɔr, ʊr/ɑr, aɪ/eɪ/ɔɪ, aʊ/oʊ)	
10th-11th		Consonants (b/p, d/t, g/k, dʒ/tʃ, v/f, ð/θ)[2]	
12th-14th		Combination of certain consonants (b/p, d/t, g/k, dʒ/tʃ, v/f, ð/θ)	
15th-16th		*Grammar:* Countable/Uncountable nouns *Vocabulary:* Numbers, shopping and giving directions	Simple words and sentences
17th		*Vocabulary:* Assisting clients	Simple words and sentences
18th-19th		Mixed of simple sentences randomly prepared by SpeechAce	Simple sentences
20th-21st	Intermediate	*Grammar:* Simple Present regular/irregular verbs *Vocabulary*: Holidays, Travelling, Giving directions	Fill in the blanks, Multiple choice and Dialogue
22nd-25th		*Grammar*: Present Continuous words and Future Tenses *Vocabulary*: Dinner Conversation and Time	
26th-29th		*Grammar:* Reported Speech *Vocabulary:* Shopping, Housekeeping and Complaints	
30th-32nd		Mixed of complex sentences randomly prepared by SpeechAce	Simple sentences
33rd		Citizenship Quiz	Quiz
34th-35th		Poem of Soggy Greens	Poem in simple sentences

[1] One week dedicated to each pair of vowels.
[2] One week dedicated to each pair of consonants.

The latter activities have been selected for many reasons. First, some of them are made by SpeechAce founders; secondly, these are some of the contents that should be covered in 3rd of E.S.O (Cole, 2014). Finally, all those contents appear as vocabulary and grammar exercises in the textbook, which have been transformed into pronunciation exercises, as shown above in Table 1.

The teacher will have access to the scores and the materials done by each student thanks to SpeechAce. Consequently, the teacher will have the chance to control what students do and what they do not do.

4. EXPECTED RESULTS

The present study was designed to determine the effect of SpeechAce, which includes ASR, in students´ pronunciation. The present findings seem to be consistent with another research which found that ASR may facilitate the pronunciation process of students (Elimat & AbuSeileek, 2014, p. 36). The main variables that will be analyzed in the classroom are the method of teaching (ASR vs. regular instruction), pronunciation errors, words stress, rythm and intonation.

The results of the study are expected to show a significant difference between those students who would receive an innovative instruction through ICT tools and those receiving regular instruction. The main differences of both groups may be attributed to the fact that each group was subjected to a different teaching method (Elimat & AbuSeileek, 2014, p. 36). The experimental students who would have been taught through SpeechAce would have obtained better results in terms of pronunciation, word stress, intonation, rythm, similarities with native speakers´ pronunciation and fluency when interacting with other people. The correlation between practising pronunciation with SpeechAce and receiving immediate feedback through ASR is interesting because teachers are to be able to perceive their students´common errors in pronunciation easily, and the main differences and similarities between the traditional and the innovative way of teaching pronunciation. According to Bruton & Samuda (1980, p. 1), choosing the appropriate method to perceive common errors in students is what really matters.

This study would show the effect that Automatic Speech Recognition (ASR) has in segmental and supra-segmental pronunciation of Secondary students, apart from the need of teaching phonetics and phonology to students, although it may be difficult for them sometimes. SpeechAce offers an ASR system because students have the chance to record their own voice and not only listen to themselves but a native speaker of English. For that reason, SpeechAce is the solution which will provide a large variety of alternatives to detect errors; for example, the immediate feedback provided by ASR and the percentage of similarity with the native speaker´s way of pronouncing the word. It is the questionnaire and SpeechAce tool what makes the teacher be aware of the methods used in the past and the aspects that should be improved in terms of teaching pronunciation in the classroom. Moreover, the exposure of students to the post-pronunciation test of no more than 17 familiar words and sentences in

English, will influence their intonation and word stress ability. The test made by the students would be successful as it will be able to identify the most typical errors that students make concerning intonation.

Another important finding would be that this experiment would detect evidence of phonemic transcriptions. Students will be unconciously provided with some phonetic and phonology knowledge thanks to SpeechAce tool. This finding agrees with Lai, Tsai, and Yu (2009), who point out that using a system which includes ASR contributes to the development of phonetic awareness and the improvement of pronunciation in comparison to the other group (cited in Elimat & AbuSeileek, 2014, p. 36).

Another striking result of this experiment when practising pronunciation would be that students would develop their collaborative skills when working in groups or in pairs, which would be benefitial for students who are more likely to suffer from fear when speaking in public. Elimat & AbuSeileek (2014, p. 37) indicate that "cooperative work is recommended because it gives students a chance to participate in activities, increases motivation, the quantity of language use, and it offers less threatening environment for language use". For that reason, it can be said that the experimental group of students taught with ICT tools, would feel more motivated than students receiving regular instruction. This is a speculation that could be deduced from the implementation of SpeechAce in the classroom, as motivation has not been the purpose of this study. Nevertheless, a future study investigating motivation with ICT tools would be very interesting. Therefore, the use of SpeechAce can have other advantages, such as complementing the individual work at home. Students can practise a vast range of English words and sentences throughout the platform.

It seems possible that these results are due to a set of factors dependant on one another. If students use SpeechAce, they receive immediate feedback from ASR. Then, students can be aware of their errors, rythm, phonemic awareness, stress and intonation. Thus, their fluency and pronunciation will be automatically improved. In this way, students will feel more comfortable to speak in public and they will feel more confident to speak English not only in the classroom but in the outside world; for instance, with native speakers of English. Apart from rythm, and intonation, students will find it easier to pronounce vowels, diphthongs, consonants, and complex sentences in English due to the use of SpeechAce.

It can therefore be assumed that the main results that could be emerged from this experiment are first, fluency, word stress, intonation and accuracy will be improved; secondly, the teacher will detect his/her students´errors sooner than if he/she would have taught pronunciation in a traditional way. Finally, further research needs to examine more closely the links between ICT tools and motivation. It should not be forgotten that this paper has attempted to provide students with some phonemic knowledge that could serve them to be more fluent in English in connected speech.

5. CONCLUSIONS

The present investigation has examined how SpeechAce can help 3rd E.S.O students to improve their pronunciation in the classroom, as well as their word stress, accuracy, intonation and fluency. The main goal of this study was to evaluate the effect of teaching phonetics and phonology to Secondary students, apart from comparing traditional instruction with an innovative way of giving a lesson by using technological devices i.e. SpeechAce. It also contributes to facilitate meaningful learning in a motivating atmosphere.

These findings suggest that, phonetics, phonology and ASR play a significant role when teaching pronunciation. It was also shown that SpeechAce seems to be the most appropriate tool to teach pronunciation in Secondary Education, because it integrates all the aspects mentioned before. This study highlights that previous teachers' instruction in technology is crucial to make an adequate use of ICT tools in the classroom, apart from some instruction about ASR too.

Finally, several important limitations need to be considered. First, the feedback offered by this tool go faster than the learning process, as it is immediate, and secondly, that it is invaluable to users who do not have constant access to a qualified instructor for pronunciation practice. Another source of weakness of this study is the lack of computers in some high schools. For the correct development of this research, students will need either one computer per person or one computer for a group of four people as maximum; otherwise, the task would not be successfully implemented. In case there are not enough computers, the development of the sessions with SpeechAce will take place in the classroom, with the teacher´s computer. As Eskenazi (1999, p. 73) asserts, teachers and scientist experts should work together to make ASR system be more efficient, compelling and dynamic. In that way, the implementation of SpeechAce in the classroom would be more effective.

Due to practical constraints, this paper cannot provide a comprehensive review of the phonetics knowledge that students obtained after having received 35 weeks of instruction. However, this study can present a significant extent of common English errors that students may have concerning pronunciation. The reader should bear in mind that the study will be based on a very short knowledge of phonetics and phonology that would be provided to students during the first five weeks of the experiment.

Future work needs to be done to establish whether SpeechAce is the most appropriate tool to teach pronunciation in the classroom. A further study could assess the long-term effects of implementing an ICT tool such as SpeechAce in the classroom. For that reason, future trials should explore the impact of pronunciation in the classroom, as it has not been deeply studied so far. A greater focus on teaching pronunciation through SpeechAce could produce interesting findings that account for a breakthrough in the educational field.

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