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**THE EFFECTIVENESS OF AUTOMATIC SPEECH
RECOGNITION SOFTWARE ON THE PRONUNCIATION OF
EFL STUDENTS IN A COLLEGE IN IRAQ**



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Abstrak

Pelajar kolej di Iraq menghadapi kesulitan sebutan dengan tepat dalam Bahasa Inggeris. Bagi mengatasi masalah ini program Pengiktirafan Ucapan Automatik (ASR) dalam pembelajaran sebutan Bahasa Inggeris perlu dilaksanakan dalam kalangan pelajar kolej di Iraq. Kajian ini bertujuan untuk menguji sama ada penggunaan perisian ASR akan membolehkan pelajar Iraq bagi program Bahasa Inggeris sebagai Bahasa Asing (EFL) memperbaiki sebutan supaya lebih mudah difahami dan dapat mengatasi kesalahan sebutan. Secara khususnya objektif kajian ialah: a) mengkaji keberkesanan penggunaan ASR dalam pengajaran Bahasa Inggeris sebagai Bahasa Asing (EFL); b) mengkaji penggunaan program perisian ASR *EyeSpeak* ke atas sebutan bahasa Inggeris pelajar; dan c) mengenal pasti persepsi pelajar tentang keberkesanan penggunaan perisian ASR *EyeSpeak* ke atas prestasi sebutan mereka. Satu kajian eksperimen menggunakan sampel rawak yang melibatkan pra dan pasca ujian dengan kumpulan kawalan telah dijalankan. Satu set soal selidik turut digunakan untuk menilai penggunaan perisian *EyeSpeak*. Di samping itu, temu bual separa struktur dikendalikan untuk mendapatkan penilaian pelajar tentang keberkesanan perisian tersebut. Dapatan kajian menunjukkan bahawa pelajar dari kumpulan eksperimen memperoleh skor lebih tinggi daripada pelajar dari kumpulan kawalan. Selain itu, pelajar memberi maklum balas positif tentang penggunaan perisian ASR. Ini selari dengan dapatan temu duga bahawa perisian ini dapat membetulkan sebutan dan memberi maklum balas. Penggunaan perisian *EyeSpeak* dapat membantu pelajar dalam kemahiran sebutan dan ini adalah sesuatu yang bermanfaat untuk kolej dan institusi mempertimbang dan mengintegrasikan teknologi ASR dalam pengajaran kemahiran sebutan.

Kata kunci: Pengajaran sebutan, Pengiktirafan ucapan automatik (ASR), Bahasa Inggeris sebagai bahasa asing (EFL)

Abstract

Iraqi college students face difficulties in pronouncing English sounds accurately. To overcome this problem, Automatic Speech Recognition (ASR) programme needs to be implemented in learning English pronunciation among Iraqi college students. The study aims to test whether using ASR software would enable Iraqi English as a Foreign Language (EFL) learners achieve more intelligible pronunciation and overcome their pronunciation errors. Specifically the objectives were: a) investigate the effectiveness of using ASR in teaching English language pronunciation to Iraqi EFL learners; b) investigate the usefulness of ASR *EyeSpeak* software programme on students' English pronunciation; and c) explore the students' perceptions of the effectiveness of using ASR *EyeSpeak* software on their pronunciation performance. An experimental study employing randomized sampling using pre-test and post-test control group design was conducted. A questionnaire was used to evaluate the usefulness of the *EyeSpeak* software. Semi-structured interviews were conducted to obtain students' evaluations of the software. The findings show students in the experimental group scored significantly higher on the post-test than the students in the control group. A positive feedback was received from students via the questionnaire regarding the usefulness of using ASR in pronunciation class. This was parallel with the opinions expressed in their interviews that the software provided correct pronunciation and feedback. Using *EyeSpeak* software significantly aided the students in their pronunciation skill and it will be significant for colleges and institutions to consider and integrate ASR technology into the teaching of pronunciation skill.

Keywords: Pronunciation instruction, Automatic speech recognition (ASR), English as a foreign language (EFL)

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Dedication

To the loving memory of my father

“A grieving Daughter, the dad I will always miss, a father’s love , no longer there, a broken heart, tear filled eye, another soul in the sky, the time we shared, the laughs we had, things I miss when I think of my dad”



to my beloved family and my beloved husband, for their constant support and unconditional love.

I love you all dearly.

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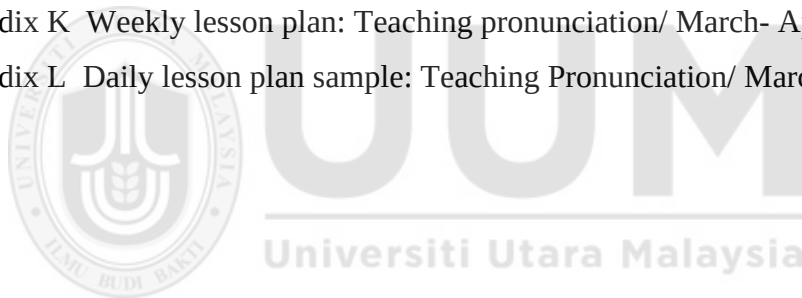
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List of Acronyms

AI:	Artificial Intelligence
ASR:	Automatic Speech Recognition
BI:	Behavioural Intention
CALL:	Computer Assisted Language Learning
CAPT:	Computer Assisted Pronunciation-Teaching System
EFL:	Learning English as a Foreign Language
ESL:	English as Second Language
FL:	Foreign Language
L1:	The First Language
L2:	The Second Language (the target language)
PEOU:	Perceived Ease of Use
PU:	Perceived Usefulness
SL:	Second Language
SLA:	Second Language Acquisition
S-R:	Response to Stimuli
TRT:	Theory of Reasoned Action

CHAPTER ONE

INTRODUCTION

1.1 Background

People the world over use various technological tools and devices; this indicates that technology is an essential element in every aspect of life, especially education. Indeed, it now has an important role in teaching and learning processes. According to Al-Ghazo (2008), there is a growing emphasis on the important role that technology can play in improving students' learning by making them active rather than passive learners. Danielson (2007) mentioned several types of technological equipment, such as video players, projectors and the computer equipment, as the most effective tools for improving the process of learning. Similarly, Hew and Brush (2007) also agreed on the positive effect of technology in education and learning. At the point when the learning environment is unable to meet students' needs, integrating educational technology, such as computer-assisted language learning (CALL), in the classroom may enhance the learning process (Lai, 2006). CALL is recognised as a beneficial tool for both teachers and learners of a second language (SL) or a foreign language (FL). The practical access of CALL systems in everyday situations and their flexibility of use make them excellent tools for either a group of learners or an individual learner.

With the use of computer technology, students' learning processes can be analysed and recorded as data, allowing teachers to support individual learners' needs (Lai, 2006). Conventional classroom learning makes it difficult for students to maintain the same pace as their peers when they miss lessons or do not understand concepts. Moreover, it can be difficult for a student to ask a teacher to explain a concept over

and over again because other students may become impatient. However, with technology, students can review a lesson or concept as many times as they want (Lai, 2006).

One of the difficulties associated with learning a second language (SL) or foreign language (FL) is mastering the pronunciation of the new language. Pronunciation is the key component in acquiring the spoken skills of any language, and students believe that pronunciation should be a priority for them (Willing, 1988). Pronunciation plays important role in enabling the learner to become an intelligible speaker (Morley, 1998). Because of the role of pronunciation in the learning of any language, it is essential for successful oral communication, listener perception, and establishing speaker identity. It is important to acquire this skill when learning the English language (Gilakjani, 2011). A study by Gilakjani (2011) showed that many FL learners of English face difficulties when learning English pronunciation. One of the reasons for their difficulties is the interference of the first language (L1) on the SL or FL (Piske, Mackay, & Flege, 2001). This difficulty increasingly occurs when there is a significant difference in the phonological systems between the L1 and the target language (TL) (Huang & Radant, 2009); the sound patterns of the learner's L1 interfere with his or her pronunciation of the TL (Jahan, 2011). This sound interference of the L1 on the SL or FL can cause a problem for English language learners which affects their pronunciation, and their English pronunciation problems weaken the efficacy of their oral communication (Hinofotis & Bailey, 1981). On the other hand, a high level of English language pronunciation proficiency increases understandability when conversing with others (Gilakjain, 2011). Therefore, it is important for learners to speak the English language as a native speaker does,

namely, ‘well enough to be understood’ (Jesry, 2005) because good pronunciation has a positive effect on conversation understandability.

Over the last decade, researchers in SL or FL acquisition have given more attention to pronunciation in language learning (Munro & Derwing, 2015). One prevailing issue in current pronunciation teaching and research is how best to teach pronunciation using the advantages of modern technological tools. An example of this is automatic speech recognition (ASR), which is used in computer-assisted language learning (CALL) for teaching SL and FL learners which allows them to listen to native speaker pronunciation (Kawai & Hirose, 2000). Also, using ASR in class can improve the students’ pronunciation quality (Franco et al., 2000; Neumeyer et al., 2000).

This research will focus on using technology for teaching pronunciation, an emerging trend in this field. The method uses speech analysis software to provide students with visual data, in addition to audio data, and gives them feedback on their FL production.

1.1.1 The Scope of Educational Technology

The use of advanced technologies has become nearly universal in FL and SL learning. One of the most effective technologies, among others, is the use of computers. Their use is essential because of the benefits for both teachers and students. Technology plays a central role in making the learning environment more interesting and encouraging. Moreover, using it in the teaching and learning process has amplified the effects of other technologies utilised in the teaching and learning

process as most depend on it. It can assist in education by accessing the diverse resources and information available on the Internet. Technological equipment, such as CALL programmes, can support efforts to achieve that educational purpose. Therefore, technology can effectively assist in teaching and learning languages, especially in certain cases where students are having difficulties in learning the new language.

Currently, many students are motivated to learn English because of its universal in international communication. Thus, it has become increasingly necessary for the non-English speakers to communicate well in English, which means speaking the language correctly. Using language as a means of communication, people can express their feelings, ideas and thoughts. The purpose of learning another language is to help people express themselves to people with a different L1. Learning how to communicate requires speaking skills, and, to develop them, students must learn to speak effectively. Speaking skills must be learned, practised and developed. One important aspect in improving speaking skills is pronunciation, and SL and FL learners are aware of that. Therefore, the teacher should pay particular attention to helping the learners to focus on and improve their pronunciation in order to better interpret and produce accurate and meaningful speech.

According to Bruns (1996), learners who engage in the regular use of an FL and receive more frequent input will most likely demonstrate a greater ability to use the FL. Therefore, the more knowledge the learner has that facilitates understanding about the topic, the easier it is for the learner to participate by speaking with ease (Lynch, 1996). Successful teaching and learning derives from providing English as a foreign language (EFL) learners with diverse opportunities to practise the English

language. Also, teaching FL learners using technology can facilitate the teaching and the learning process (Hollenbeck, DeRue, & Guzzo, 2004). This can be accomplished by providing learners with authentic materials and activities relevant to real-life situations (Dukes, 2005). Additionally, it is important to make the class more interesting for the learners, and technology can help to accomplish this (Alkahtani, 2011). Lastly, encouraging the students by increasing their confidence and motivating them with interesting materials is essential (Chartrand, 2001). Therefore, teachers should consider the advantages and effectiveness of using technology in FL teaching.

It is important to mention the advantages and disadvantages of using technology in the language classroom. One of the advantages of using technology is that it increases students' academic success which will better prepare them for the real world. Technological innovation can increase learners' interest by providing them with the best possible resources for learning the TL by including essential instructional aspects such as individualised input and frequent feedback. A disadvantage is the cost of the initial acquisition of technological equipment, but the potential long-term benefit to an institution is an excellent return on the investment because technology can save both time and money over the long term. However, the use of new technologies may cause students frustration in dealing with software and hardware and distract them from learning tasks. Therefore, it is important for the teachers to emphasise the delivery modality over the learning objectives. A less significant disadvantage is the need for the teacher to learn how to use the ever changing programmes, but this can be mitigated with adequate administrative support.

Some research has investigated the advantages and disadvantages of using technology in the classroom. Researchers who support the use of technology in the classroom, such as Cradler and Bridgforth (2005), have stated that technology could empower both students (learning process) and teachers (teaching process). Others note that it provides an authentic learning context (Haertel & Means, 2003). Over the last thirty years, much research (Chappelle, 1997; Felix, 2005; Stockwell, 2007) has been conducted on CALL, providing evidence of how using it improves language learning. On the other hand, Salomon (2002) stated that ‘as long as [technology] is being domesticated and trivialised to be totally subservient to ongoing practices, emasculated tools cannot harm, but they do not do any good, either’ (p. 71). Thus, teachers’ knowledge of the technology and the ability to determine the appropriate strategy to fit the needs of the students are essential for successful learning. As noted by Earle (2002), ‘Teachers have to come up with a strategy to make [technology] work’ (p. 6). Integrating technology in FL learning, despite its costs and complexities, is essential as it collaborates with teaching and pedagogy for the purpose of educational development.

1.1.2 History and Trends of Teaching Pronunciation

Teaching pronunciation usually gets less attention in the teaching and learning of any language than other aspects of language, such as grammar and other linguistic elements. In the 1960s, teaching pronunciation was predominantly conducted using repetition and recitation while, in the 1970s and 1980s, teaching pronunciation was considered unimportant in language learning (Brown & Yule, 1983). According to Derwing and Rossiter (2002), less attention given to pronunciation leads teachers to stop teaching pronunciation in the classroom. Research by MacDonald, Yule and

Powers (1994) showed that teachers are uncertain about the most effective teaching method to use in pronunciation class. Three commonly used approaches for teaching pronunciation associated with traditional methods and modern techniques are the following: 1) the intuitive imitative approach, 2) the analytic linguistics approach and 3) the integrative approach (Chen, 2007).

The first method, the intuitive imitative approach, has students listen to and then imitate the sound rhythm of the TL and is usually used in combination with a technology such as computer-assisted software or audiotapes. With the second method, the analytic approach, the instructor explains the pronunciation using sound articulation descriptions, the phonetic alphabet and sound charts. With this approach, the teacher can use interactive speech software. The third method, the integrative approach, is based on learning pronunciation by practicing meaningful task-based activities instead of learning from isolated sound and word drills. In this approach, learners focus on listening activities and engage in practice related to the suprasegmentals, such as stress, intonation and rhythm, to help in learning pronunciation. The aim of this approach is to develop intelligible speech that helps learners communicate in the TL (Miller, 2006). According to Morley (1991), there are various benefits gained from intelligible pronunciation which lead the learners towards increased self-confidence and improvement in their communication, speech monitoring ability and speed modification strategies.

The previously mentioned methods are three currently used approaches to teaching pronunciation, even though teaching pronunciation has been the subject of study for

a long time. One study (Celce-Murcia, Brinton, & Goodwin, 1996) which proposed several approaches in teaching pronunciation is shown in Table 1.1.

Table 1.1

Pronunciation Teaching Approaches (Lee, 2008, p.3)

Years	Approach	Definition
Late 1800s and early 1900s	Direct method	Teachers provided students with a model for native-like speech. By listening and then imitating the modeller, students improved their pronunciation.
1940s–1950s	Audio-lingual method	Pronunciation was taught explicitly from the start. Learners imitated and repeated after their teacher or a supported recording model of the native speaker pronunciation. Teachers used a visual transcription system or articulation chart. Technique: minimal pair drills.
1960s	Cognitive approach	This de-emphasized pronunciation in support of grammar and vocabulary because (a) it was assumed that native-like pronunciation was an unreliable objective and could not be obtained, and (b) time would be better given to teaching more learnable items such as grammatical structure and vocabulary.
1970s	Silent method	Learners focused on the sound system without having to learn a phonetic alphabet or explicit linguistic information. Attention focused on the accuracy of sounds and structure of the TL from the very beginning. Tools: sound-colour chart, Fidel charts, word charts and colour rods.

	Community language learning	The pronunciation syllabus was primarily student initiated and designed. Students decided what they wanted to practise and used the teacher as a resource. The approach was intuitive and imitative.
Mid- to late 1970s and 1980s–today	Communicative approach	The ultimate goal was communication. Teaching pronunciation was stressed and intelligible pronunciation was seen as necessary in oral communication. The techniques used to teach pronunciation were the following: listening and imitating, phonetic training, minimal pair drills, visual aids, tongue twisters, developmental approximation drills, practice of vowel shifts, reading aloud/recitation and recordings of learners' language production.
Twentieth century and more recent	Grammar translation and reading-based approaches	Oral communication was not the primary goal of language instruction. Therefore, little attention was given to speaking and almost none to pronunciation.
	Naturalistic methods	Total physical response Students would begin to speak when they were ready. They were expected to make errors in the initial stage, and teachers were tolerant of them.
	Natural approach	The initial focus on listening without pressure to speak gave learners the opportunity to internalize the target sound system.
Today	New directions	New ideas from other fields, such as drama, psychology and speech pathology, influence learning. Techniques: use of fluency-building activities, accuracy-oriented exercises, appeals to multisensory modes of learning, adaptation of authentic materials and use of instructional technology in the teaching of pronunciation.

Celce-Murcia, Brinton and Goodwin (1996) proposed the specific details about several approaches in teaching pronunciation. Chen (2007) proposed general historical information about the role of pronunciation in second language acquisition (SLA) as is shown in Table 1.2.

Table 1.2

An Historical View of the Role of Pronunciation in SLA

1940s–1960s	1970s–1980s	Late 1980s–present
-Teaching of pronunciation was heavily stressed	- Teaching of pronunciation was largely ignored	- Pronunciation was a key ingredient in the development of communicative competence.
- Behaviouristic audio-lingual methods were used: imitation drills, pattern practice and dialog	- Communicative approaches focused more on fluency than form	- A more balanced approach that valued both accuracy and fluency was used

Source: (Chen, 2007 cited in Lee, 2008, p.3)

1.1.3 Conventional Classroom Techniques in Teaching Pronunciation

Pronunciation instruction is a fundamental branch of the communicative approach, and, traditionally, instructors of English pronunciation use phonetic symbols, word transcription and visual aids that show the place of articulation and manner of articulation, pair drills and reading aloud activities. Celce-Murcia (1996) described another way of teaching pronunciation related to listening which has the students imitate the native speaker.

All of these teaching techniques depend on the pronunciation teacher and identifying the best way to help the students to learn. Teachers of pronunciation usually begin by

introducing the sound first and then practising it in actual speech. Some of the students comprehend more easily in this way, but others need a real-life context to enable them to learn. Accordingly, there are several technologies used in the language instruction setting to facilitate language learning, which are considered essential for learning English pronunciation, especially in the FL classroom.

1.1.4 New Trends in Teaching English Pronunciation

The guiding concept for the new approach in teaching and learning was developed from other study areas, such as psychology and speech pathology (Celce-Murcia, 1996). The new approach that Celce-Murcia described is based on how to facilitate students' pronunciation learning by the use of fluency-building class activities, accuracy-oriented class activities, authentic materials, review of learning multi-sensory modes and technology in the teaching of pronunciation.

Moreover, a variety of technological equipment is available for use in an educational setting, such as computers, overhead projectors, instructional software, Internet, website materials and multimedia resources. Therefore, integrating these technologies can serve educational purposes and assist in the learning process (Muir-Herzig, 2004). Lee (2000) highlighted the reasons that educators should integrate computers into teaching SL and FL learners to facilitate the learning process; computers in the language learning classroom 1) increase students' motivation, 2) enhance students' success, 3) encourage student interaction, 4) provide authentic native-speaker materials and 5) offer expanded opportunities for students to practise.

AbuSeileek (2007) noted that the most important aspect of using CALL for pronunciation learning is the use of computer-assisted pronunciation training

(CAPT) which significantly helps in teaching the segmental and suprasegmental pronunciation features in the sound system. Figure 1.1 presents all the features of English pronunciation.

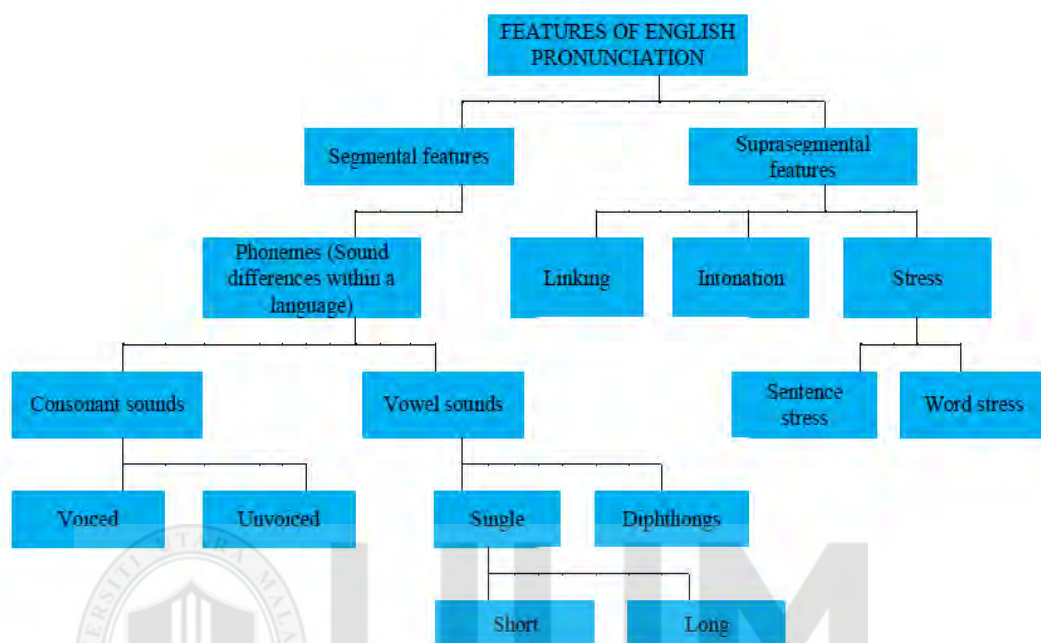


Figure 1.1. Features of English pronunciation (Gilakjani, 2012, p. 120).

Rostron and Kinsell (1995) pointed out that the use of CAPT can improve students' pronunciation. CAPT is designed to address individual students' needs by offering them the opportunity to train themselves by providing private and immediate correction and feedback. The role of teaching language pronunciation using the CAPT application has been the focus of pedagogical research (Neri, Cucchiari, Strik, & Boves, 2002). Many studies (Butler & Wiburg, 2003; Neri, Cucchiari, Strik, & Boves, 2002) have investigated the benefits of using CAPT to monitor improvements in students' English pronunciation. By using CAPT in pronunciation classes, students will be able to learn independently. Also, CAPT will be beneficial for the pronunciation teacher by providing drills and practice exercises without time-consuming preparation; in traditional classes, practising and drilling take a longer

time, and it still might not be long enough for all the students to do the practice exercises. Thus, CAPT can provide the proper learning setting to address all learners whether individuals, pairs or small groups (Pennington, 1999).

Some studies (Carey, 2004; Hirata, 2004) proved that CAPT using ASR enhances students' pronunciation. The importance of using ASR in teaching pronunciation is that it provides a valuable way to improve student training because it can analyse individual students' pronunciation. This increases awareness in the pronunciation teacher of the advantages that integrating ASR can offer, especially to FL learners. It enables students to practise a single sound or sounds in the context of words or sentences by showing them how to pronounce the sound or sounds and then providing them with animated and visual feedback on their pronunciation. This will improve the students' understanding and provide them with the opportunity to practise as much as they need.

The application of ASR software will assist in teaching and learning pronunciation and help the learners to master their FL pronunciation and overcome pronunciation issues. The use of ASR software will enable the teacher to realise their students' pronunciation problems and provide an opportunity for the students themselves to be aware of their pronunciation errors. Also, it can establish a comfortable environment for the students who feel afraid of practising and making a pronunciation mistake in front of their colleagues in the classroom; thus, ASR software will help them to practise more and to enhance their pronunciation performance (Neri, Cucchiarini, & Strik, 2001). CAPT with ASR offers significant advantages for the learners: it reduces anxiety in the learners, and it provides an opportunity for the individual learner to practise independently (Purushotma, 2005). Neri, Cucchiarini and Strik

(2003) stated the reasons that make ASR an excellent way to teach pronunciation. They are the following:

1. Speech Recognition: ASR enables the transformation of the speech signal into a series of words from the inserted phonetic and syntactic models. This is the first and most imperative stage, as the consequent steps rely on the precision of this first step. Additionally, this phase alone permits the creation of a range of computer-based exercises to teach the students how to communicate in the FL using interactive conversation and pronunciation activities. Therefore, ASR can be highly beneficial by providing pedagogical advantages which can offer convenient student training for oral skills of the FL and improve their pronunciation quality. The accompanying steps demonstrate how this assessment is conceivable.

2. Scoring: This step makes it possible to give an initial, worldwide assessment of pronunciation quality as an evaluation score. The ASR programme analyses the learner's speech compared to examples of speech that have been previously identified. The analysis of a student's pronunciation performance is evaluated based on how close s/he is to the native speaker reference properties; the closer the student is to the native properties, the higher the score will be. The advantage of ASR programme pronunciation training is that it provides immediate evaluation of pronunciation production and feedback on how to enhance the student's pronunciation.

3. Error Detection: The programme can detect pronunciation errors and show the learner where s/he committed errors. Noting each sound issue within the words can

be very helpful in increasing the students' awareness of errors and will help them focus on their problematic sound issues.

4. Error Diagnosis: The ASR programme can identify the types of errors that students make and provide a solution for correcting their errors. The ASR programme can accurately analyse students' pronunciation errors which is difficult for the students to do themselves.

5. Feedback Presentation: This stage involves showing all the information on students' pronunciation from the overall score evaluation bar and the numeric scale of their pronunciation performance. This stage is important because the students can know their pronunciation performance accuracy level by seeing this meaningful information about their pronunciation errors.

Pronunciation is part of speaking skills which few teachers have expertise in, yet many learners need assistance to master the pronunciation of the TL. According to the most recent research, quality pronunciation training will be achieved by using pronunciation software as it aids and increases the students' understandability, especially as technology continues to develop the capability of responding to learners' utterances. The increase of technology implementation will modify the nature of the learning process and encourage students to engage with the materials, empowering them to learn by increasing targeted feedback.

In Iraq, where most colleges and schools lack classroom instruction techniques and equipment, educators are faced with significant challenges as they change from

lecture-based instruction to computer-based instruction supported by technology; however, this is a challenge that must be met. Romano (2003) stated that improving the educational system (teaching and learning processes) occurs by empowering that system through the use of technology as an educational tool. Also, Alley (1996) observed that technology is a critical component to integrate into academic institutions. This is particularly the case when a FL is being taught. To enhance the students' learning of the FL, the teaching process must include and provide efficient and sufficient knowledge with the assistance of technological tools. Krashen (1978) noted in his 'affective filter hypothesis' that technology can enhance motivation, and, in effect, will then enhance the comprehensible input that is received.

One main concern is improving the students' pronunciation skills in the TL, as well as improving their English language usage. Because of the importance of developing speaking skills when teaching EFL learners, it is critical to determine and apply the best instructional methods, materials, activities, media and other tools that will assist learners to master speaking skills (pronunciation). Therefore, teachers need to provide content that is easily understood by the students because effective learning relies on the meaningful connection between content and learners. However, a meaningful connection requires the learner to access existing knowledge in order to relate it to new information (Zazelenchuk, 1997).

Therefore, in this study, the aim was to investigate the use of teaching instruction techniques which may facilitate the language learning process to help EFL students improve their English pronunciation. Teachers have to identify the students' specific needs in practising the FL to improve their pronunciation, as this skill requires both

training and exposure to native speakers of the English language. Many EFL students must consistently make oral presentations in their general education classes; this can be a frightening experience for a beginner-level language learner. By blending the teaching methods with the use of CALL, ASR software can be an excellent tool in attaining these goals. ASR can offer an opportunity for students to practise their English pronunciation skills in an enjoyable, challenging and low stress classroom atmosphere. Also, it allows them to reflect on their personal communication (McNulty, 2013).

Instructional techniques that were applied in this study used CALL programme ASR software to help learners practise their English pronunciation in a way that is as similar to native speakers of English as possible. ASR exposes learners to and familiarizes them with native spoken language and enables them to understand stress patterns, speech rhythms, speed of speech and intonation. This helps the students to gain knowledge and a greater understanding about the way native speakers talk. The use of CALL and ASR helps students recognise their errors. ASR software can also encourage students' interest in participating in pronunciation class subjects. Teaching pronunciation with ASR can enable them to build a solid link between educational materials and real practical applications.

For the purposes of this study, after teaching pronunciation with a CALL programme, the lecturers gave the students the chance to practise English. Using ASR software, specifically EyeSpeak, the students were able to detect their pronunciation errors. This helped them improve their pronunciation by doing practice exercises until they attained accurate pronunciation. Thus, with the help of

the ASR software, the students were made aware of their pronunciation errors, which helped them overcome their weaknesses.

1.2 Problem Statement

Speaking occupies an important place in the teaching and learning of a FL. Speaking is considered an essential component of language and the basic means of communication; thus, knowing the language means being able to speak it well (Lazaraton, 2001). A pronunciation leads to better understandability as it delivers the right message to the listener; while inaccurate pronunciation may result in misinterpretation of what was said. Pronunciation mastery is considered one of the most difficult skills required to learn any language (Aliaga-Gracia & Mora, 2009; Martínez-Flor et al., 2006). For EFL learners to master English pronunciation, they need to listen to native speakers. As Nowacka's (2012) study found, college students reported improvement in their pronunciation as a result of listening to a native speaker of English, participating in practical phonetic instruction exercises and imitating native speaker pronunciation.

A significant problem has been identified in Iraqi students' struggle to become accurate in English language pronunciation. In Iraq, the English language is considered a FL, which means that learners have few opportunities to speak English outside of the classroom. The lack of students' exposure to English natives, as well as the limited time spent in language laboratories, was reported in a recent study (Muhammed & Saud, 2014). Alwan (2004) stated that there are still a considerable number of students who complain that they have never learnt to 'really use the language' (p. 6). In the classroom, especially in pronunciation class, students do not

want to participate as they fear being embarrassed by making a pronunciation mistake; as a result, they remain silent in class. According to Lacina (2004), learners who are worried about their mispronunciation do not want to speak up. Students know that making several errors while speaking the TL will lead to poor pronunciation. With poor pronunciation skills, difficulties will occur in communication because this will distract and mislead the listener, making the message and its meaning difficult to comprehend (Celce-Murcia & Goodwin, 1991). Also, the teaching process is often mainly teacher-centred, with the teacher performing the majority of tasks, while the role of the learner is simply that of an information receiver. In addition, the absence of certain English sounds in the Arabic sound system can influence the English language pronunciation of EFL students. These sounds are /p/, /v/, /ŋ/, /z/, /tʃ/ (Odisho, 2005) and dark /l/. As Avery and Ehrlich (as cited in Thanasoulas, 2003) pointed out in their study, the absence of sounds has a significant influence on the acquisition of the TL. Cook (1992) stated that the L1 is present in the TL learner's mind, whether the teacher wants it or not. Avery and Ehrlich (1992) stated that learners unconsciously transfer the sound patterns of their L1 into the TL and this transference is probably caused by a foreign accent.

Therefore, the main concern of this study was to help Iraqis college students pronounce the English language accurately, and help them reduce their pronunciation errors related to the differences between the Arabic and English language sound systems, specifically the English language consonant sounds that are absent in the Arabic language which may influence the learners' pronunciation. However, when the learning environment fails to meet students' needs, integrating instructional technology may facilitate the student learning process (Lai, 2006). Using ASR

pronunciation training software can assist language learning, as it provides learners with practice activities and the ability to listen to native speakers, as well as providing correction and feedback from graphics, sound charts, sound waves and animations of speech organs.

1.3 Purpose of the Study

In this study, the purpose was to examine the effectiveness of using ASR software (EyeSpeak) in teaching English pronunciation and to determine if using this technique would improve pronunciation for Iraqi FL learners of English. This study aimed to test whether using ASR software to teach pronunciation to Iraqi students would help them overcome their pronunciation errors in speaking English and if it would enable them to achieve more intelligible and understandable pronunciation. Developing students' English pronunciation is an important goal in teaching English pronunciation to EFL learners. Also, the study intended to investigate whether there was any significant improvement in their pronunciation of the English language.

Bailey's (2006) article shows that successful EFL learners should go through 'four purposes for learning'. They are the following: 1) access—to get access to resources and information, 2) voice—to demonstrate principles and beliefs with the confidence that they will be noticed and taken into consideration, 3) action—to fix problems and make decisions without having to rely on others to mediate the world for them and 4) bright to the future—to prepare the adults to keep up with the innovation around the world through their learning (Merrifield, 2000, cited in Bailey, 2006). Moreover, studies by others (Levy, 1997; Salaberry, 2001; Zhao, 2003) have suggested that using classroom aids and technology sources is a remarkable way to improve SL learning. According to Cummins (2000), for learners to master their pronunciation in

speaking the SL, this requires about two years of initial exposure to the SL, and at least five years to catch up to native speakers (p. 76).

Using the features of ASR software in FL classes can assist the learners with their pronunciation by providing the essential connection between everyday language and the more challenging academic language (D'Cruz, 2004).

1.4 Research Objectives

The objectives of this study were the following:

1. Investigate the effectiveness of using ASR in teaching English language pronunciation to Iraqi EFL learners (to determine whether using this software would improve Iraqi students' pronunciation or have no effect on them).
2. Investigate the usefulness of ASR EyeSpeak software functions on students' English language pronunciation.
3. Explore the students' perceptions of the effectiveness of using ASR EyeSpeak software on their pronunciation performance as a supportive tool in learning English pronunciation.

1.5 Research Questions

The research questions posed by this study were the following:

1. Is there any significant difference in Iraqi students' English pronunciation as a result of using ASR (EyeSpeak) software?
2. How do Iraqi students perceive EyeSpeak software in term of usefulness and ease of use in the learning process?
3. What is the students' evaluation of the efficacy of using EyeSpeak software in pronunciation class?

1.6 Research Hypothesis

H1: There is no significant difference in Iraqi students' English pronunciation as a result of using ASR EyeSpeak software.

1.7 Significance of the Study

In the process of teaching a FL, there are several activities which can help improve language learning, such as concentrating on the four essential language skills: speaking, writing, listening and reading. However, this study was intended to help Iraqi college students improve their speaking skill, specifically their pronunciation of the English language. Pronunciation is an important component in language learning that the students want to improve. Zimmermann (2004) stated that pronunciation is significant, as it is the most noticeable thing about ESL learners' usage. Pronunciation plays a significant role in making communication easier because accurate pronunciation delivers the right message to the listener. As noted by Derwing et al. (1997), without comprehensible production and clear pronunciation of the TL, there will be no communication as this will make it difficult for the listener to understand the intended message.

With ever increasing worldwide technological advances, modern students have come to expect that more innovative and modern approaches will be used in education. Therefore, incorporating the ASR instructional technology in the process of learning pronunciation will enrich the students' knowledge and enhance their pronunciation, and this may help students overcome their pronunciation errors. It offers the possibility of satisfying the needs of FL learners of English. This can be achieved by allowing individual learners to practise, then immediately showing them their

mistakes, correcting them and providing feedback. In this way, the learning process will be stimulated. It may also increase their confidence in speaking English both inside and outside of the classroom. This method will improve Iraqi students' English pronunciation performance and, consequently, enhance their communication ability in the English language. It is stated by Morley (1991) that pronunciation is an essential component of communication.

The use of CAPT as part of a CALL system can offer the students training and practice with a native English speaker by using ASR software. This enables the students to monitor their own learning (Neri, Cucchiarini, & Strik, 2002). It is also significant for the teacher as ASR software gives an opportunity for the teacher to discover the individual problems of the learners as well as to observe the improvement process from the stored student profile, which shows the teacher the information about each student in the log files. Also, the teacher does not have to print out the pronunciation material for the phonetics alphabet and activities, such as transcription practice, which is usually done in the traditional teaching of a pronunciation class. ASR software provides these materials and practice activities for the students. The availability of many sources can support the academic system and help students learn in a more effortless and enjoyable way, as well as facilitate the teaching process.

This study also explored students' perception of the use of EyeSpeak software in learning English pronunciation. Thus, the conclusions of this study will be useful, specifically for higher education in Iraq, by providing information about the effectiveness of using a new technology in the language learning laboratory. It also investigated the practical effect of technology integration on education as a whole.

This research will provide valuable insights about including technological innovation to improve students' pronunciation in speaking the English language. Colleges and other institutions may also make use of the findings of this research to provide evidence about the value of integrating technology, such as ASR software, in the classroom.

1.8 Scope of the Study

Currently, the English language is a global language, and the contexts of teaching English have increased around the world. One of the difficulties that FL learners face is mastering English pronunciation. Research by Jdetawy (2011) reviewed the reasons for Arab EFL learners' difficulties: English is an FL; therefore, Arab learners use Arabic for communication. Iraqi learners prefer to use Arabic in the EFL classroom instead of English, which can lead to poor pronunciation quality. FL learners know that poor pronunciation may cause a barrier to their success in English acquisition and that they must give it a higher priority in order to master pronunciation (Fraser, 1999; Nunan, 1988). Also, one of the factors that Arab EFL learners face is the difference in the Arabic sound system compared with that of the English language sound system, as there are English sounds which do not exist in the Arabic sound system. In this study, the focus was on the differences in the six consonant sounds in the English language which are absent in the Arabic sound system; these sounds are /p/, /v/, /ŋ/, /ʒ/, /tʃ/ and dark /l/. This problem also may be related to the individual speech sound transference from the mother tongue into the TL or FL. Therefore, it is necessary for Iraqi learners to differentiate between the L1 and the TL sound systems because this can help them recognise the areas of

influence of the L1 on the TL. Also, teacher awareness of this can contribute to developing class activities that focus on the sound interference issue.

Also, using technology may help to improve EFL students' English language pronunciation. There are varieties of ASR-based CALL system pronunciation training software which can be adopted in teaching English pronunciation, and their usefulness cannot be denied. ASR pronunciation training software can provide learners with graphics, animated productions of speech sounds and an interactive environment with native speaker sources. As the English language is established as an important means of global communication, it is even more important for learners to successfully achieve academic graduation goals that include English language competency. To satisfy this need, private language institutes have quickly emerged.

In teaching and learning pronunciation, ASR-based CALL products have been used for two different purposes. First, they are used to provide a correct TL pronunciation for FL learners (Kawai & Hirose, 2000). Second, they are used to assist FL learners' in improving the pronunciation quality of the TL (Franco et al., 2000; Witt & Young, 2000). Using ASR software appears suited to teaching pronunciation as it helps the learners evaluate themselves, and it provides appropriate immediate feedback. The ASR EyeSpeak software could assist college students in learning English pronunciation. The characteristic features of the ASR software that may help the students in learning pronunciation are the following: 1) listening to oneself, 2) listening to English native speaker models and 3) correcting and providing a visualised feedback. Assessing the students' pronunciation accuracy has been determined to be a phoneme verification problem, and it is considered the most

important factor in pronunciation measurement (Franco et al., 2000; Witt & Young, 2000).

Therefore, this study investigated the effectiveness of using an Internet-based ASR programme, EyeSpeak, to help Iraqi students in learning English pronunciation. The aim was to determine if using EyeSpeak would give the students the time to practise in order to help them improve their learning and overcome their pronunciation problems.

1.9 Operational Definitions

- 1) ASR:** This is the ‘engine [that] translates the incoming speech signal into a sequence of words on the basis of internal phonetic and syntactic models’ (Neri, Cucchiarini, & Strik, 2003, p. 1157)
- 2) CALL:** Computer-assisted language learning uses computer technology as an aid in the presentation, reinforcement and assessment of material to be learned; also, it usually involves a substantial interactive element (Delcloque, 2000).
- 3) EFL:** English as a foreign language refers to English learned in a country where it is not the primary language. EFL can be defined as the study of English by people who live in places in which the English language is not the main language that the people use for communication (Gebhard, 2006).
- 4) EyeSpeak:** This is a multimedia visual pronunciation software which offers speech recognition technology, animated visuals, sound recordings, graphic articulatory displays and record/playback capabilities. It can

evaluate and give visual feedback on EFL learners' vowel and consonant quality (Tao, 2007).

5) Effectiveness: This is the extent to which something achieves its intended objectives or outcomes (MacDavid, Huse, & Hawthorn, 2013).

6) Pronunciation: This 'is a necessary part of speaking (oral communication). It involves making the correct sounds of a particular language, as well as how the sounds are put together in the flow of speech (not just in isolated words' (Boyer & Boyer, 2002, p. 1)

7) PEOU: Perceived ease of use is 'the degree to which the prospective user expects the target system to be free of effort' (Davis, Bagozzi, & Warshaw, 1989, p. 985).

8) PU: Perceived usefulness is defined as 'the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context' (Davis, Bagozzi, & Warshaw, 1989, p. 985).

1.10 Summary

This study investigated the effectiveness of using one type of CALL programme with ASR software and its effect on students' English language pronunciation. Its main goal was to determine if ASR software could help students improve their pronunciation of the English language and assist them in reducing their weaknesses in using the language in classroom communication by offering the advantages of innovative technology and its components to enhance their pronunciation performance.

1.11 Thesis Organisation

This thesis is organised into five chapters consisting of the introduction, literature review, methodology, data analysis and findings and, finally, the discussion and recommendations.

1.11.1 Chapter 1: Introduction

The first chapter contains the overview and the background of the study and describes the background information about educational technology from a historical perspective and the modern trends used in teaching pronunciation. This chapter also explains the research problem examined in this study, as well as the questions that have been investigated and the significance of this study.

1.11.2 Chapter 2: Literature Review

Chapter 2 reviews the literature of background information about the changing role of pronunciation teachers and learners and the importance of this change, starting with integrating instructional technology that facilitates the teaching and learning processes. Also, the theoretical point of view and its implication in instructional technology is examined—in other words, the link between learning theory and the use of technology in teaching pronunciation. Furthermore, it presents previous studies similar to the current study. It highlights the effectiveness of ASR software in teaching pronunciation compared to other ASR software programmes.

1.11.3 Chapter 3: Methodology

Chapter 3 highlights the methodology of the research, as well as the research design, sampling, instruments, procedure and analysis. The validity of the instruments is also discussed in this chapter.

1.11.4 Chapter 4: Data Analysis and Findings

In Chapter 4, a detailed analysis of the data collected with the instruments used in this study, including tests, students' response ratings from a questionnaire and students' responses to interview questions, and an explanation of the outcome information from the data analysis are presented.

1.11.5 Chapter 5: Discussion

Chapter 5 presents the discussion and explanation of the final results obtained from the data analysis. It also highlights the study's contributions and limitations, and offers recommendations for further studies similar to the current one.

1.11.6 Chapter 6: Conclusion, Implications and Recommendations

Chapter 6 summarizes the findings of the study. This final chapter provides the conclusions drawn from the findings derived from answering each of the research questions as well as reviews the pedagogical implications and their impact on the learning a FL using traditional teaching methods and integrated ASR software. It also highlights the study's contributions and offers recommendations for further studies similar to the current one.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Speaking is a complicated construct. Thornbury and Slade (2006) have noted that this complication comes from our socially built daily language usage. Because speaking a language is linked to everyday interactions, the concept is difficult to define. Several fields including 'linguistics, psychology, anthropology and sociology' have informed the study of speaking (Gumperz, 1999, p. 98). Therefore, giving a brief, comprehensive definition of speaking a language is challenging. The only way to define speaking is through its features, its usages and its conditions. Doing so suggests that speaking could be defined as a social, multi-sensory speech event with an unpredictable topic. Speaking also has a social component because speaking establishes rapport and mutual agreement between people, and it supports and adapts a social identity related to personal spoken skills (Thornbury & Slade, 2006). This social component expresses itself by means of 'attitudes, feelings, judgments, opinions and wishes', all of which can hardly apply to the classroom's formal teaching approach.

Gumperz (1999) has said that speaking is cooperatively constructed and dependent on the presumption, participation, objectives and understanding of what participants say. Because speaking is supportive, it is a discussed and self-managed procedure (Nunan, 1999; Sayer, 2005) generated segmentally through short, regular turn-takings made up of phrases and clauses (Thornbury & Slade, 2006). Interactive rules and routines motivate this cooperative discourse (Dornyei & Thurrell, 1994). Those structures create a guide to explain how the native English speaker uses the language,

including its intonation, type of interaction and volume, to organise speaking (Applegate, 1975). Speaking a language requires from its speakers several areas of information about that language (Burnkart, 1998). These areas of knowledge include pronunciation, grammar and vocabulary. It is important to consider certain elements during a pronunciation class. In other words, in a speaking class, using the correct method, motivating activities, suitable devices and motivation is needed.

In addition, the pronunciation classroom requires a variety of facilities (textbooks and audios of native speakers). Nunan (1999) emphasises giving students the chance to participate in the target language (TL). These opportunities are an integral part of a speaking class. The inclusion of technology in foreign language (FL) instruction has been a priority for both teachers and theoreticians. Technology is seen as a facilitating element in human life. Using technology with its variety of elements in education can influence students' learning achievements. Dooley (1999) and King (2003) have shown the benefits of using technology in the classroom for both the learners and the instructors.

This research particularly highlights the effectiveness of the use of computer-assisted language learning (CALL) programmes through automatic sound recognition (ASR) software in the process of improving students' pronunciation in speaking the English language. The goal of the literature review of this study was to understand the effectiveness of using ASR in the English as a Foreign Language (EFL) classroom, and whether it has any effect on students' pronunciation and improves their English pronunciation. To this date, few studies exist which have dealt with the EyeSpeak software. Thus, the findings resulting from this study will be useful for further

studies and will have specific pedagogical implications, and they will provide information on the effectiveness of EyeSpeak on the pronunciation performance of EFL college students.

2.2 Sounds of the English Language

There are 44 sounds in the English language which are comprised of 20 vowel sounds and 24 consonant sounds as shown in Figure 2.1.

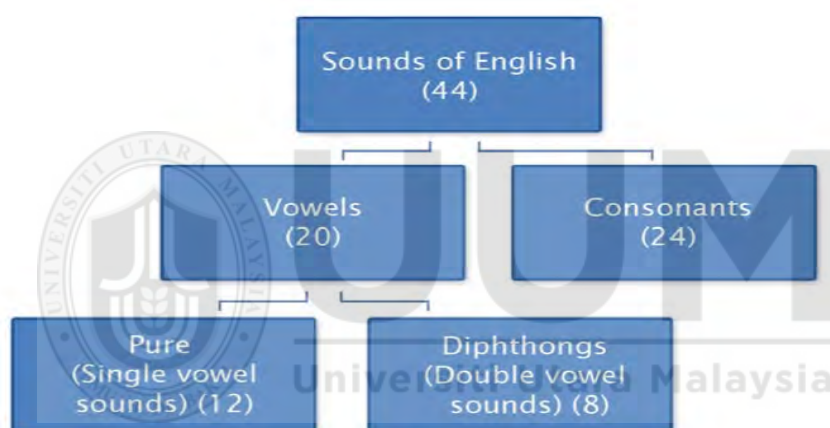


Figure 2.1. Types of English sounds

2.2.1 Consonant Sounds

The English language consists of 24 consonant sounds, corresponding to 21 alphabet letters in the English language. Examples of the English consonant sounds are shown in Table 2.1.

Table 2.1

Consonant Sounds of English

Consonant sound	Example	Transcription
/p/	pin	/pɪn/
/b/	bad	/bæd/
/t/	tin	/tɪn/
/d/	dog	/dɔ:g/
/f/	five	/faɪv/
/v/	van	/væn/
/θ/	thin	/θɪn/
/ð/	that	/ðæt/
/m/	man	/mæn/
/n/	nose	/nəʊz/
/ŋ/	thing	/θɪŋ/
/h/	half	/hɑ:f/
/tʃ/	chip	/tʃɪp/
/dʒ/	jam	/dʒæm/
/ʃ/	ship	/ʃɪp/
/ʒ/	measure	/meʒə/
/k/	kind	/kaɪnd/
/g/	gun	/gʌn/
/s/	say	/seɪ/
/z/	zoo	/zu:/
/l/	leg	/leg/
/r/	run	/rʌn/
/w/	work	/wɜ:k/
/j/	yes	/jes/

The places of articulation for consonant English sounds are shown in Table 2.2 and Figures 2.2 and 2.3.

Table 2.2

Consonant Sounds and Places of Articulation

		Place of Articulation							
		Front Back →							
Manner of Articulation		Bilabial	Labio-dental	Dental	Alveolar	Palato-alveolar	Palatal	Velar	Glottal
	Plosive/ Stops	p b			t d			k g	
	Affricate					tʃ dʒ			
	Fricative		f v	θ ð	s z	ʃ ʒ			h
	Nasal	m			n			ŋ	
	Lateral				l				
	Approximant					r	j	w	

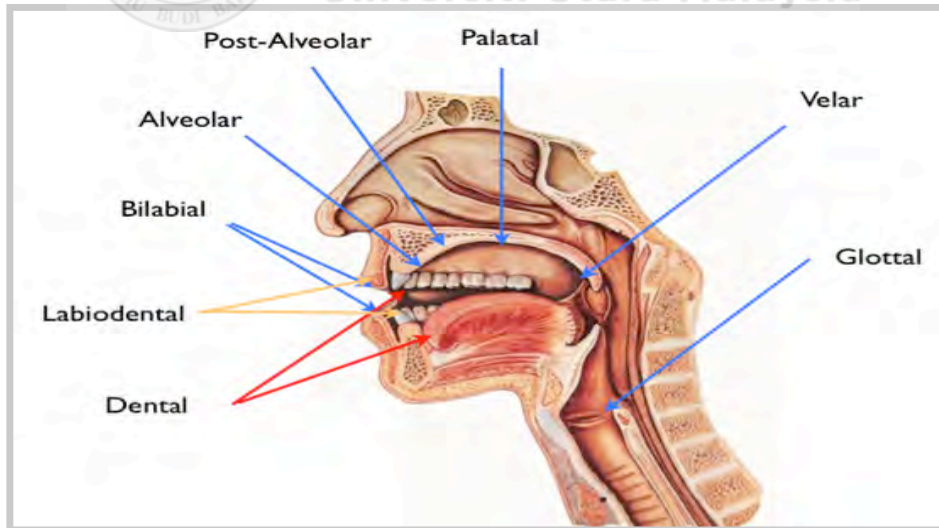


Figure 2.2. Speech organs and their places of articulation

Bilabial

Upper lip/lower lip



Labio-dental

Lower lip/upper front teeth



Interdental

Tip of tongue/upper front teeth



Alveolar

Tip of tongue/tooth ridge



Palato-alveolar

Front of tongue/hard palate



Velar

Back of tongue/soft palate



Glottal/Glottis

The gap/the vocal cords are used
to make audible friction



Figure 2.3. Places of articulation

2.2.2 Vowel Sounds

In the English language, there are 20 vowel sounds. The production of the vowel sound comes freely out of the mouth without closing the mouth cavity with the teeth, tongue or lips. There are two types of vowel sounds:

(1) Single vowel sounds: The production of these sounds occurs when the tongue stays in the same position even if the sound is long. It consists of only one sound, which is called the pure vowel, such as the sound /e/ in 'let' and the sound /i/ in 'sunny'. Single vowel sounds are shown in Figure 2.4.

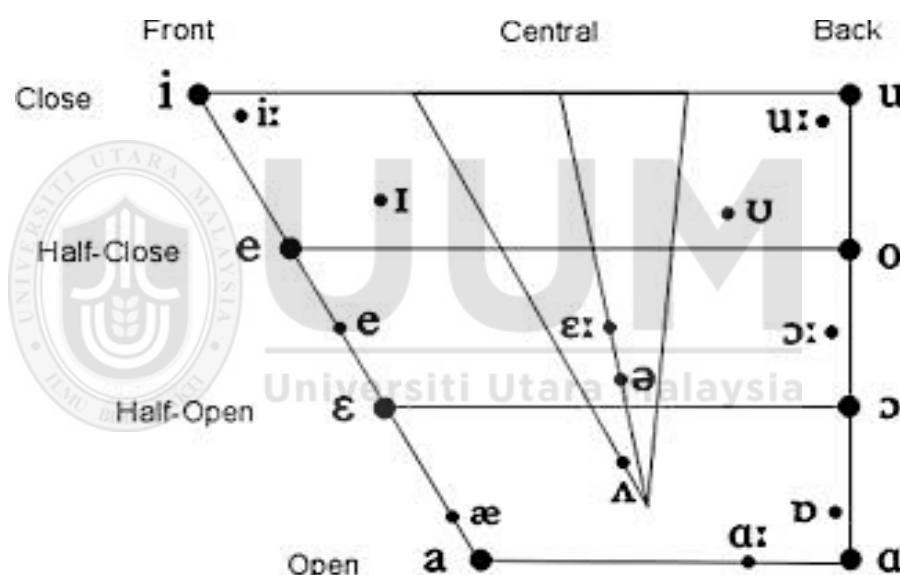


Figure 2.4. Places of articulation for vowel sounds

(2) Double vowel sounds: These types of vowel sounds are the result of blending two single vowel sounds and are called 'diphthongs', and when the production of these sounds occurs, the tongue moves from one position to another. Examples are the word *ice* /ai/, which is the combination of the sounds /a/ and /i/, and the word *owl* /au/ which is the combination of the sounds /a/ and /u/.

2.2.3 Differences in the Consonants

Languages differ greatly in the number of segments they have (Gussehoven & Jacobs, 1998). Each language has its unique sound system (Sloat, Hoard, & Taylor, 1978). In the Arabic language, there are 28 consonant sounds; in the English sound system there are 24 consonant sounds. Considering the consonants in both of these languages, one can easily see that some sounds in English do not exist in Arabic and vice versa.

The focus of this study is the English consonant sounds which do not exist in Arabic and which constitute a problem for Arab students when learning English. They experience difficulties pronouncing those sounds because these sounds do not exist in their language, so they usually, and unconsciously, pronounce the Arabic sound which is nearest in pronunciation to the English sound. Replacement of sounds usually takes place between similar sounds in different languages (Hawkins, 1984). Below are some examples:

2.2.3.1 Consonant Sound /p/

The sound /p/ is a voiceless sound. The place of articulation for this sound is bilabial which is articulated by two lips. The manner of articulation is plosive which means there is a complete closure of the air passage in the mouth and pressure is built up and then the air is released with an explosion. The sound /p/ does not exist in the Arabic sound system, so Arab learners try to replace it with the sound /b/ (voiced) which is the closest sound to it that is found in the Arabic language. As a result, they pronounce words like *people* and *panda* as /bi:bl/ and /ba:nda:/. The difference between /p/ and /b/ is shown in Figures 2.5 and 2.6.

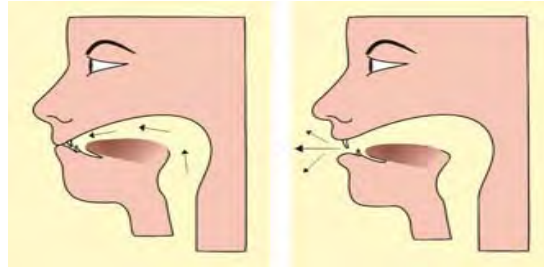


Figure 2.5. Production of the sound /p/

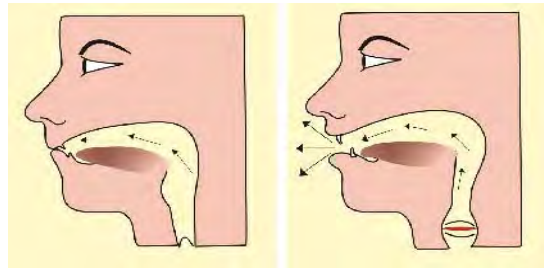


Figure 2.6. Production of the sound /b/

2.2.3.2 Consonant Sound /tʃ/

The sound /tʃ/ is a voiceless sound. The place of articulation for this sound is palato-alveolar which is articulated by the blade of the tongue against the teeth-ridge. The front of the tongue is raised towards the hard palate. The manner of articulation is affricate which means there is a complete closure of the air passage in the mouth. The air is then slowly released to produce a friction sound. This sound does not exist in the Arabic sound system, so Arab learners replace this sound by the one nearest in sound in Arabic /dʒ/ (voiced). A word like *chips* is pronounced /dʒɪps/ as shown in Figures 2.7 and 2.8.

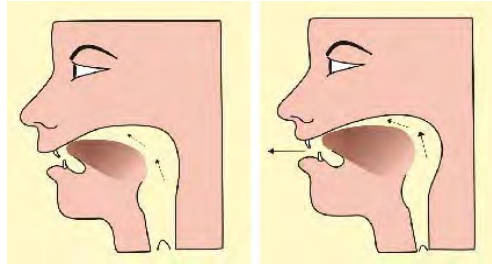


Figure 2.7. Production of the sound /tʃ/

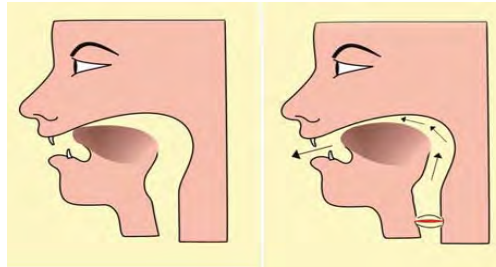


Figure 2.8. Production of the sound /dʒ/

2.2.3.3 Consonant Sound /v/

The sound /v/ is a voiced sound. The place of articulation for this sound is labio-dental which is articulated by the lower lip against the upper teeth. The manner of articulation is fricative which means there is a narrow passage for the air between the two organs and friction is produced when the air passes through it. This sound is not in the Arabic sound system, so Arab learners of English pronounce a word like *seven* as /sefn/. They replace this sound with the closest Arabic sound /f/ (voiceless) as shown in Figures 2.9 and 2.10.

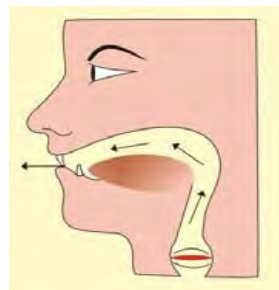


Figure 2.9. Production of the sound /v/

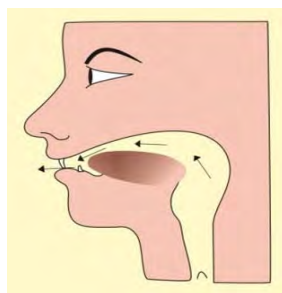


Figure 2.10. Production of the sound /f/

2.2.3.4 Consonant Sound /ŋ/

The sound /ŋ/ is a voiced sound. The place of articulation for this sound is velar which is articulated by the back of the tongue against the soft palate; the manner of articulation is nasal which means that there is a complete closure of the mouth; the soft palate is lowered, and the air escapes through the nose. This sound is not found in the Arabic sound system, so Arab learners have difficulty pronouncing this sound in words like *king* /kɪŋ/, and they pronounce it /kɪŋg/ as shown in Figure 2.11.

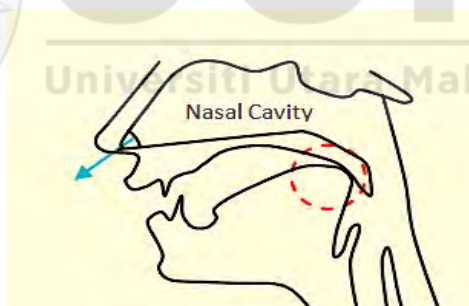


Figure 2.11. Production of the sound /ŋ/

2.2.3.5 Consonant Sound /ʒ/

The sound /ʒ/ is a voiced sound. The place of articulation for this sound is palato-alveolar which is articulated when the front of the tongue touches the hard palate. The manner of articulation for this sound is fricative which means that the restricted air flow causes friction, but the air flow is not completely stopped. This sound is not found in the Arabic sound system. Therefore, learners unconsciously try to replace it

with the closest sound that is found in the Arabic sound system, which is the affricative sound /dʒ/. For instance, for the words *pleasure* /pleʒə/ and *beige* /beɪʒ/, they mispronounce the sound /ʒ/ as /dʒ/ which results in the words being pronounced as /pledʒə/ and /beɪdʒ/ as shown in Figure 2.12 (Mousa, 2015, p. 242).

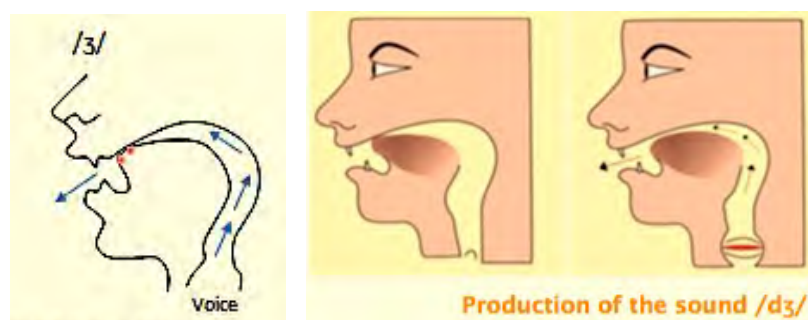


Figure 2.12. Production of the sounds /ʒ/ and /dʒ/

2.2.3.6 Consonant Sound Dark /l/

Arab learners of English also experience some difficulty pronouncing words with the dark /l/. The place of articulation for this sound is alveolar which is articulated when the tongue tip or blade goes against the alveolar ridge. The manner of articulation is lateral which means the sound is produced by a structure of complete closure in the centre of the vocal tract. The air, however, has free passage on the sides. This sound is only found in one word in the Arabic language which is /ællæh/, the name of God. Therefore, they replace the dark /l/ by the light /l/ in words such as *milk*, *school* or *call*, as shown in Figure 2.13.

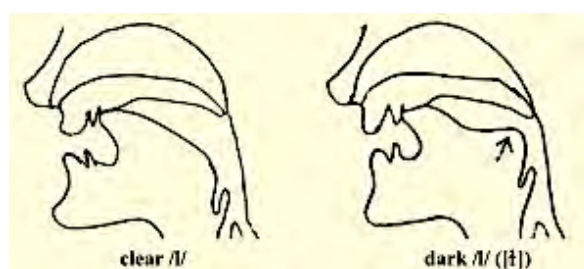


Figure 2.13. Production of the sounds light (clear) /l/ and dark /l/

2.2.4 Differences in the Vowels

As for vowel sounds, there are eight vowel sounds in the Arabic sound system, while there are 22 vowel sounds in the English language sound system. Furthermore, there are some vowel sounds in English which are not found in Arabic. Therefore, Arab learners face difficulties pronouncing vowel sounds. For example, the diphthong /əʊ/ is not a vowel in Arabic, so Arab learners pronounce words like *go* /gəʊ/ as /gɔ/ with the simple vowel /ɔ / instead.

The results of an analytical study of Iraqi learners by Faris and Hussein (n.d.) show the errors that Iraqi learners make in their pronunciation of English vowel sounds. As far as diphthongs are concerned, not all of them present intelligibility problems. They noticed that the diphthong /əʊ/ creates the majority of the intelligibility failures and that /əʊ/ is closely followed by /eɪ/. In all, only four diphthongs presented a threat to the intelligibility of Iraqi learners, with /ɪə/ and /aɪ/ presenting less of a threat than /əʊ/ and /eɪ/. Below is a descriptive summary which shows those vowels and diphthongs that cause intelligibility failures for Iraqi learners of English.

2.2.4.1 Vowel Sound /ə/

This vowel causes a serious problem for Iraqi learners of English and is the most common cause of intelligibility failure. The vowel sound /ə/, in most cases, is recognised as /e/, /ɪ/, /æ/ and /ɒ/. Iraqi learners pronounce the letters instead of the sound behind the letter. For instance, the words *pressure* and *matures* are recognised as *process* and *matters*. However, this is understandable because Iraqi learners primarily learn pronunciation through the written text and not from oral communication.

2.2.4.2 Vowel Sound /ɪ/

This vowel is not assumed to present much of a difficulty for Iraqi learners because it is relatively close to vowel phonemes occurring in the Arabic language. However, astonishingly, it is one of the vowels that cause most of the intelligibility problems that are observed in the Iraqi learners. Iraqi learners usually disregard the quality in this sound by mainly depending on the spelling, and they produce it as /e/, as in *evaluated* /ɪˈvæljuetɪd/ → /evæljuetɪd/. This is the reason for intelligibility failure for Iraqi learners.

2.2.4.3 Vowel Sound /æ/

In the sequence, this vowel is the third greatest single vowel that causes intelligibility failure. This vowel is expected to cause comparatively few intelligibility problems because it is found in the phonetic inventory of Arabic. However, the differences among Iraqi learners and the diversity in the ways that they pronounce this sound cause it to be a common problem, such as with the word *re-evaluation* /rɪˈvæljuɪʃn/ → /revəleɪʃn/ *revelation*.

2.2.4.4 Vowel Sound /e/

This vowel is one of those sounds that cause comparatively few intelligibility problems. This sound causes intelligibility failure when Iraqi learners pronounce the word *measurable* /mezərəbl/ → /mɪzərəbl/ *miserable*; hence, the replacement of /e/ by /ɪ/ occurs. However, the sound generally poses no other significant intelligibility problems.

2.2.4.5 Vowel Sound /ɒ/

This vowel sound causes intelligibility problems when it is heard by native English speakers because Iraqi learners have two ways of pronouncing it. The following two instances are recognised: *concept* /kɒnsept/ → /kensept/, where the Iraqi learner changes it into /e/ and *opportunity* /ɒpətju:nəti/ → /epətju:nəti/, where the Iraqi learner changes it into /ə/.

2.2.4.6 Vowel Sound /ʌ/

Even though this vowel is not found in the Arabic phonetic system, Iraqi learners commit few problems of intelligibility as /ɜ:/, /ɔ:/, /i:/, /u:/ and /ʊ/. /ʌ/ is changed into /u/ by learners as in *of adjusting* /əˈdʒʌstɪŋ/ → /əˈdʒustɪŋ/.

2.2.4.7 Diphthong /əʊ/

This diphthong is responsible for the greatest number of intelligibility failures. Most of these difficulties appear as a result of Iraqi learners trying to pronounce this diphthong sound as a single vowel sound such as /ə/, /ɒ/ or /ɜ:/. Examples include: /əʊ/ → /æ/ and /ɒ/ as in *motor* /məʊtə/ → /mætə/ *matter*. Also, /əʊ/ is rendered as /ɜ:/ in the word *both* /bəʊθ/ → /bɜ:θ/ *berth*.

2.2.4.8 Diphthong /eɪ/

This diphthong is the second greatest cause of intelligibility failures after the diphthong /əʊ/. The sound is replaced by /ə/, /ɑ:/ and /u/, as presented in the following examples: /eɪ/ → /ə/ *agents of* /eɪdʒənt/ → /ədʒənt/, /eɪ/ → /ɑ:/ *change* /tʃeɪndʒ/ → /tʃɑ:ns/ *chance* and /eɪ/ → /aɪ/ *rate* /reɪt/ → /raɪt/ *right*.

2.2.4.9 Diphthong /aɪ/

Concerning this diphthong, only two cases of intelligibility failure are shown as a result of the differences between the received pronunciation (RP) realization of this diphthong and the Iraqi learners' realization. The two cases are: aɪ→ɪ *stile* /stail/→/stɪl/ *still* and aɪ→ɪ *life* /laɪf/→/lɪv/ *live*.

2.2.4.10 Diphthong /ɪə/

Even though this vowel is infrequent in Iraqi learners' speech, this difference does not cause the usually predictable problems of intelligibility to native listeners. Only one case of intelligibility failure has been acknowledged: ɪə→əʊ *merely* /mɪəli/→/məʊli/.

Other pronunciation difficulties that Iraqi EFL learners face relate to the use of suprasegmental linking features of pronunciation in their speech. Linking is considered one part of connected speech. When English speakers talk, they produce various phonemes that have a place with the words they are using in a more or less continuous stream. Nonetheless, phoneticians feel that it is important to pay close attention to the way the end of a single word is joined to the beginning of the following word (Roach, 2002). Kenworthy (1990) stated that English speakers do not pause between words when they talk, but connect one word with another to make the speech flow go smoothly and easily.

The difficulty that Iraqi learners confront is attributed to interlingual transfer. This type of error occurs because of the impact of the first language on the foreign language. The Arabic language does not have linking glides, and, while speaking, Arabic speakers apply the glottal stop to isolate one vowel from another and a vowel

from the consonant in following words (Kenworthy, 1990). Another reason that Iraqi learners face difficulties in pronunciation is related to educators who believe that linking is not that vital because learners can still communicate without linking.

My observation in teaching ‘conversation’ to first-year college students at Al-Turath University College (a private university in Iraq) is that most Iraqi students face difficulties in accurately speaking the English language. Because of this, the main concern of this study is to investigate whether incorporating ASR with the authentic pronunciation of native speakers in the classroom will accelerate learning in Arabic speakers who are learning the English language.

2.3 Historical Overview of Pronunciation Teaching and Learning

Prior to the 1960s, audiolingualism and the direct method were the primary teaching methods used in the language classroom. The main goal of pronunciation instruction was focused on the accurate production of the segmental features such as phonological segments (Jones, 1997; Morley, 1991). Teaching pronunciation was carried out by specifically addressing the phonological rules and using the native speaker model for correction. Learners’ practise was based on drilling, imitation and repetition (Celce-Murcia, Brinton, & Goodwin, 1996).

From the 1960s to the late 1970s, teaching pronunciation was marginalised in teaching approaches. First, the teacher primarily focused on drills, repetition and memorization, and that left no room for practising meaningful communication. Second, the methodology depended on the cognitive approach and the critical period hypothesis which led learners to believe that they were not able to have native-like pronunciation because of their age (Celce-Murcia et al., 1996; Jones, 1997). Third, instructors’ perspective was affected by the Krashen input hypothesis which

proposed that the language knowledge (input) was important, while speaking (output) was less important in the language classroom. Krashen claimed that language is an acquired skill rather than a learned one (Jones, 1997). As a result, pronunciation received less attention in language teaching and learning.

In the 1980s, the arrival of the communicative approach put the focus back on pronunciation in the area of language teaching. The main idea was to make the students use the TL in communication. The pedagogy of that time stressed providing authentic input, task-based methodology, meaningful communicative practices and the interactive approach (Jones, 1997). According to Morley (1991), the new educational perspectives addressed pronunciation instruction in the following areas: basic philosophical contemplations for teaching pronunciation; significance of meaning and contextualization practice; learners' self-monitoring; involvement in class activity; intelligibility and correction issues; giving attention to stress, intonation, assimilation and rhythm; and the extended points of view on the connection between listening and pronunciation.

By late 1980s, EFL instruction focused on enabling students to become intelligible speakers rather than to have native-like pronunciation or be 'perfect pronouncers' of English (Morley, 1991, p. 489). Many researchers (Celce-Murcia et al., 1996; Hahn, 2004; Pickering, 2001) argued for improving learners' intelligibility by focusing on teaching suprasegmentals (e.g. stress and intonation). Derwing and Munro (1997) suggested that correcting phonemic errors and focusing on segmentals can improve proficiency and lead to non-native speakers' comprehensibility.

Morley (1991) stated that intelligible pronunciation is an essential component of communication. Therefore, teachers should include pronunciation when teaching the

TL and focus on reassessing students' needs and using the appropriate methodologies for teaching and learning objectives. The teachers should also consider the current trends in teaching and language learning theory and pedagogy. However, for learners with unintelligible pronunciation, communication in the TL will be limited. Morley (1992) indicated that not attending to the student's pronunciation needs is an absolute abrogation of the professional responsibility to help the individual learner to improve his/her overall pronunciation, ranging from the segmental to suprasegmental. Thus, teaching strategies should focus less on teacher-centred classrooms and more on learner-centred ones.

Celce-Murcia and Goodwin's (1991) study suggests that there is a beginning level of pronunciation in English, and, when learners are exposed to non-native pronunciation, they will fall below this level. Moreover, no matter how well the learner monitors his/her English grammar and vocabulary, the learner still will not be able to communicate with native English speakers.

Gilbert (1984) stated that the skills of listening comprehension and pronunciation are interdependent: if the learners cannot comprehend the heard English well, they will be cut off from conversation with native TL speakers. Also, Nooteboom (1983) suggested that speech production is substantially affected by speech perception, which indicates that the learners' input is an important factor in their language production. Moreover, this reflects the need for the integration of pronunciation training software which allows the students to listen to a speaker model and practice their pronunciation production.

The current trend in teaching pronunciation is affected by the discipline of psychology. Learners' pronunciation is influenced by emotional factors, such as self-

confidence, character and ego. Therefore, many pronunciation instructional methods focus on the student being emotionally calm and psychically relaxed. Research findings show that the degree of the student's self-confidence and the relaxed status of the student's mind influence the pronunciation production of the TL. Therefore, establishing a comfortable, stress-free and non-threatening environment is of great importance in modern pronunciation teaching. An efficient way to achieve this goal is by dealing with students' emotions in ways that reduce their practising stress by the use of technological aids. Through technology, the learners can become more expressive and be more willing to experiment with sounds without the fear of committing pronunciation mistakes in front of their peers.

Over two decades, teaching pronunciation has given more attention to learners' autonomy in language instruction. Autonomous learners 'take charge of [their] own learning' (Holec, 1981, p. 3, as cited in Cotterall, 2000, p. 109). In other words, encouraging students to learn, be independent and assume responsibility for their learning is the main goal for language teachers. It is believed that autonomous learners make their learning process more efficient (Dickinson, 1987). Many researchers have suggested that helping students acquire knowledge of language learning strategies is essential (Cotterall, 2000; Hsiao & Oxford, 2002). The emphasis on learner autonomy has resulted in pronunciation teachers encouraging students to become active learners by being independent in the practising activities which will be beneficial for the students in the long run.

Many innovative pronunciation teachers have tried to move from the traditional methodologies towards the new direction of autonomous pronunciation learning. They motivate and encourage their students to be independent learners and make their own decisions in pronunciation learning. The teachers' motivation of their

students can be done with the use of computer-assisted pronunciation software which can direct the student towards autonomous pronunciation learning. Nevertheless, Hismanoglu (2004) stated that using computer-assisted pronunciation software will make students semi-autonomous because the teacher is still the one responsible for selecting the programme that suits each individual learner's needs.

Moreover, with the extended use of technology in pronunciation language teaching, many types of programmes have been introduced to assist in the pronunciation learning process and to serve pronunciation pedagogy (Albertson, 1982; Chun, 1989; Molholt, Lane, Tanner, & Fischer, 1988; Perdreau & Hessney, 1990). Several studies emphasised the effectiveness of using pronunciation programmes in FL pronunciation learning and teaching (de Bot, 1983; Johnson, Dunkel, & Rekart, 1991; Schwartz, Markoff, & Jain, 1991). The effective use of computer-assisted pronunciation teaching (CAPT) presents the students with a private, stress-free environment where they can reach an essentially unlimited input. Using ASR as a CAPT programme can provide students with practise and feedback which can be very beneficial for FL learners.

2.3.1 Changing Roles of Pronunciation Teaching and Learning

Because of the changing contexts and shifting focus in teaching pronunciation, teachers and learners' roles in traditional language classrooms have been redefined considering those changes. According to Vitanova and Miller (2002), pronunciation instructors should not only teach how to produce sounds but also how to learn pronunciation so that learners can identify their strengths and weaknesses, and then use strategies to make themselves more intelligible, communicative speakers.

In language classrooms where learner-centred teaching approaches are applied, the pronunciation teacher is viewed as a coach who is responsible for helping the learners improve. According to Morley (1991), the tasks for the teacher-as-coach include the following:

1. Identifying and prioritising the target features that will make the greatest impact on learners' intelligibility,
2. Helping learners set both short- and long-term goals,
3. Monitoring and assessing speech production and performance,
4. Guiding modification by providing models, cues or feedback,
5. Encouraging learners' speech awareness and self-monitoring,
6. Providing as many practice opportunities as possible and
7. Valuing and supporting learners' efforts.

Sardegna and Molle (2008) also address new roles for pronunciation teachers. According to their perspective, the teacher is a facilitator and a trainer whose ultimate goal is to make learners their own teachers. Hence, the responsibilities of the teacher are the following:

1. Facilitating learners' self-instruction with explicit pronunciation rules, recordings (as models) or charts,
2. Fostering learner autonomy and self-direction by encouraging learners to choose strategies that fit their own needs, to take responsibility for their own learning process and to examine the effectiveness of their strategy use,
3. Enhancing learners' self-involvement by giving them more challenging, interesting or rewarding tasks and by encouraging them to be responsible for improving the targets they choose to work on and

4. Equipping learners with perception, prediction and production strategies by overtly teaching them how, when and why the strategies can be used (Morley, 1991; as cited in Chang, 2012).

Furthermore, Morley (1991) and Sardegna and Molle (2008) examined the changing roles of the learner in a learner-centred classroom. They determined that a pronunciation student should be able to achieve specific personal goals:

1. Identify self-responsibility for being an active participant rather than a passive recipient,
2. Manage his or her learning process through goal-setting, decision-making and self-evaluation,
3. Develop speech awareness, self-observation skills and self-monitoring skills with a positive attitude,
4. Build self-modification skills without regarding correction as a bad thing,
5. Develop a broad range of learning strategies that will lead to efficient and effective learning and
6. Perceive his or her progress and recognise self-accomplishment.

The shifting roles and the new responsibilities assigned to both the pronunciation teacher and the learner not only reflect the notion of autonomous learning, but also suggest the importance of pronunciation learning strategies and strategy instruction. This chapter will present the theoretical background, definitions and categorizations of language learning strategies, followed by a review of documented pronunciation learning strategies and taxonomies that have been proposed in the pronunciation field.

2.4 Factors Affecting Pronunciation

Several factors influence the students' pronunciation weaknesses, and some researchers (Pennington & Yue, 1994) have pointed out the factors which they believe affect the mastery of students' pronunciation. These factors comprise age, personality, mother tongue influence, gender and learning context. These factors are briefly summarised below.

2.4.1 Age

Learner age may affect language acquisition and, particularly, pronunciation. As children learn languages more easily than adults, they can master native-like pronunciation more rapidly than adult learners can. As indicated by the Critical Period Hypothesis suggested by Lenneberg (1967), there is a biological or neurological period, which closes around the age of 12; after this age, it is very hard to achieve total pronunciation mastery of the TL. However, other studies (Bialystock, 1997; Bongaerts, Planken, & Schils, 1997) have demonstrated that adult learners can attain native-like TL pronunciation. Nevertheless, the level of pronunciation performance accuracy, as noted by Avery and Ehrlich (1992), is different from one learner to another, and the differences in pronunciation among adults in the TL classroom can be beneficial to enhancing learners' pronunciation.

2.4.2 Personality

The non-linguistic issues of a learner's character, learning objectives, attitude, motivation towards learning the TL and culture, which cannot be controlled by the teacher, all play a major role in developing the learner's TL pronunciation. Moreover, another important factor that may affect learners' pronunciation is related

to the level of exposure to the TL; more exposure to the TL helps improve learners' pronunciation. For instance, learners who are active socially and communicate with native speakers are more likely to practise the TL pronunciation (Avery & Ehrlich, 1992). On the other hand, some learners are uncomfortable in attempting new pronunciations with new rhythms and melodies which are different from their mother tongue, and this may lead them to assume that it is difficult to learn English pronunciation (Laroy, 1995).

2.4.3 Mother Tongue Influence

Avery and Ehrlich (1992) argue that one of the factors that affects learners' pronunciation is the transferring of the mother tongue language into the TL. Therefore, the learner usually mispronounces the TL, and that is reflected in the pronunciation of the sounds, intonations and stresses of the TL. For instance, non-local speakers' English language pronunciation has been the main consideration of several studies (Anderson, 1993; Mochizuki-Sudo & Kiritani, 1991; Wenk, 1985). These studies suggest that the replacement of the learners' first language by the TL influences their pronunciation production of the TL, which may lead the learners to feel anxiety while speaking the TL.

Moreover, Avery and Ehrlich (cited in Thanasoulas, 2003) mentioned that the sound system of the first language could affect the learner's pronunciation of the TL and that this occurs in three ways. The first is when there are sounds in the TL which are absent in the mother tongue language or vice versa; therefore, students may not be able to produce the sounds correctly. As is the case of Iraqi learners, their mother tongue of the Arabic language has a different sound system from the English sound

system in which some English sounds are absent in the Arabic sound system. The second is when the rule that links the sounds together into words is distinctive between the mother tongue and the TL. This can affect the learner's pronunciation. The third is when the melody, rhythm, stresses and intonation of the mother tongue are different from the TL, and this may influence the pronunciation of the learned language.

Having knowledge about these factors that affect students' pronunciation will enable the teacher to recognise the students' pronunciation issues; thus, the teacher can better help the students to overcome their mother tongue influence by focusing on the problematic issues and assisting them in improving their TL pronunciation. Also, it will help the teacher select the most suitable teaching method to fit the students' needs.

2.5 The Need for CALL in Pronunciation Training

In language teaching and learning, pronunciation is sometimes neglected. In the 1960s, audiolingual teachers frequently drilled pronunciation in their teaching of new languages. In the 1970s and 1980s, where the communicative approach was used in language learning, teachers considered pronunciation as 'irrelevant' in language learning (Brown & Yule, 1983). Therefore, pronunciation stopped being taught in the language classroom (Derwing & Rossiter, 2002). Teachers were uncertain which was the most effective method for teaching pronunciation and treated it as any other aspect of language learning, especially when there were variations among individual learners (MacDonald, Yule, & Powers, 1994). Moreover, all learners do not require the same amount of training. Therefore, teachers were unable to choose the most

effective method for teaching pronunciation, and this had a significant effect on all the students.

It is a widely accepted belief that effective instruction leads to successful learning. Alessi and Trollip (1991) investigated the most effective teaching instruction methods in order to determine which most significantly affect learning. They recommended several ways to make teaching more effective: using computer-based instruction, imitation and drilling, testing and using games (Alessi & Trollip, 1991; cited in Boyd & Murphy, 2002). Boyd and Murphy (2002) have stated that using a CALL instructional design in language teaching provides the learners with animated, video and sound features with a native speaker pronunciation production model that stimulate auditory, visual and kinaesthetic learners. It is well-known that animated features increase learner motivation and interest in the process of learning by using visual stimulation to connect between the concept and the concrete (Dooley, Stuessy, & Magill, cited in Boyd & Murphy, 2002).

Pronunciation training software is a highly effective way to apply CALL in the classroom for several reasons. Pronunciation software makes the teaching process more effective by showing graphics and animation to the FL learners. The students will experience the sounds not only by listening and repeating, but also by receiving correction and feedback. Some students feel uncomfortable, embarrassed and hesitant about practising in front of the class because they are afraid of committing pronunciation mistakes; therefore, the teacher may be uncertain about how to provide the correction that the students need. However, with the use of pronunciation software, learners may take feedback without feeling embarrassed in front of other

students. Also, it is a powerful means to encourage and engage students in the learning environment (Boyd, 2002).

In the FL classroom, students may face difficulties with the TL, but their pronunciation errors should not prevent their understandability with each other (Jenkins, 2000). Instruction methods can cause permanent pronunciation errors, as can be the case for Iraqi learners when learning English as a FL; hence, many Iraq learners find it difficult to speak the English language correctly. However, the use of pronunciation training software can stimulate the students' learning in an English environment. A research paper by Witt (2012) discusses CAPT's contribution to pronunciation evaluation. The summary of the results shows that using an intelligent virtual tutor is ideal as it assumes the role of a private tutor for the students. By providing correction using audio-visual feedback and showing the differences between the students' pronunciation and native speaker pronunciation, a CALL programme such as EyeSpeak will help them realise their mistakes.

Furthermore, Liou (2000) declared that, in the modern CALL classroom, technology now offers students significant freedom in determining how they use the learning environment. Pronunciation software can offer training for the learners to improve their English pronunciation. Experimental research by Mohsin (2012) investigated whether using CALL in a secondary school helped teachers improve their English pronunciation. A total of 50 random subjects were selected for one month of training. The pre-test and post-test results showed a significant improvement as it helped the teachers pronounce individual sounds that they were unable to pronounce prior to the training. Pennington (1999) indicated that both adult and younger learners might risk

‘diminishing returns’ or ‘fossilisation’ in the beginning stages of learning the new language. Diminishing returns means that most adult learners can learn a new language to varying degrees, but that it becomes more difficult to make consistent and tangible progress as they proceed. According to Pennington (1999), ‘Most adult learners will hardly be able to improve their productive and receptive competence of a new sound system without explicit instruction’ (p. 428). Celce-Murcia et al. (1996) defined ‘fossilisation’ as ‘a plateau in language learning beyond which it is difficult for learners to progress without exceptional effort or motivation’ (p. 21). However, pronunciation software can help both young and adult learners with their pronunciation production and receptive competence in language learning. Therefore, as noted previously, the ideal age to learn and be exposed to the English language through the use of pronunciation software is from 18 to 23 years of age. The students selected for this study were from this age group.

Di Martino (1999) explained that the contribution of computer network resources could be beneficial for students and teachers as well. Also, Di Martino (1999) stated that the use of a technology network will be effective when it addresses students’ differences and fulfils their needs.

The fact is that many English pronunciation teachers do not possess suitable teaching method models for instructing pronunciation skills. Therefore, the use of CALL systems and products is an effective option in the pronunciation classroom. The language laboratory provides the pronunciation training necessary for students to learn proper pronunciation. Moreover, the digital language laboratory comes with a variety of pronunciation training software which provides more than simple practice

or recording and playback. Ideally, such software is available for use not only in the lab but also on home computers via the Internet. Many CALL researchers have explored the design of effective teaching materials that improve the learning of FL students. One of the most often noted ways to assist FL learners is the use of the ASR features. The ASR materials and methods allow students to practise pronunciation, and this helps to promote their learning and understanding. Previously, teachers did not have access to the well-developed instructional tools that create an effective teaching environment in the FL classroom. In the learning of any language, speaking is considered the interactive form of the language; therefore; learning to speak requires authentic interactive materials provided by native speakers which encourage students to engage in the learning process.

One area of CALL that has presented particular difficulties for researchers and teachers, and, at the same time, has significantly contributed to the learning materials for speech and pronunciation, is the use of ASR. The benefits of ASR software for student use are many and have been documented by numerous researchers and teachers who have used the software (Hemard, 2004; Hincks, 2003). FL students can practise their pronunciation and speech samples, receive feedback, repeat, listen and hear a native model in an individualised setting.

Therefore, Davies (2006) suggested excellent sources that can be used in teaching methodology to achieve teaching objectives by presenting the material in an understandable way for the learners. Davies referred to the CALL development of the ASR programme that contributes to the concept of empowering learning with the assistance of artificial intelligence (AI) in the learning environment. The AI of the

computer is capable of producing responses that are equal to those of actual humans in terms of correct sentence structure. The AI of CALL is based on including speech analysis and theoretical linguistic concepts. However, language teachers may get confused between the speech analysis and ASR as both are used to study speech sounds. The difference is that speech analysis consists of converting the speech sounds into visual formats, either textually or graphically. This kind of analysis appears on a TV or monitor screen; therefore, learners are able to read the word on the screen and understand only the most basic concept about the pronunciation. However, an ASR programme can recognise the speech sound, analyse and compare it and then provide a correction of and feedback for the students' pronunciation production, which results in students who are engaged in the learning environment, not students who are simply passive receivers.

The benefits of ASR involve the ability to more effectively produce speech sounds by offering practice features, evaluating students' pronunciation and providing feedback. A research study by Hincks (2003) evaluated the students' perception of the ASR programme features and their feedback in regard to its use, and it revealed that the feature that compares students' pronunciation with that of native speaker models is the most effective feature in ASR. The findings revealed that ASR is effective for identifying students' errors and showing how different the students' pronunciation is from the native speaker pronunciation model.

2.6 CALL Evaluation in FL Tasks

In this section, the evaluation of CALL will provide a comprehensive view about the effectiveness of CALL instruction in the FL environment. Chapelle's (2001) research evaluated CALL features, the programme design and the programme examination

tasks, in respect to their impact on students. The findings revealed that the most positive impact on students' learning was related to the examination tasks, while the qualitative investigation of the research revealed that the CALL design was relatively essential to its success, based on the context of the tasks used. A CALL programme was designed by Hémard (2004) for French learners, and it examined the effectiveness of the interactive features of the design by evaluating the students' perceptions based on their experience using the programme. The findings from the evaluation indicated that the usability of the programme is especially helpful in creating new learning materials.

Smith and Gorsuch (2004) used a university usability lab (UL) and related technologies for comprehensive examination of audio, video and computer interaction combined with student interaction and response. They determined that the importance of using CALL in the teaching environment relates to its effectiveness in the learning process. Supporting this idea, Hubbard and Siskin (2004) provided evidence on the effectiveness of CALL as a powerful instructional tool as it leads learners to be independent in their language learning. They state that the CALL application provides the learners with effective feedback, including the recording and comparing feature, which uses sound waves to compare the learner's speech with that of native speakers and which, therefore, enhances the language learning.

FL student perceptions of learning and performance are essential to the efficient design and evaluation of software developed for learning. Barr et al. (2005) cite research from Burnage (2001) that supports students' recognition and appreciation of CALL software designed with FL pedagogical value. From the findings revealed, it

can be concluded that integrated technology in pronunciation teaching and learning is the best way to develop learners' speaking skills.

Jamieson, Chapelle and Preiss (2004) studied the effectiveness of using CALL as part of language teaching methodology. They found that the best currently developed technological tool used in language teaching, especially for the instruction of speaking skills, is speech recognition software, which adds a refined method of teaching that is well-suited to the FL classroom. Using ASR not only provides native speaker pronunciation but also records student data, scores their performance and provides immediate feedback—all of these features assist students in their learning.

2.7 Potential of Computer Technology in FL Learning

The latest approaches in the field of language teaching and learning have been introduced by the communicative method of teaching respective of interactionist theories. Although oral proficiency is considered an important skill in language curriculums, oral skill still does not get much attention in traditional classes. This is due to the limited time available in traditional language teaching classes (Ehsani & Knodt, 1998).

Using CALL programmes offers a solution to this problem related to class time consumption. ASR CALL programmes provide the individual learner with the practice needed to address pronunciation problems. ASR can provide learners with the opportunity to practise, therefore, adding significant value to the teaching environment. Several types of ASR software can provide a variety of feedback by using graphics, animation and oral and written feedback. Dunkel (1990) stated that

using computer technology in language learning helped the students in three important areas: 1) language proficiency, 2) self-confidence and 3) overall academic skills. Well-developed CALL programmes such as ASR improve the learners' speaking skill (Leather & James, 1996).

2.8 CALL Research Using Speech Technologies and ASR

FL teaching and learning have been increasingly associated with second language acquisition (SLA) learning theories and methods of applied linguistics research. Since CALL is the main interest for SLA researchers, particularly in teaching with the use of technology, it seems that the increase in technological development influences CALL research. Over the past ten years, researchers have proposed utilising CALL products and materials for research (Levis, 2007; Xi, 2008) to support teaching and provide better learning with the use of CALL materials. Several materials associated with CALL development are used for teaching pronunciation and for improving the students' speaking skills, such as audio, video and numerous learning activities incorporating all four language skills. Researchers in the field of CALL who analyse its technological features need to know how to interpret the development of CALL and apply its benefits to FL teaching and learning, in order to make the interaction between the learners and the technological programme comprehensible.

The use of ASR in teaching pronunciation in the FL classroom has gained considerable attention from FL teachers as it is designed to diagnose and analyse FL speech. Chun (1998) summarized the benefits of using ASR software in teaching FL learners, stating that it provides various types of feedback, such as auditory, visual

and contextual modalities which help students to understand their errors as well as to improve their pronunciation performance.

Chun (2002) focused on speaking skill instruction with the use of CALL in the language classroom, which emphasised speech intonation as a part of FL proficiency. Chun (1998) declared that the language development based on the use of FL multimedia software required more research on the effectiveness of pronunciation training software. Chun's study hypothesised that FL communicative methods with the use of a computer could improve teaching pronunciation and intonation. Implementing model dialogues of the native speaker in the CALL design provides 'authentic speech' which improves the students' overall speaking skills. The development of a CALL design presented by means of ASR showed improvement in the quality of the student's performance. Chun (1998) recommends more research on CALL to show its usefulness and effectiveness in students' speech production and oral feedback.

McIntosh et al. (2003) used an ASR online web-based product available from the US firm Wimba, Inc. In order to record FL students' oral production and activities. The research revealed that speech recognition software is beneficial for foreign students' pronunciation practice and production. The teacher evaluated the students' pronunciation production of their spontaneous speech and their feelings about it. The evaluation responses showed a positive result, and the FL students were more confident in the use of the TL. In practice, ASR embodies production and evaluation of the FL learners' speech. The students' evaluation of the speech production revealed a significant improvement in their pronunciation production. Hincks (2003)

has evaluated several ASR software programmes based on the pronunciation features and students' feedback from their evaluation, and the results indicate that ASR is an effective tool for determining how much speech samples differ.

Eskenazi's (1999) study emphasised the significance of investigating the practical applications for ASR in FL learners' pronunciation, which will be significant for students as well as for teachers who use CALL. Eskenazi, Tomokiyo and Wang's (2000) experimental research investigated whether using the fluency trainer that uses SPHINX II errors recognizer, improved user pronunciation. The study focused on testing the voiced and the voiceless sounds of /ð/ and /θ/, as in *that* and *thin*, and the results showed improvement and error reduction in the pronunciation of these sounds. These findings suggest that ASR can be a significant factor in the development of FL curriculums and the improvement of both teachers and students' performance.

2.9 Foreign Language Pronunciation Training Systems in CALL Environments

2.9.1 Advantages of CALL Systems for Pronunciation Training

Using a CALL system for pronunciation training can offer several advantages. First, the use of CALL in pronunciation class can solve individual pronunciation problems. Second, it gives students the time they need for pronunciation practice and provides them with feedback. Third, it offers students a favourable and comfortable learning environment which can reduce their anxiety level (Young, 1990). Fourth, students' profiles can be kept in a log file which will allow the teacher and the students to detect problems in order to improve their pronunciation. Because of these advantages, the CALL system can be beneficial for improving the students' pronunciation and helping the teacher identify the students' problems.

2.9.2 Non-ASR-based CALL Systems for Pronunciation Training

Currently, systems such as the CALL system are available which provide details about the production of sounds from articulation, the position of the target sound and its similarity to the first language.

However, despite the advantage offered by presenting visual cues that have been proven to have a significant effect on the improvement in speech production and perception (Flege, 1988), some CALL systems are limited. Some systems do not train receptive abilities and do not help in the effective production of the students' utterances, despite the importance of enhancing pronunciation in speaking. Therefore, the better systems are those that have been developed to help the students of the FL to pronounce the language correctly by recording their pronunciation production for evaluation by the teacher, and these systems also provide comparisons with native speaker's utterances (Tutsui et al., 1998). However, one difficulty that students often face with such systems is that they cannot recognise the differences between the first language and the TL. Therefore, they can fail to distinguish the phonetic differences (Flege, 1995). In addition, teachers need to evaluate the students' recorded speech which is sometimes unfavourable when rating the students; this is similar to traditional classroom methods.

To solve this problem, the web-based company ViaSpeech introduced a distance learning method to improve pronunciation using the SpeechWorks CD-ROM with The Internet Way learning system. Students can practise pronunciation in SpeechWorks by downloading a diagnostics test, pronouncing the test and then uploading it to their account page on ViaSpeech. Authorised trainers will listen to the

test, score it and send the score to the students (Ferrier & Reid, 2000). The students can then revise their responses and focus on how to improve their pronunciation. The limitation of this type of system is that it does not provide immediate feedback which is beneficial to the students. Many researchers declare that immediate feedback is significant in limiting repetition of the students' errors (Eskenazi, 1999).

Different types of CALL systems are used to provide phonetic analysis of intonation and duration of students' speech and to display the results graphically (Lambacher, 1999). The effectiveness of these systems for students is questionable, as it can be difficult to interpret the display, and even a phonetics expert may find the information difficult to understand. As a result, this may hinder students' pronunciation improvement.

2.9.3 ASR-based CALL Systems for Pronunciation Training

At this point in the development of CALL, ASR is considered by many to be the best solution for correcting pronunciation problems. ASR provides instruction in a way suitable for different types of learners. However, each learner is unique and requires full attention, so the training should involve a one-to-one relationship between the learner and the tutor. Integrating ASR in pronunciation class can provide the learners with interaction that diagnoses individual learners' errors and provides immediate feedback. Currently, many ASR software programmes are used to teach pronunciation for L2/FL students (Dalby & Kewley-Port, 1999). However, despite the availability of various ASR programmes, no single programme is ideal.

Various studies on ASR scoring revealed that the evaluation of L2/FL learners' pronunciations scores by humans was superior compared to machine scoring

(Cucchiaroni et al., 2000; Franco et al., 2000). However, there is evidence of the usefulness of ASR scoring as it provides the students with direct evaluation on the quality of their pronunciation production. Moreover, there are few positive reports by students indicating that they appreciate global ASR scoring (Interactive Spoken Language Education ISLE, 1999; cited in Neri et al., 2001). However, ASR for FL learners appears to be suitable for pronunciation practice in addition to providing appropriate pronunciation feedback. EyeSpeak provides comprehensible feedback. Visual feedback is provided on pronunciation features such as pronunciation, timing, loudness and pitch. Students listen to a native speaker's recording, say the word and receive immediate audio-visual feedback from the system. The students and the natives' speech patterns are shown on the screen, and this enables students to easily compare them to see whether the relevant features are matched. EyeSpeak offers two important visualisation feedback styles. It visualises the sound wavelengths of the students and the native speaker's speech by showing the pronunciation, pitch, loudness and timing. It also visualises an animated cutaway side view of the human mouth showing the production of sounds (the consonant and the vowel) by exhibiting the place of articulation for each sound. A study by Nylén (2009) in a high school in Sweden described students' attitudes towards the use of EyeSpeak in learning the English language after a two month period of using the programme in their English studies. The results indicated a positive attitude towards EyeSpeak software as a tutor because it offered the students new chances to learn.

In this study, a serious attempt was made to diagnose the segmental errors of students and provide feedback. Thus, EyeSpeak software was an excellent choice for the research as it targets FL learners of English and aims to provide feedback on their

pronunciation errors, concentrating precisely on the word level, for which it checks the mispronounced sounds.

2.10 Features of Computer-assisted Pronunciation Teaching (CAPT)

Neri et al. (2002) declared that, if the students' intention is to learn pronunciation, the best way is by following the teacher's instructional guidance and communicating with a native speaker of the TL. The role of the teacher is to give the students time for more practice and to concentrate feedback on individual pronunciation problems. However, with forty or more students in a pronunciation classroom, the teacher often finds this hard to achieve. Therefore, to solve the problem of large pronunciation classes, using CALL programmes will be the most suitable way to support teachers as well as students. CAPT systems fit the needs of the students in the process of pronunciation training by providing several advantages. First, it addresses individual student pronunciation problems. Second, it provides the training as long as the student requires it. Third, it creates a stress-free environment and causes less anxiety during the training, thus, indirectly encouraging learners to feel more positive about their learning (Young 1990). Fourth, it gives the students the opportunity to record their performance process so that both the students as well as the teacher can monitor the problems and improvements (Neri et al., 2002).

According to Neri et al. (2002), learning must occur in a stress-free environment so that the students can significantly listen to meaningful input and practise oral skills. The feedback should focus on those 'segmental' and 'suprasegmental' features that have a high influence on intelligibility. Segments are vowels and consonants, and suprasegments are features connected to speech, such as intonation, stress and accent.

Neri, Cucchiarini and Strik (2001) stated that ASR could ultimately diagnose pronunciation errors and instantly give feedback. With the expansion of technology in education, many new products have improved ASR technology, especially for use in the FL classroom. Thus, using CALL can reduce students' anxiety because each student works independently; therefore, this will provide the student with a stress-free environment. In addition, there has been an increasing emphasis on using CALL as a new direction for teaching pronunciation (Celce-Murcia 1996), and this emphasis is related to the features that CALL offers for language teaching and learning (Table 2.3).

Table 2.3

General Features of CAPT

1. Use of multimedia in teaching pronunciation
2. Audio feedback
3. Video
4. Computer-assisted instruction
5. Speech spectrographic devices
6. System that incorporates ASR modules
7. Stress-free environment
8. Learner centred approach: focuses on individual problems, allows self-pacing and self-directed learning
9. Immediate corrective feedback
10. Multiple samples of native speakers
11. Interaction with the speakers with the software and with classmates (incorporating ASR modules)
12. Focus on both segmental and suprasegmental aspects

Source: (Celce-Murcia 1996, pp. 311–315)

ASR is one of the technologies utilised in computer software which contains voice recognition (Anderson-Hsieh, 1998; Chun, 1989). ASR can measure sound waves digitally as opposed to pronunciation in a written and visual form which requires microphones and speakers. Celce-Murcia et al. (1996) stated that incorporating speech spectrographic devices with the traditional teaching methods of pronunciation

might assist those students with fossilised pronunciation. Students who have fossilised pronunciation require special attention to improve their pronunciation so it will be clear and understandable to other speakers of English. On the other hand, a survey study by Ai (2013) examined CAPT system feedback and perceptual feedback. Ai criticised ASR software's visual feedback because it does not provide information on how to improve pronunciation, and recommended that using forced alignment might help students recognise the wrong phoneme and then discover when to increase or reduce emphasis, loudness or pitch.

2.11 Effective Pronunciation Instruction

The crucial issue in pronunciation teaching is increasing the effect of the most helpful instruction for the students. One of the central questions is how to provide the best instruction in the language learning classroom. Earlier teaching methods concentrated on the segmental features of pronunciation, while more modern methods focus on the suprasegmental features, such as intonation, stress and rhythm. However, there is still no consensus as to whether or not one of these methods is superior to the other. The current modern methods of pronunciation curriculum design should most probably focus on both segmental and suprasegmental features in teaching pronunciation. Yet, the crucial issue remains as to what exactly is the most effective way of teaching pronunciation. As is common with the development of any methodology, the techniques used in traditional teaching methods have been developed over time, while new methods and techniques have been created. A more contemporary view introduced by Gagne's Nine Events of Instruction (Moallem, 2001) describes modern pronunciation techniques in the classroom and moves to empower teaching pronunciation.

There is clear evidence on the impact of pronunciation teaching methods which have been the subject of several studies (Derwing, Munro, & Wiebe, 1998; Derwing & Rossiter, 2003; Elliot, 1995; Jamieson & Morosan, 1986; Macdonald, Yule, & Power, 1994; Yule, Hoffman, & Damico, 1987). Many positive effects have been reported for the various techniques and methods used in teaching pronunciation features. For example, Derwing, Munro and Wiebe (1997) found that L2 learners had improved significantly over the long term in comprehensibility, intelligibility and accent. Jamieson and Morosan (1986) suggested a successful pronunciation teaching framework and proved its effectiveness on acquisition by using contrastive pairs of English sounds with French learners. Moreover, Elliot (1995) noted that using several teaching methods can improve specific Spanish sounds in American learners.

In summary, previously reviewed research indicates effective teaching pronunciation using various methods. This study investigated the effectiveness of integrating instructional software and compared its use with traditional methods of instruction. The comparison aimed to re-examine the most efficient teaching methods on the segmental features of students' pronunciation. The methodology of instruction used the matched method proposed by Gagne's Nine Events of Instruction (Moallem, 2001). Two groups of students participated in this study; one group was instructed using traditional methods, and the other group was instructed using instructional software (EyeSpeak). Comparison of the students' scores for both groups and their individual pronunciation performance from the pre-test and the post-test showed that the results of instruction methods were not equivalent and that the second group's performance was superior to that of the first.

2.11.1 Studies Related to the Effectiveness of ASR in Teaching Pronunciation to Undergraduate Students

Al-Qudah (2012) examined the effectiveness of ASR usage on learners' pronunciation, and the results of the study revealed that ASR is very useful in improving learners' pronunciation. A study by Kim (2006) also investigated the reliability of ASR in teaching pronunciation. EFL students were asked to record their pronunciation, and they were then exposed to and listened to native speakers. The result of the study revealed that ASR was a helpful tool for teaching pronunciation because the students had the opportunity to listen to native English speakers. Hincks (2005) also examined the effectiveness of an ASR software programme (Talk to Me). The study focused on professional, middle-aged immigrants studying English in Sweden. The study's report on the experimental group showed that the ASR feedback improved their pronunciation quality and that their learning outcomes were superior to those of the group which was taught using traditional teaching methods. Likewise, Seferoglu (2005) studied the effect of the CAPT system on improving the influence of visual feedback software on students' segmental and suprasegmental pronunciation features. The results of the experimental study showed pronunciation improvement in the experimental group when compared with the control group which had little exposure to English by native speakers.

Moreover, Chiu, Liou and Yeha (2007) investigated the effectiveness of CandleTalk, a web-based conversation context, for EFL learners practising speech to improve their oral competence. The findings of the study revealed that teaching speech using an ASR application was very useful for freshmen college students, especially for non-English speakers. It appeared that the students could understand better by using ASR in their pronunciation class. A study by Saito (2007) explained the

effectiveness of explicit phonetic instruction for Japanese learners of English. Saito's study provided two major suggestions about explicit phonetic instruction and the activities based on it. The explicit phonetic instruction method was used by four students, who struggled to pronounce the English vowel sound /æ/, to help them overcome their pronunciation problem with good results. This method's activities made the language learners aware of their pronunciation production of English; thus, these activities can obviously contribute to pronunciation pedagogy, especially in the FL classroom in which students lack regular exposure native English usage.

A study conducted by Lee (2008) showed the effectiveness of two different ASR software programmes (My English Tutor and Issues in English) to assist Taiwanese learners in enhancing their English pronunciation. The findings of the study demonstrated that the students were in favour of using ASR software because of the correction feedback feature. Also, these ASR software programmes assisted the students significantly in improving their English. Furthermore, Chen (2011) examined the effectiveness of the Microsoft Speech Application Software Development Kit (SASDK) in improving the English speaking skills of FL learners. Chen also explored the use of an ASR-based website that provided the learners with various types of online activities which enabled them to practise their pronunciation and receive instant feedback. The study revealed that nearly all teachers and students were in favour of using the ASR-based website because it enhanced students' English pronunciation performance. The study also showed that providing different kinds of training exercises encouraged the production of the students' pronunciation in a stress-free environment.

2.11.2 Studies Related to the Effectiveness of Using ASR at Different Levels

Several studies, such as Moshin's (2012), have concentrated on examining the effect of ASR on the words, sentences and conversations of language learners. Also, Yu, Tomokiyo, Wang and Wibel (2000) explored whether the CALL Application Fluency Pronunciation Trainer was beneficial in enhancing the pronunciation of difficult English sounds encountered by English learners. After three weeks of practising, the experiment showed that both groups revealed similar significant improvement. The experimental group's results indicated significant improvement on the sentence level. Mohammed (2008) investigated the influence of two methods of teaching the English language's silent consonant letters: one method used CALL in teaching and learning, and the other utilised the traditional approach. The findings of the study showed the usefulness of utilising computer programmes and games which include sound and script in teaching and learning. In a similar study, Neri, Mich, Gerosa and Giuliani (2008) stated that the quality of pronunciation for isolated words was significantly enhanced in both groups of students. Students practising with the use of CALL software improved significantly in their pronunciation over those who practised using the traditional method.

Cincarek, Gruhn, Hacker, Noth and Nakamura (2009) conducted a study concerning the effectiveness of using CAPT's automatic sentence level scoring where sentences and words are used as the scoring units. CAPT automatically diagnoses the mispronounced phoneme errors. The statistical data of the study revealed reasonable results for five non-native speaker groups. These statistics can be used to produce non-native pronunciation errors. Franco et al. (2010) used ASR software (EduSpeak) to evaluate the level of the pronunciation quality of words and sentences. The

findings of the study indicated that the software evaluation was reliably transcribed and was slightly higher than the human evaluation. Additionally, the use of EduSpeak software has been shown to enhance student pronunciation. Hismanoglu and Hismanoglu (2011) concentrated on the pronunciation of English vowels which cause articulation problems for Turkish EFL students. They also investigated whether teaching pronunciation with Internet-based materials is more effective for students than teaching with printed materials. The findings revealed that /æ/, /ov/ and /ε/ were the most problematic English vowels for Turkish EFL learners, and that the problem could be solved by exposing the students to Internet-based pronunciation lessons.

2.12 Role of Computer Technology in English Pronunciation Instruction

The computer can impact teaching pronunciation in many ways: Computers can provide learners with individualised instruction and daily practice through listening discrimination and focused repetition exercises, as well as providing them with the automatic visual support that shows the learners how closely their own pronunciation approximates model utterances (Levis, 2007). Mich, Neri and Giuliani (2006) tested experts' belief that ASR-based CALL systems contribute positively to pronunciation teaching and pedagogy. In addition, they compared two groups, one using ASR-based CALL instruction and the other having teacher-led pronunciation instruction. The findings revealed that the quality of the students' pronunciation improved significantly in both groups. The study demonstrated that both teacher-led instruction and ASR-based CALL instruction were equally effective in teaching pronunciation.

Machovikov, Stolyarov, Chernov, Sinclair and Machovikova (2002) stated that using a computer in teaching English pronunciation is effective in identifying students'

pronunciation mistakes and in assisting them in the correction of their pronunciation mistakes. Neri, Cucchiarini and Strik (2002) stated that teaching pronunciation with computer-assisted instruction had many advantages not available with the traditional teaching methods. The advantages of using computer-assisted instruction are the following: 1) provides students with unlimited exposure to native speaker pronunciation of the TL, 2) provides students with immediate feedback, 3) provides students with high-quality pronunciation by a native speaker and recognises the articulation of sound production, 4) compares students' pronunciation with that of native speakers and 5) has the advantages of offering many pre-recorded materials to the learners.

Hismanoglu (2006) declared that CAPT gives the students unlimited access to native pronunciation of English and provides immediate feedback in a stress-free environment. According to Neri, Cucchiarini, Strik and Boves (2002), in teaching pronunciation, many teachers use Internet-based materials rather than using printed material and lecture notes. Hişmanoğlu (2010) indicated that using electronic pronunciation materials in teaching pronunciation can change the way of receiving phonological input.

Neri, Cucchiarini and Strik (2006a) investigated a group of immigrants in the Netherlands and divided them into three groups: 1) one that was given regular instruction with an ASR-based Dutch CAPT system, 2) one where the CAPT system was not used and 3) one where the CAPT system was used without feedback. The findings revealed that the students provided positive feedback on both the use of the CAPT system without ASR after training and the use of the ASR-based CAPT system.

2.13 FL Pronunciation: Guidelines for Optimal Training

The lack of established guidelines for CALL professionals affects the overall quality of FL instructional design. Moreover, teachers are usually trying to provide an alternative programme for students' pronunciation practising; thus, some teachers believe that using several training programmes may be more efficient for student learning. However, at this point, in the field of teaching pronunciation, there are no straightforward answers as to what the most effective method to use is or what kind of attention needs to be focused on teaching pronunciation (Celce-Murcia et al., 1996; Flege, 1995; Morley, 1991). As a result, it appears that some degree of pronunciation training needs to be implemented to achieve the goal of improving students' pronunciation intelligibility. It is also important to distinguish between accentedness and intelligibility. A foreign accent does not prevent intelligibility in speech and does not require specific instructional attention to improve it (Derwing & Munro, 1997). However, Derwing and Munro's (1997) study did not give clear and straightforward conclusions that could be applied to generalisations in regard to this important factor.

Nevertheless, recent research may help identify the factors that influence learning pronunciation of the TL and may provide general guidelines for teaching pronunciation. Studies have shown many variables that may affect learning pronunciation of the TL, such as age, amount of exposure to the TL, influence of the mother tongue and motivation to learn the TL (Celce-Murcia et al., 1996). These factors can vary from one person to another, and the teacher cannot manipulate them to achieve the desired learning goals. However, other factors which affect learning pronunciation can be manipulated to achieve learners' pronunciation improvement.

These factors include input, output and feedback, all of which will be explained in detail in the following sections.

2.13.1 Input

Interactionist theories consider input the most important factor for successful language acquisition. Therefore, in teaching pronunciation, it is important to enable students to have a large amount of time to listen to TL pronunciation by native speakers. Even though many studies deal with the influence of different types of input that lead to the acquisition of linguistic aspects other than pronunciation (Schachter, 1998), there are several reasons to believe that input affects learning pronunciation. Leather and James (1996) believed that the speech production model, whether in L1 or L2, implies that the phonetic representation is based on a previously receptive auditory model acquired from one's community or training. As in the case of acquiring the first language, multiple-talker models appear to be efficient in distinguishing between varieties of speech and allow for imitation of the general phonetic categories (Logan et al., 1991). Moreover, input can play a significant role in facilitating the perception of the articulation, tune and rhythm of the speech model which can be correctly identified, such as cue-enhancement techniques (Hazan & Simpson, 2000). Eventually, a certain kind of instruction on a variety of pronunciations may lead to learners' improvement (Derwing et al., 1998).

2.13.2 Output

Despite the importance of exposure to native speaker pronunciation of the TL, input alone is not considered sufficient to improve pronunciation (Swain & Lapkin, 1995). Morley (1991) found that, despite the long term which foreign residents spend in the intended language learning country, they often retain their accent and are hardly

intelligible in the TL. Generally, it is believed that, if the learner wants to speak accurately and fluently, practice speaking of the TL is important (Hendrik, 1997). Output enables learners to compare their own pronunciation with the accurate pronunciation input and, in this way, improve their pronunciation.

Moreover, output can help the learners transfer existing knowledge of the TL into declarative form, and this enables elicitation of more input and involves self-monitoring skills (De Bot, 1996). To achieve the best level of output, the learner needs special attention to encourage speech production, and this must be done in a meaningful, stress-free environment (Hendrik, 1997). The teacher's role is to select and provide various types of material which meet each individual student's different learning style in order to stimulate, motivate and encourage the best language production (Murray, 1999).

2.13.3 Feedback

Although the argument related to the role of feedback is still unclear and doubtful (Krashen, 1982; Schachter, 1998), Krashen (1982) stated that, even when teachers provide the best learning environment conditions, their corrections will not obtain the expected results as many teachers think. Research by Long (1996) explained that corrective feedback makes the learners realise the difference between the TL and their output. Exposure to the TL alone is not enough; students need feedback to recognise their pronunciation mistakes. Krashen (2003) admitted that correcting the student's errors might assist his or her learning, but he still doubted the scope of its effect as he commented that pedagogical intervention is only practicable for student's learning. Therefore, feedback is very important to the process of learning the FL as learners may produce several mistakes transferred from the mother tongue

in their pronunciation of the TL (Flege, 1995). The influence of the mother tongue is powerful and cannot be controlled by comparing the input with the output as that may lead to an unintelligible pronunciation of the TL (Flege, 1995). Therefore, feedback could play a significant role in improving students' pronunciation, especially with 'feedback that does not rely on the student's own perceptions' (Ehsani & Knodt, 1998, p. 9). Through teacher feedback and guidance, students can concentrate on particular problems which encourages them to strive for pronunciation self-improvement. Students' awareness of their pronunciation issues can help them to take a further step towards improvement.

A study by Lyster and Ranta (1997) dealt with corrective feedback which they classified into six types of strategies for providing feedback to students: recast, explicit correction, metalinguistic feedback, elicitation, repetition and clarification recast. Their findings revealed that recast, the most commonly used technique for a reformulation of a student's production, had the lowest rate uptake and generated few attempts towards self-correction and reformulation. Explicit correction revealed a good rate of students' correction reformulations, although those corrections were done by the teacher, not by the students themselves. Elicitation was best when done by the students themselves, as this revealed a greater ability to correct their own mistakes. Metalinguistic feedback revealed a lower rate of overall understanding and students' ability to improve, diagnose and correct their mistakes. Lyster and Ranta (1997) examined the role of corrective feedback in general, but their findings focused on pronunciation training software. They indicated that the most efficient feedback relies not only on the production of the students, but also on how they can correct their output themselves.

Therefore, in pronunciation, these strategies may encourage productive and self-monitoring feedback as mentioned above. There are several reasons, however, to conclude that elicitation is the most effective type of feedback for the pronunciation learning environment. In addition, the teacher is not required to provide feedback for the individual student using pronunciation training software. In this way, the software corrects each student and stimulates him or her to correct his or her own pronunciation mistakes.

Neri et al. (2002) indicated that feedback should concentrate on specific individual pronunciation errors which influence the learner's intelligibility. They emphasised the provision of feedback for individual learners and addressed segmental and suprasegmental errors in order to improve pronunciation. One specific ASR feature provides students with spectrographic and animated feedback of their pronunciation production. This type of feedback may help the students to realise their pronunciation mistakes. Pennington (1999) suggested that a better kind of feedback showed students a total analysis of their recorded speech. Moreover, this will help the learners to be aware of the differences and the similarities between the first language and the TL pronunciations. This will lead students to improve their meta-analysis and the self-corrections of their pronunciation performance. Based on the theoretical frameworks proposed by Neri et al. (2002), Pennington (1999) and Egbert and Hanson-Smith (1999), Figure 2.14 summarises the basic features of an interactive pronunciation oriented software programme.

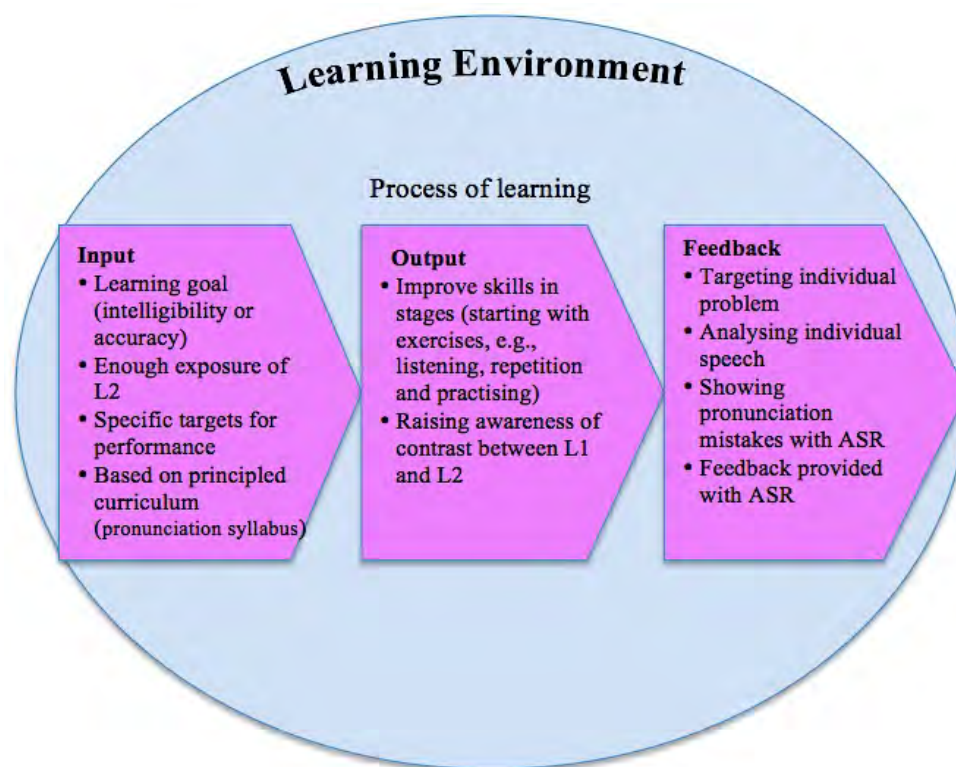


Figure 2.14. Basic features of an interactive pronunciation oriented software programme

2.14 Information about EyeSpeak

EyeSpeak is a multimedia visual pronunciation software which is notable as a speech recognition online-based pronunciation software with sound distinction training. This software was created by Visual Pronunciation Software Ltd in 2005. EyeSpeak includes activities such as drills, practice, speech recording with playback capabilities, sound graphic articulatory display and well-animated and visual feedback of pronunciation. Also, all of these software features provide evaluation and visual feedback for EFL/ESL learners of English language sounds (vowels and consonants). It can be a helpful pronunciation tool for beginner-to-intermediate EFL learners in distinguishing differences between English sounds and accurately produced English phonemes.

The software consists of two types of user profiles, one for the teacher and one for the students. The teacher profile, constructed to be able to check students' sound progress, will enable the teacher to observe an individual learner's skill levels and scores. The student profile consists of the following five sections: home, lesson, speech, dictionary and fun.

The *home* section (see figure 2.15) provides students with a general overview of their skill progress over the latest seven days, total student score, study completion percentage and homework notification, if any.



Figure 2.15. EyeSpeak's home section

The *lesson* section (see figure 2.16) consists of eight lessons (one basic grammar lesson, three conversation lessons, two listening-spelling lessons and two vocabulary lessons).



Figure 2.16. EyeSpeak's lesson section

The *speech* section consists of three categories: Improve My Speech, Similar Sounds and Word Practice. The first category, Improve My Speech, provides students with several sentences to practise by listening to a native speaker first, recording their pronunciation, replaying it and then presenting the full overview of the students' score percentages with all details regarding pronunciation, pitch, timing and loudness. The second category, Similar Sounds, is a powerful practice. It deals with selected sound practice by delivering two words: one that contains the selected sound which is then compared with another word that includes the nearest sound to the one selected. The students must listen and then choose the correct word pronounced by the native speaker. The third category, Word Practice, includes all English sounds. The students have to select one of these sounds, and the software then provides several words with that sound. The students can practise the words by listening, recording their pronunciation, replaying the recording and then comparing it to the native speaker. It also gives the students the total percentage similarity to the native

speaker's pronunciation and an animated waveform of their pronunciation compared with that of the native speaker, which shows all the details about pronunciation, pitch, timing and loudness. This activity also provides an animated cutaway side view diagram of a human figure producing the sounds, in order to show the difference between the comparable pronunciations.

The last two sections are the *dictionary* section, which gives the students the opportunity to check the meaning of any unknown word, and the *fun* section, which includes three types of games: spelling, grammar and vocabulary.

2.15 Comparison of Features Between ASR EyeSpeak Software and Other ASR Software

Understanding computer technology possibilities can give language teachers assistance in the teaching and learning processes. ASR software can analyse the students' oral production to assist them in diagnosing their pronunciation errors, providing them with both correction and feedback.

Derwing, Munro and Carbonaro (2000) declared that using ASR software is very useful because of its ability to recognise and identify students' pronunciation mistakes. Derwing et al. (2000) referred to the use of speech recognition technology as being insufficiently implemented in the non-native speaker classroom. In addition, Derwing et al. (2000) reported that ASR software recognised 90% of the speech production of the native speaker, and had the ability to understand 24% to 26% of the non-native speaker's speech production (p. 597). Also, they referred to the use of ASR in identifying the production errors of the FL learners' pronunciation. Their study indicated that ASR software revealed promising results when it is used in the FL classroom.

The researcher identified three programmes which used CALL in teaching English pronunciation. These were EyeSpeak, Issues in English and Tell Me More. They each had all the features listed by Neri et al. (2002). Table 2.4 gives a comparison of these three programmes.

Table 2.4

Comparison of Three Computer Software Programmes

Comparison Criteria	Comparison Feature	EyeSpeak	Issues in English	Tell Me More
Language and grammar	Reading level and technical terms	Appropriate	Appropriate	Appropriate
Surface features	Navigation	Simple, logical and understandable package that can connect to online learning	Simple, logical and understandable package	Simple, logical and understandable package
	Audio	Appropriate	Appropriate	Appropriate
	Graphic	Appropriate	Appropriate	Appropriate
	Text quality	Easy to read	Easy to read	Easy to read
	On completion	Student is given appropriate credit	Student is not given credit	Student is given credit
	Management	Easy and logical	Easy and logical	Easy and logical
Questions	Feedback	Feedback is given, supportive and corrective, clearly identifies discrimination errors	No feedback, students can hear their own production and the model's	No feedback, students can see their own sound wave form and scores only
	Testing	Tests	No tests	Tests

Other pedagogical issues	Motivation	Curiosity, confident satisfaction maintained	Curiosity, confident satisfaction maintained	Curiosity, confident satisfaction maintained
	Interaction	Playback comparison	Playback comparison	Comparison role play
	Student control	Self-access	Self-access	Self-access
Subject matter	Goals and objectives	Pronunciation (sound distinction training), vocabulary enlargement activity, listening discrimination	Grammar, listening, pronunciation, reading	Pronunciation, conversation, grammar, listening
Invisible function	Content emphasis	Pronunciation, speaking and listening	Pronunciation, speaking, reading, listening and grammar	Pronunciation, reading, listening and grammar
	Records and data	Students' sound files not recordable	Students' sound files recordable	Students' sound files recordable
	Accessibility	Students cannot access their records	Students cannot access their records	Students can access their records

Source: The comparison criteria are according to Alessi & Trollip's *A Checklist for Evaluating Computer Based Learning Software* (1991).

2.16 Reasons for Selection of EyeSpeak Software in this Study

The characteristic features of the ASR EyeSpeak software that may help the students in learning pronunciation are the following: 1) listening to oneself, 2) listening to English native speaker models and 3) correcting and providing visualised feedback.

The selection of EyeSpeak was based on the five sequences of an ideal ASR-based CAPT (Neri, Cucchiari, & Strik, 2003). Neri et al. (2003) define the five sequences

of an ideal ASR as these: 1) speech recognition (translates the incoming speech into words), 2) scoring (evaluates students' pronunciation quality), 3) error detection (indicates learners' errors), 4) makes an error diagnosis and 5) provides feedback.

As has been noted, there are several features of the EyeSpeak software that have the potential to assist EFL learners in solving their segmental pronunciation problems. The following is a summary of the EyeSpeak functions that may help the students' pronunciation:

- 1- Showing animated speech organs from the front and the side of the human mouth with the position of each sound production, how to produce the sound and which speech organs to use for pronouncing each sound.
- 2- Providing a view of the waveform of the sound produced by a native speaker while listening to it; recording the student's pronunciation and comparing it with the pronunciation of the native speaker's model.
- 3- Listening to words including the target sound and its transcription; recording the student's pronunciation and comparing it with the native speaker's pronunciation.
- 4- Listening to minimal pairs containing the target sound with transcription; recording the student's pronunciation and comparing it with the native speaker.

2.17 Theoretical Framework

In this part of the study, a logical connection will be provided that supports the research objective with theoretical bases.

Behavioural theory is ‘concentrated on immediately observable, thus behavioural changes in performance (tests) as indicators of learning’ (Roblyer, 2003, p. 65). Considered the grandfather of behaviourism, B. F. Skinner found that human behaviour could be shaped by ‘reinforcement’, which he identified as either ‘positive’ or ‘negative’ reinforcement. Most of the software drills and practices are based on Skinner’s reinforcement principles. Similarly, EyeSpeak is based on these principles, as the activities in the software provide learners with immediate feedback by showing them an animated cartoon figure as the ‘positive reinforcement’ for the correct answer by the student or as the ‘negative reinforcement’ for the wrong answer.

Behaviourist learning comprises two methods: programmed instruction and mastery learning (Beatty, 2003; Richards, 2002). Programmed instruction is a behaviourist model of instruction that teaches the students in a variety of subjects and gives them information graduating from small steps to the more difficult ones. EyeSpeak software provides graduated activities from the least difficult task to the most difficult one. Each step requires positive responses from the students before they can advance to the more difficult steps.

The cognitive constructivism theory of learning, introduced in 1990s, put great emphasis on learners’ active engagement during the learning process. According to Mayer, ‘learning occurs when learners actively try to make sense of material presented to them’ (as cited in O’Neil & Perez, 2003, p. 128). Constructivist learning is also called ‘knowledge construct’ or ‘active learning’ because learners will organise and construct their own knowledge in the learning process. The aim of this theory is to determine the appropriate techniques to improve the students’ learning process and enable them to use the learned knowledge in a real situation. In addition,

Mayer declared that ‘Constructivism assessment focuses on the quality of knowledge they have required for understanding rather than the quantity of knowledge they have acquired’ (as cited in O’Neil & Perez, 2003, p. 128).

In other words, learning occurs based on the knowledge constructed in the learner’s mind. Therefore, the process of learning, as it is referred to in this theory, is a psychological process. In relation to this study, when the students trained with ASR EyeSpeak software with its exposure to the authentic pronunciation of native speakers of English, the learners observed the information that was received by their eyes and ears. According to constructivism theory, after a successful learning process, students will be able to use the constructed and learned knowledge in a real situation. Therefore, students will be able to use the required knowledge the same way that it was presented by the native speaker’s voice in the TL. Furthermore, ‘cognitive constructivism assumes that the process of constructivist learning occurs both within learners and within groups of learners while retaining the straightforward idea that the outcomes of constructivist learning are stored within learners’ (Mayer as cited in O’Neil & Perez, 2003, p. 145).

Constructivism gives students the confidence and freedom to experience the learned knowledge instead of simply receiving the knowledge (Newman, 2001). EyeSpeak allows the students to do the activities and practice their pronunciation in a less stressful environment. Also, they will be able to listen to native English speakers’ pronunciation; it is like having their native speaker of English teacher with them as they use the software. The Chinese scholar, Zhou (2004), pointed out that the knowledge constructing process could be gained from the teachers, as well as from suitable learning aids.

The psychologist Lev Vygotsky who introduced the educational method of scaffolding which believed in developing each individual's potential, and Jean Piaget focused on the cognitive development of the individual. Both believed that the more visual resources available, the better the students understand and that this can stimulate increased development more quickly and to a higher level. EyeSpeak presents a variety of visual resources including graphic, animated human side views of speech organs which show how the sounds are produced and sound charts that show the student's sound waves as compared to the sound waves of a native speaker of English. These EyeSpeak resources can increase the students' level of understanding.

Trylong (1987) provided evidence on the process of information input which showed the percentages of information the learning process gained through the five senses: 83% visual, 11% auditory, 3.5% olfactory, 1.5% tactile and 1% taste. Therefore, multimedia features can provide a significant benefit for students because they will receive information through visual and auditory approaches. Howard (1983) divided sensory registers into three parts: the auditory sensory register, the visual sensory register and the tactual sensory register. These sensory devices play a significant role by giving the learners the required stimuli to obtain information. During pronunciation class, learners are constantly exposed to the auditory sensory register. Therefore, this register can have negative effects on learners if there is incorrect pronunciation by the EFL teacher. An effective way to provide learners with authentic English pronunciation is to have them listen to and observe how native speakers speak, which can be accomplished through the visual and auditory senses.

Gagné was a leader in building on both of these behavioural and cognitive theories to recommend approaches to instruction. Gagné (1965) established nine ‘Events of instruction’ based on the teaching process as a lesson plan with the use of technology (see figure 2.17). He believed that to accomplish all of that is necessary in a tutorial so it can ‘stand by itself’ (Roblyer, 2003, p. 60), it should follow the events of instruction. Therefore, in this study, the researcher follow the ‘nine events of instruction’ to ensure that the teaching instruction is efficient.



Figure 2.17 Gagné’s nine events of instruction

Cognitive psychology experts and researchers have emphasised the role of the psychological status of learners. Martlin (1989) conducted a cognitive psychology study in which he stated that the acquisition of information depends on the attitude, psychological status and background of the learners. Martlin’s study found that students should be regarded as active and constructive participants in, not as passive

recipients of, information given by their teachers. Effective learning and enthusiasm can be empowered by the use of suitable classroom technology aids.

Davis, Bagozzi and Warshaw (1989) developed the technology acceptance model (TAM), based on Fishbein and Ajzen's (1975) Theory of Reasoned Action (TRA), to describe the behaviour associated with using the computer. Fishbein and Ajzen (1975) stated in this theory that the behaviour of an individual influences the attitude and subjective norms which affect an individual's performance. In other words, the TRA defines a person's behaviour based on the behavioural intention determined by her or his attitude and the subjective norms of the society in which the individual lives (Ajzen & Fishbein, 1980) (see Figure 2.18).

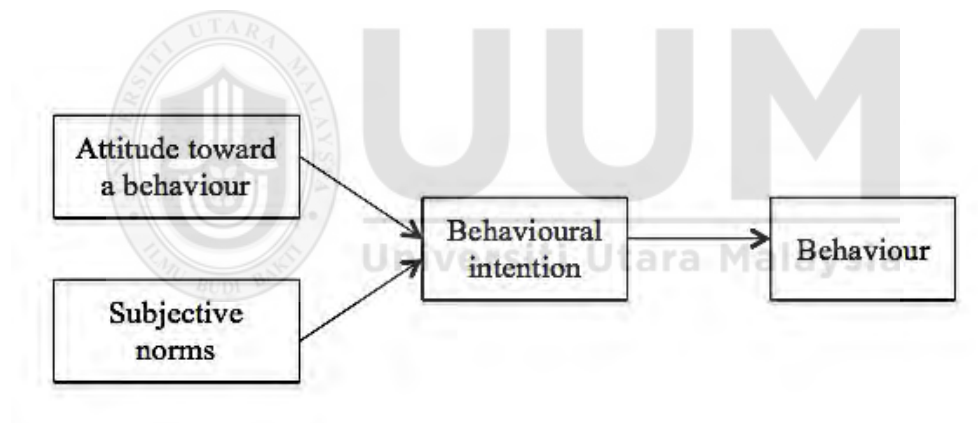


Figure 2.18. The Theory of Reasoned Action (Ajzen & Fishbein, 1980)

The main purpose of the TAM is to give an interpretation of the acceptance of the computer and user behaviour across a wide range of the population (Davis, Bagozzi, & Warshaw, 1989). This is one of the most popular models related to technology adoption, and it is widely used in technology adoption studies (Davis, 1989; Ibrahim, 2008; Legris, Ingham, & Colletette, 2003). According to the TAM, there are two types of principles used to assess user acceptance of new technology: 'perceived

usefulness' (PU) and 'perceived ease of use' (PEOU). Davis, Bagozzi and Warshaw (1989) defined PU as the prospective user's subjective expectation that using a particular application system to increase his or her performance and defined PEOU as the standard level at which the prospective user expects the target device to be free of effort, as it shown in Figure 2.19.

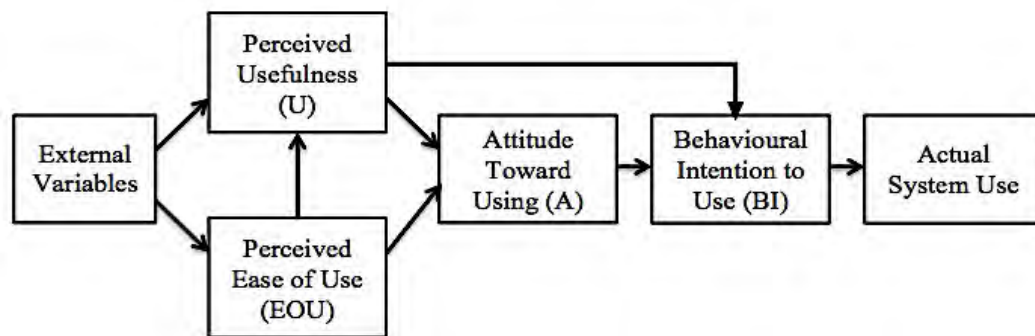


Figure 2.19. The technology acceptance model (Davis, 1989)

According to the TAM, the external variables that may affect PU and PEOU are 'user' (personality variables and cognitive style), 'system design', and 'implementation task'. Even though both PEOU and PU are important in determining the behavioural intention (BI) to use, PU is considered more important. The reason is the belief that, after using the technology for a period of time, PEOU loses its effect on intention, while PU has cohesiveness and an effect on intention (Gardner & Amoroso, 2004). Rose and Straub (1998) conducted a study on technology acceptance in Sudan, Jordan, Saudi Arabia, Egypt and Lebanon and found that PU and PEOU were significant in influencing actual system use. They suggested that the TAM be recommended in the Arab World without making any correlations among the cultures in the region.

In Krashen's (1985) explanation of his affective filter hypothesis, he noted that affective factors, which have an influence on language acquisition, are unrelated to the field of linguistics, but they are associated with psychological and social effects. Krashen (1985) said that many different physical emotions, such as anxiety, self-doubt, motivation and self-confidence, could play a significant role in the acquisition of a second language. Those factors can be effective adjustable filters that allow or prevent the acquisition of language information input. According to Krashen's theory of adjustable filters, high motivation, low self-doubt and low anxiety can effectively increase language acquisition. Conversely, low motivation, low self-confidence and high anxiety can prevent learners from acquiring the information. The association between 'receptive skills' and 'productive skills' in entire language acquisition is explained in Krashen's 'input and output hypotheses'. This has been recognised widely as 'comprehensible linguistic input' which will progressively become intake (Krashen, 1991). In accordance with Krashen's hypotheses, several researchers recommended that improving the quality and the quantity of language input will speed improvement in the quality and quantity of students' productive skills (Hanley et al., 1995; Weyers, 1999). Similarly, when the students experience the input knowledge using CALL programmes, such as ASR software, with no stress or anxiety of making mistakes, this will provide an authentic, relaxing environment for the student.

In this study, the theoretical framework that was adopted is based on the general guidelines of Neri et al. (2002) applied in CAPT systems for improving pronunciation pedagogy. Neri et al. (2002) declared that there are three crucial factors which influence the acquisition of the second/foreign language pronunciation: the *input*, the *output* and the *feedback*. These three factors control the outcome of

learners' better pronunciation. The *input* refers to the amount of exposure to the TL which involves a variety of meaningful class materials which fit the learners' needs and style (Neri et al., 2002).

When the students use the CAPT programme, some have accuracy as their intended goal, while others aim for intelligible pronunciation. In addition, excessive exposure alone cannot guarantee success in language learning; there is also the need to practice the language. According to Neri et al. (2002), the importance of learning a second language (L2) is to be able to practice and use the newly acquired language in communication (i.e. *output*). Practicing the L2 will encourage the learners and make them more familiar with the correct pronunciation. Integrating CALL programmes will make the learners more independent in their learning process (Egbert & Hanson-Smith, 1999).

As for *feedback*, Neri et al. (2002) stated that the main issue causing learners intelligibility failure is linked to pronunciation errors, which should be the main focus for improving it. In an effort to facilitate students' improvement, their study investigated learners whose particular pronunciation issues related to segmental and suprasegmental errors. They found that, with the ASR feedback feature, students improved significantly more than other groups of students who received CAPT but received no feedback. Their findings support the argument that ASR feedback is important as it provides the learners with various types of feedback by showing graphic, animated speech production figures and native speaker pronunciation models which help them improve their pronunciation performance. Pennington (1999) stated that incorporating ASR feedback helps the learners improve their speech production in timing, intonation and linking. Moreover, providing a

presentation of learners' errors helps them improve their production and allows them to continuously reflect on their own learning (Egbert & Hanson-Smith, 1999).

2.17.1 Implications of Learning Theory for Technology Integration

Roblyer (2000) describes how technology integration with learning theories can succeed in carrying out the goals of language learning. The first four learning theories and their implications for technology integration have the most relevance for this study, as is shown in Table 2.5.

Table 2.5

Implications of Learning Theory for Technology Integration

Learning Theory	Implications for Technology Integration
Skinner's behaviourist theories of learning: building on the Response to Stimuli (S-R) connection	Most original drill and practice software is based on Skinner's reinforcement principles. Instructional software is usually based on the idea of programmed instruction, to help the students memorize important basic information, and it provides the students with an efficient way to attain the concepts they want to learn.
Gagne's principles: providing tools for teachers	Gagne, Wager and Rojas (1981) showed how Gagne's 'Events of Instruction' could be used as a basis to plan lessons using instructional software (drill, tutorial and simulation). They said that only a tutorial could 'stand by itself' and accomplish all of the necessary events of instruction if it is based on the events.
The contributions of Vygotsky: building a scaffold to learning	Many constructivist models of technology use the concept of scaffolding to develop each learner as effectively as possible. The more visual tools available, the more help that can be provided to the students to raise their understanding level by showing them graphic examples and giving them a sense of real-life situations.

**Piaget's theories:
cognitive development in
children**

Many technology-using teachers believe that using visual resources can help raise children's development levels more quickly than would have occurred through maturation. However, research to support this belief is still being gathered.

**The contributions of
Bruner: learning as
discovery**

Many of the more 'radical constructivist' uses of technology employ the discovery learning approach suggested by Bruner. Most school uses of technology, however, implement what Eggen and Kauchak (1999) call a guided discovery learning approach.

**Papert: turtles and
beyond**

Papert was not concerned with instructional methods or curriculum matters, and he had no interest in trying to accelerate the stages of cognitive development. He believed that children could advance in their intellectual abilities more quickly with the right kind of environment and assistance.

**Gardner's theory of
multiple intelligences**

Gardner's theory of multiple intelligences links well with the trend toward learning with technology to support learners. When teachers assign students a multimedia product, they can assign students specific roles based on their type of intelligence.

Source: (Roblyer, 2000, pp. 54–67; Moallem, 2001, p. 2) cited in (Lee, 2008, p. 23–24)

Lai and Biggs (1994) argue that mastery learning is achieved over time. In other words, they believe that all students will eventually reach mastery in their learning. Gagne's nine events of instruction provide a good illustration of programmed instruction and mastery learning and are of relevance to the research described in this study.

2.17.2 Gagne's Nine Events of Instruction and Computer Software

Gagne's nine events of instruction provide a very useful computer software design for learning. The events in order are as follows: gain attention, learn information about the objective, stimulate recall of prerequisites, present stimulus material, provide learning guidance, elicit performance, provide feedback, assess performance

and enhance retention and transfer (cited in Moallem, 2001). The ASR EyeSpeak software used in this study followed Gagne's nine events of instruction to ensure an effective and systematic approach to stimulate the learning outcome; the sequence is displayed in Table 2.6.

Table 2.6

Gagne's Nine Events of Instruction

1. Gain attention	Present a good problem, a new situation or a novel idea to gain students' attention.
2. Inform learner of the objective	Objectives are to be communicated effectively to the learner (use words, even pictures, if appropriate).
3. Stimulate recall of prerequisites	Have learners recall previously acquired capabilities just before the new learning takes place.
4. Present the stimulus material	Stimuli that are to be displayed are those involved in the performance that reflects the learning.
5. Provide learning guidance	The amount of hinting or promoting will vary with the kind of learner and the difficulty of the task/lesson objective.
6. Elicit performance	Have learners show that they can carry out the task. This is usually done informally.
7. Provide feedback	Once the correct performance has been exhibited by the learner, there should be feedback concerning the degree of correctness/appropriateness of the learner's performance.
8. Assess performance	At this level, the teacher gathers formal and convincing evidence (valid and reliable) regarding the learner's performance.
9. Enhance retention and transfer	Varieties of new tasks are to be assigned to enhance the learner's understanding and to assure the transfer of learning.

Source: (Moallem, 2001, p. 4)

How will the EyeSpeak programme used in this research fit with Gagne's nine events of instruction? This is illustrated in Table 2.7.

Table 2.7

Matching EyeSpeak with Gagne's Nine Events of Instruction

Event	EyeSpeak
1. Gain attention	Presents authentic content, visual/animated graphics and audio material.
2. Inform learner of the objective	The teacher informs the students about the objectives that they need to work on in each class (i.e. which specific sounds they need to practice in each class) using the ASR software.
3. Stimulate recall of prerequisites	The students are given five minutes to recall a previously acquired capability by using an EyeSpeak activity for a quick revision.
4. Present the stimulus material	Provides native speaker model (with different accents—British, American and Australian) and provides different types of visual and audio material.
5. Provide learning guidance	Learners can follow the guidance easily.
6. Elicit performance	Students can produce their own pronunciation and record it.
7. Provide feedback	Gives scores and tells students exactly which sound they mispronounced. Compares student speech with native speakers by using speech spectrograms, sound waves, diagrams and animated graphics.
8. Assess performance	Records student's own voice and compares it with that of native speakers. Gives scores and shows the students which sound is correct and which one is incorrect by using speech spectrograms, sound waves, diagrams and animated graphics.
9. Enhances retention and transfer	Poses challenges to the learners.

2.17.3 Combining Behaviourist and Constructivist Learning

Hung (2001) described four models of learning: behaviourism, social constructivism, cognitivism and constructivism. He also illustrated the main tenets of these dominant learning theories as shown in Table 2.8.

Table 2.8

Key Concepts of Dominant Learning Theories

	Behaviourist	Cognitivist	Constructivist	Social Constructivist
Learning	Stimulus and response	Transmitting and processing of knowledge and strategies	Personal discovery and experimentations	Mediation of different perspectives through language
Type of learning	Memorizing and responding	Memorizing and application of rules	Problem-solving in realistic and investigative situations	Collaborative learning and problem-solving
Instructional strategies	Present for practice and feedback	Plan for cognitive learning strategies	Provide for active and self-regulated learners	Provide for scaffolds in the learning process
Key concepts	Reinforcement	Reproduction and elaboration	Personal discovery generally from first principles	Discovering different perspectives and shared meanings

Source: (Hung, 2001, p. 284)

According to Beatty (2003), the basic instructional models differ between the constructivist and the behaviourist models. The constructivist model is based on the fundamental belief that it is best to let the students practice and work interactively with a programme based on their interests. The behaviourist instructional model, on

the other hand, is based on the belief that students' engagement is developed and encouraged by extrinsic rewards.

2.17.4 Behaviourist and Constructivist Theories in Using CALL

According to (Roblyer, 2000), proficient technology-oriented teachers should learn to combine direct instruction and the constructivist approach. In implementing these strategies, the teacher should select the most appropriate technology support and the best method to carry them out.

Moallem (2001) proposed that well-designed web-based instruction is a mixture of a variety of learning theories. Learners can then explore their different learning stages and identify their weaknesses. In the first level of learning, students need cognitivist and behaviourist classroom instruction which emphasises direct instruction. After learners gain prior knowledge, they can then acquire more advanced knowledge from collaboration in social interactions to explore their learned knowledge in an authentic context. Moallen (2001) also claimed that the learner's prior knowledge is necessary for learning English as a FL. Furthermore, Hung (2001) demonstrated that the prior knowledge of the learners (e.g. the alphabet sequence) should be 'told' before they engage in constructivist and social constructivist practices. As is the case in which an Iraqi is teaching English pronunciation to college students with little prior knowledge to build on, the focus of the instructional design should be on the beginning level of the students.

Furthermore, students with a low level of English proficiency need more basic instruction that allows them to practise as much as possible. Each student needs drills and practice which can be stimulated by using a software pronunciation training

programme. However, students with a higher level of English proficiency require more collaboration experiences and tools that allow them to communicate with and compare themselves to a model native speaker. Students with a low level of English proficiency need more basic instruction that can allow them to practise repeatedly. They need individualised tutorials, drills, practice activities and feedback, while students with a higher level of English proficiency need a collaborative environment and tools that would allow them to compete with one another. Teaching English to FL college students can be a challenging task, especially teaching those with average to low competence in the TL. Thus, combining instructional technology, whether it is computer-based or web-based, with the traditional teaching methodology, in other words, combining cognitivist and behaviourist approaches as Gagne's nine events suggest, will produce the most effective learning strategy. Providing several practice activities, drilling and feedback will stimulate and reinforce the students' learning. Thus, it is important to note that the ASR programme used in this study allowed for this effective combination.

Otlowski and Fraser (1999; cited in Egbert & Roe, 2016) agreed that the most important goal in teaching pronunciation should not be to focus on native-like pronunciation, but rather to acquire pronunciation that achieves intelligibility and communicability. Harmer (2001) noted that the 'perfect' pronunciation of the students depends on their attitude toward how well they hear and speak. However, many psychological issues may affect FL learners and teachers when they speak the TL. Therefore, teachers should consider intelligibility as the main goal in teaching pronunciation.

Adult learners may be able to control their pronunciation in practice and be more accurate, but still, they cannot transfer this accuracy into a spontaneous speech of the TL (Grant, 2000). Intelligible pronunciation for most language learners, in general, takes a longer time than expected. Grant (2000) also declared that students' development in pronunciation differs from student to student depending on the student's personality, motivation, attitude, the amount of outside practice and his/her first language. Furthermore, he recommended certain principles that play a significant role in aiding effective language learning. First, learners need time and practice to control speaking and reading, which can be noticed in their speech performance. Second, committing errors is a natural part of language learning, and students need to understand and accept this. Third, learners may generalise language rules before they pronounce the language accurately. Fourth, learners may not integrate all the new features into spontaneous speech, even though partial integration is considered to have a positive effect on intelligibility. These principles can be used in teaching FLs in the traditional classroom or in teaching with computer-based instructional design.

2.18 Conceptual Framework

Miles, Huberman and Saldana (2014) defined conceptual framework as an overall visible or written outcome. Consequently, the conceptual framework is a vital element in research for integrating technology in language learning because it can bridge the gap between the potential use and the practical methods required, taking into account current perspectives on the implementation of a computer programme for language learning purposes.

Learning theories are very important to consider when attempting to ensure the delivery of effective instruction using technology. In this section of this study, we will explain the combination of the behaviourist and the constructivist learning theories and its implication for technology integration. Behaviourists have long held influence in the field of computer-based training, with incessant repetition and usage of clear behavioural learning objectives as key elements of these training programmes (Berg, 2003). Most original drill-and-practice software was based on Skinner's reinforcement principles. Instructional software was used to help students efficiently learn and memorise the important information to help them grasp and retain the desired concepts (Roblyer, 2003). Skinner was the first behaviourist to consider the use of the computer for educational purposes. According to Skinner, using technology in teaching offers a key advantage to the learners: immediate feedback. Skinner (1964) stated, the important features of the device, one of them is: 'reinforcement for the right answer is immediate' (p. 24). By teaching with technological devices or programmes, such as the EyeSpeak software used in this study, the constant interchange between the students and the software allows learning improvements. As Skinner (1964) stated, 'Unlike lectures, textbooks, and the usual audio-visual aids, the machine induces sustained activity' (p. 39). Also, information processing theorists have guided the development of artificial intelligence (AI) applications or software which can stimulate the learning process to encode the newly learned information into long-term memory. Some research indicates that, when they are in well-suited learning environment, students perform better (DiPaolo, 1999). Skinner (1964) defined learning opportunity as the environment where learning takes place by using technology in teaching to improve learned behaviour by organising learning objectives, customising the learning experience and freeing

the teacher from repetitive teaching. Therefore, the use of EyeSpeak in this study consisted of several practice and drill activities that were intended to help students learn important concepts as well as memorize the learned information through reinforcement with immediate correction and feedback.

Furthermore, to accomplish the necessary teaching instruction steps in creating an effective lesson that employed ASR EyeSpeak software in teaching pronunciation, Gagné's 'Nine Events of Instruction' were used to ensure an effective and systematic approach to stimulate the learning outcomes. Gagné's nine events of instruction, which make up the sequence that drives the learning process with computer software programmes, are the following: 1) gaining attention, 2) informing the learner of the objectives, 3) stimulating recall of prerequisites, 4) giving the stimulus materials, 5) giving learning guidance, 6) eliciting performance, 7) providing feedback, 8) assessing performance and 9) enhancing transfer and retention (Moallem, 2001, p. 4).

Constructivists, on the other hand, believe that the task of educational technology is to concentrate on the construction of the knowledge and to understand what cognitive structure teachers bring to the learning environment. Vygotsky's constructivist learning theory indicates that technology gives support in the learning process, which constructs the knowledge by providing more visual resources to raise learners' level of understanding, and is tailored to the unique needs of the individual learner. Similarly, Piaget's constructivist theory, which also refers to visual resources, states that using technology with visual resources can raise learners' cognitive development level more quickly. EyeSpeak gives the students the

knowledge using a variety of visual resources. The software visualises how the sound is produced by showing an animated side view of the human speech organ and shows exactly the students' mispronunciation production in detail. Therefore, all these types of visual feedback can support individual learner needs in the learning process.

The pedagogical implementation of technology for the learning objectives of a FL can create a favourable condition for language learning. Integrating technology, such as computers, in FL teaching and learning has become widely accepted. Therefore, the primary focus of this study was on implementing technology in an educational setting, specifically in teaching English pronunciation. English language education is greatly needed today in Iraq, where English language instruction is compulsory and taught in schools and universities, and it is necessary for careers which require a full mastery of specific academic and business-related communication and proficiency in listening, speaking, reading and writing English. Some have not realised the importance of helping students function more effectively in an academic setting or have misunderstood its complex nature. The conceptual framework proposed here focuses on the important element in speaking skills, i.e. pronunciation. The potential for a variety of classroom activities increases as teachers experiment with the use of ASR software as an aid to teaching instruction and reap the advantages of involving technology in the classroom (see Figure 2.20). Using pronunciation software in the classroom setting can facilitate the learning process by having the students listen to the native speaker pronunciation of English and engaging all students in the software activities and allowing them to practise. This is difficult to achieve using traditional teaching methods.

The theory of language learning that underlies this framework, which supports improving language learning, is based on the interconnection to the TL. Combining classroom teaching methods with ASR programmes provides an authentic source of the TL's native speaker pronunciation. Therefore, the students will be more motivated to study and will become familiar with the native English speaker's pronunciation. The search for ways to blend these instructional activities will be imperative as EFL teachers and methodologists endeavour to clarify theoretical approaches and classroom practices in an attempt to provide various opportunities for the development of English pronunciation for FL learners. In FL education, ASR software has been proven to be a convenient teaching aid for many reasons. ASR materials give the students exposure to the use of the FL in a natural setting. Thus, the language will be used in a less structured way. Through the use of ASR EyeSpeak software resources in teaching a FL, students will be given more opportunities to actively practise speaking in the classroom. At the same time, using ASR software will increase the acquisition of knowledge and cognitive skills. EFL educators have been given the responsibility of helping their students acquire certain skills to allow them to connect their knowledge (Kasper & Rose, 1999). Therefore, the instructors' responsibility is to let the students connect what they have learnt and apply it in real-life situations. In this way, ASR software can be used as an effective transitory tool. To help in this process, this study investigated the effectiveness of using ASR software that models standard English pronunciation by native speakers to assist in the students' language learning, specifically in learning English pronunciation.

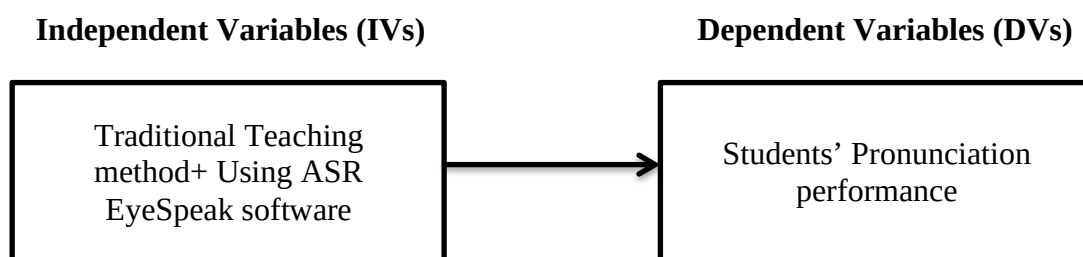


Figure 2.20 Conceptual framework of the study

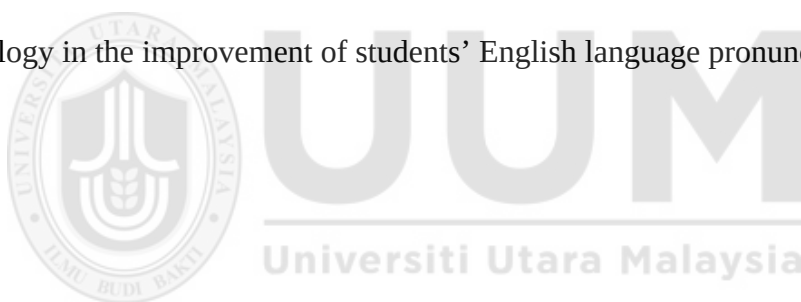
2.19 Conclusion

Foreign language students are empowered by improving their ability to use the learned language. Therefore, using ASR can provide that kind of improvement and assist in their speech production. The literature reviewed in this paper reports on research about how to improve students' speaking skills using CALL programme technology in class from theoretical, pedagogical and practical perspectives. Technology is a fundamental part of the educational world and can effectively help successful language acquisition if used properly in teaching classes. Using ASR CALL programme software in the teaching and learning process can create an authentic and comfortable language environment in which students can communicate naturally using the FL. In this novel way, students will be inspired to participate and become more involved in the tasks and activities used to improve their learning of a FL.

Teaching with the help of computer instruction is growing increasingly common in the field of FL education, especially as its relevance is becoming more acceptable and better understood. The CALL system may offer new hope for enriching language instruction in the FL environment. CALL systems integrated into traditional instruction enable learners to increase the quality of their English pronunciation.

Reviewing previous studies in the field of integrated ASR CALL software in language learning classrooms provides several efficient and tangible recommendations concerning the benefits of technological innovation in respect to the use of ASR and how teachers need to integrate these techniques for efficient pedagogical purposes. Therefore, it will benefit the researcher to build a solid foundation and to use it throughout this research which is based on acceptable theories.

In summary, the study presented in this dissertation attempts to determine the benefit of using ASR technology in Iraqi pronunciation classes. It is expected that efficacy will be achieved through sound language instruction combined with the use of ASR technology in the improvement of students' English language pronunciation.



CHAPTER THREE

METHODOLOGY

3.1 Introduction

This study addressed EFL learners, specifically Iraqi learners in the Department of English at Al-Turath University College. The low proficiency of the students' English pronunciation led to an investigation of the effects of ASR technology in helping the students improve their pronunciation using EyeSpeak software.

When learning EFL, gaining knowledge about the language with a high level of proficiency requires that learners are able to speak and communicate in the language, especially learners who need to accomplish academic tasks in English. Therefore, it is important to note that various authors (e.g. Chapelle, 1997; Levy, 1997) have linked technology integration and successful L2 acquisition to the advantages that CALL has to offer, and this observation has been supported by the recent growing popularity of ASR software applications in educational settings.

One significant benefit of using ASR in English pronunciation class is that it provides learners with more authentic oral practice and that it addresses learners' pronunciation problems. ASR functions offer practice, evaluation and feedback for individual learners; this is difficult to accomplish in the traditional classroom. Consequently, the need for the integration of such a technology is essential to achieve the goal of improving language learners' pronunciation. Hence, this study aimed to examine the effectiveness of using ASR EyeSpeak software in pronunciation class and to determine whether using it helps improve the students' pronunciation.

This chapter will explain, in detail, how the current study was conducted and will explain the research design, sampling method and procedures for collecting and analysing the data.

3.2 Research Design

This study used an experimental research design with two data collection methods, a questionnaire and an interview, to ‘provide a better understanding of the research problem’ (Creswell, 2012, p. 535). A true experimental design known as the Randomized Subjects, Pre-test-post-test Control Group Design (Ary, Jacobs, Sorensen, & Walker, 2013) was used and is shown in Table 3.1.

Table 3.1
Randomized Subjects, Pre-test-post-test Control Group Design

	Group	Pre-test	Independent variables	Post-test
(R)	E	Y ₁	X	Y ₂
(R)	C	Y ₁	--	Y ₂

R: Random assignment of subjects (participants) to experimental groups

E: Experimental group (treatment group)

C: Control group that does not receive experimental treatment

X: Independent variable manipulated by the experimenter (treatment)

Y₁: Dependent variables before the manipulation of independent variables (X)

Y₂: Dependent variables after manipulation of independent variables (X)

Source: Ary, Jacobs, Sorensen and Walker (2013).

According to Creswell (2003), when conducting experimental research, the researcher can manipulate at least one of the independent variables and control the other relevant variables, in order to observe the effect on one or more dependent

variables when one group receives a treatment, but the other group does not. In this way, the researcher can isolate whether it is the treatment and not other factors which influence the outcome. The purpose of the experiment was to examine the effect of integrating ASR EyeSpeak software into Iraqi students' English pronunciation instruction. One independent variable was manipulated by using EyeSpeak software to control other relevant variables, and it measured the effect on the dependent variable, which was the students' pronunciation. One group was exposed to EyeSpeak, and the other group was not. In this way, it could be determined whether it was the treatment that influenced the outcome rather than other factors. The control group did not receive the experimental treatment. Their performance on the dependent variable served as the basis of comparison for the experimental group's performance on the dependent variable. The purpose of this group was to control for threats to validity. A control group is important as scientific evidence requires at least one comparison (Campbell & Stanley, 1963). The statistical analysis made it possible to meaningfully interpret the results of the study.

One technique of data collection used in this study was the closed-ended questionnaire; it investigated the students' perceptions of the EyeSpeak software in terms of its usefulness and ease of use in the process of learning English pronunciation and its functions that help to improve the students' English pronunciation. Semi-structured student interviews, a second data collection method, were conducted to develop more in-depth information on the students' evaluation of the use of EyeSpeak software in pronunciation class to better understand how the experimental intervention worked.

3.3 Sampling

A simple randomised technique was chosen for this study in which sample participants were randomly selected and randomly assigned to groups. The 40 participants of this study were randomly selected from the population of 80 first-year college students in Al-Turath University, Baghdad, Iraq, which were then randomly assigned to two groups of 20 students each to form two new classes specifically for this experiment. They were from 17 to 22 years of age and were all students of the Department of English. The selection procedure used in this study is called the ‘fishbowl technique’ (Drew, Hardman, & Hosp, 2008, p. 97). After determining the individual participants for the study, they were enrolled in a group (class). Two classes were used in this study; one class was the control group, and the second class was the experimental group. Twenty students were randomly assigned to the control group where conventional teaching methods would be used, and twenty were assigned to the experimental group in which technologically supported teaching methods (ASR EyeSpeak software) would be used for teaching pronunciation (Figure 3.1).

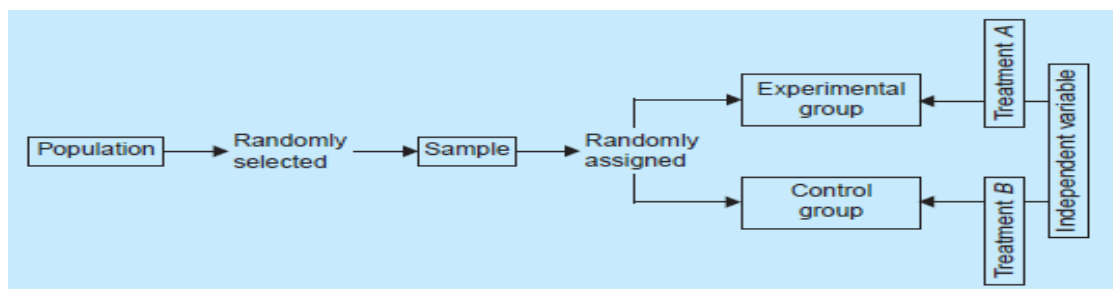


Figure 3.1. The simple two group randomized experimental design (Kothari, 2004).

After the experiment procedure ended, the 20 experimental group students were given a questionnaire. Only 13 students from the experimental group agreed to participate in the interview as some were shy and others did not want their voices

recorded. Those 13 students were at different pronunciation proficiency levels which were identified from their pronunciation receptive and productive post-test scores. This means that students with both higher and lower test scores were included.

3.4 Materials

In this section, all the materials (books and resources) used for both classes will be explained. Also, the ASR EyeSpeak software and its sections, functions and facilities for learning English pronunciation will be detailed.

3.4.1 Pronunciation Classroom Teaching Materials

The materials used for both the control and experimental groups were the same. Both classes used the same textbook, *Better Pronunciation* (O'Conner, 2003), which is used in higher education in Iraq. This book provides a pronunciation system and an introduction to English pronunciation for intermediate and advanced students on how to improve their spoken language. It also explains how the speech organs work. In addition, it introduces separate sounds before putting the sounds into words, rhythm patterns and intonation, and practice material is given at intervals throughout the book. The same lecturer taught both groups in order to prevent the 'experimenter bias effect' whereby the researcher 'unconsciously transmitted to subjects in such a way that their behaviour is affected' (Ary, Jacobs, Sorensen, & Walker, 2013, p. 302). Therefore, both groups were taught by the same pronunciation lecturer, Assistant Professor Fatimah Sabri, who holds a Master's (MLitt) degree in Linguistics from St. Andrews University in the UK. She possesses thirty-four years of experience teaching English language and eleven years of experience teaching phonetics and phonology (pronunciation). Instruction on sound articulation, sound

transcription and phonological processes was provided equally for both classes to help the students understand and improve their pronunciation.

In addition, the instructional materials ('Similar Sounds' and 'Word Practice') were prepared by the researcher and Assistant Professor Sabri in advance of the study. These materials were taken from EyeSpeak, and the subject lecturer was asked to provide the same materials to all students. Thus, the control group students were assigned the same 'Similar Sounds' and 'Word Practice' on the same day as the experimental group, but the experimental group used EyeSpeak.

The lecturer and the researcher also used *English Pronunciation in Use* (Marks, 2007) as a reference in addition to the class text. Effective tests were created from these texts that measured students' improvement in pronouncing English consonant sounds, as the main focus of this study was improving the consonant sounds that are not found in the Arabic sound system. Therefore, only the consonant sounds /p/, /v/, /ŋ/, /ʒ/, /tʃ/ and dark /l/ were tested.

3.4.2 EyeSpeak

EyeSpeak as a component of the experiment was only used by the experimental group. In this study, the primary concern was to help students improve their English pronunciation. Therefore, the focus was on the activities that achieved that goal by practicing the sound learning activities offered in EyeSpeak. The lecturer allowed the students to practise in only two sections—Speech and Fun Time. In the Speech section, the students only practised in the Similar Sounds and Word Practice categories. These categories presented all English speech sounds, but the main focus of the study was the practice of the consonant sounds not found in the Arabic sound

system; therefore, the emphasis was only on these sounds with their nearest sounds in the Arabic sound system. The sounds that the students practised were the following: /p/, /b/, /v/, /f/, /tʃ/, /ʃ/, /dʒ/, /ʒ/, /ŋ/ and /l/.

The Similar Sounds category allows students to practise from the selected sounds provided by EyeSpeak using a variety of words. Two paired words with similar pronunciations are presented, and the students have to select one pair. Next, EyeSpeak presents two words and pronounces one of the words; the students then have to select the correct word being pronounced. This type of drill is repeated five times to obtain the student's score (see Figure 3.2). This activity lets the students hear a clear pronunciation by a native speaker and is especially effective with the use of a headset.

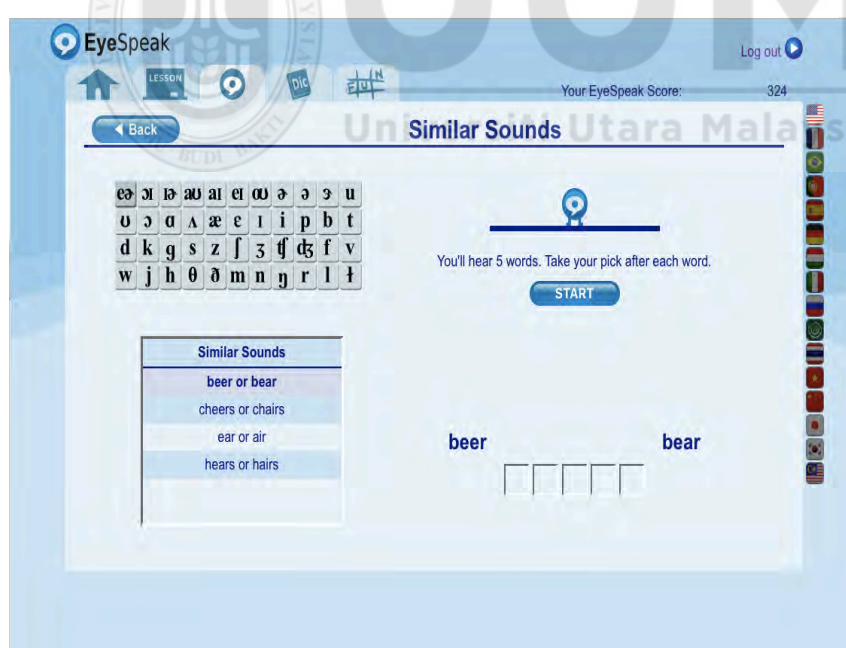


Figure 3.2. The Similar Sounds category of the Speech section in EyeSpeak

The Word Practice category provides opportunities for the students to practise each word under a particular selected sound. The student first listens to the native

speaker's pronunciation for the selected word, and then records his/her pronunciation. Next, EyeSpeak presents the student with a comparative overview of his/her pronunciation with the native speaker's pronunciation of the word. The software provides all the details from the comparison with the native speaker in respect to overall similarity percentage and animated sound wave similarity for pronunciation, pitch, timing, loudness and animated sound production, as well as showing a cutaway side view diagram of the human speech organs (see Figures 3.3, 3.4 and 3.5). It also shows the student's the pronunciation with an animated cutaway side view of the speech organs producing the sound.



Figure 3.3. The Word Practice category of the Speech section in EyeSpeak before selecting a word

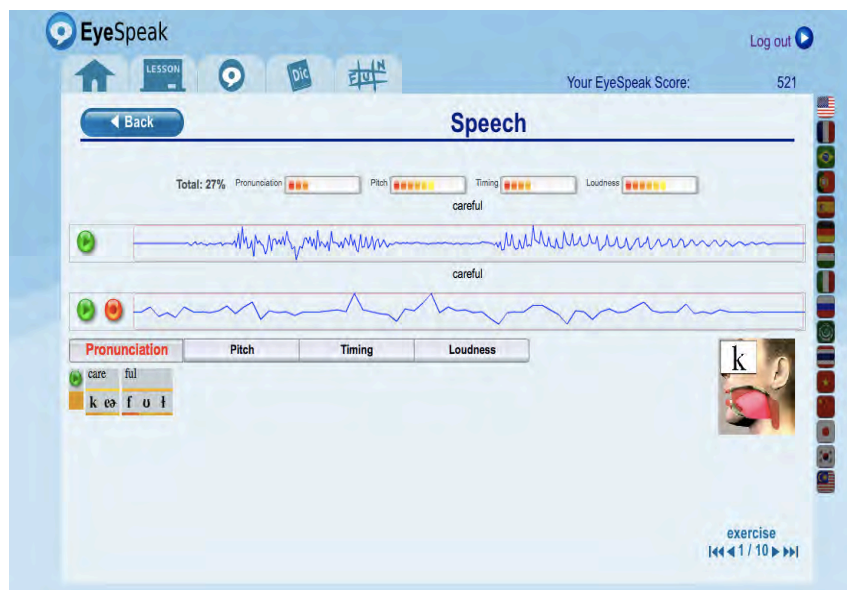


Figure 3.4. The Word Practice category of the Speech section in EyeSpeak after selecting a word

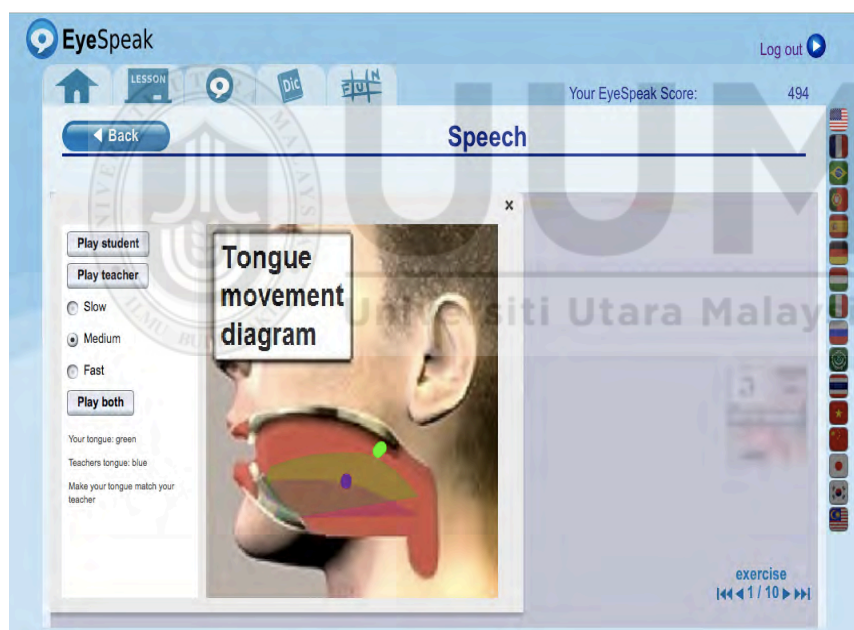


Figure 3.5. The Word Practice category in the Speech section of EyeSpeak after selecting the animated cutaway side view

The second section that the students practised was the Fun Time section. This type of practice is presented as game playing, and rewards students who attain a higher level by encouraging them to be even more motivated and interested in learning. However, few students in our study used this category (see Figure 3.6).

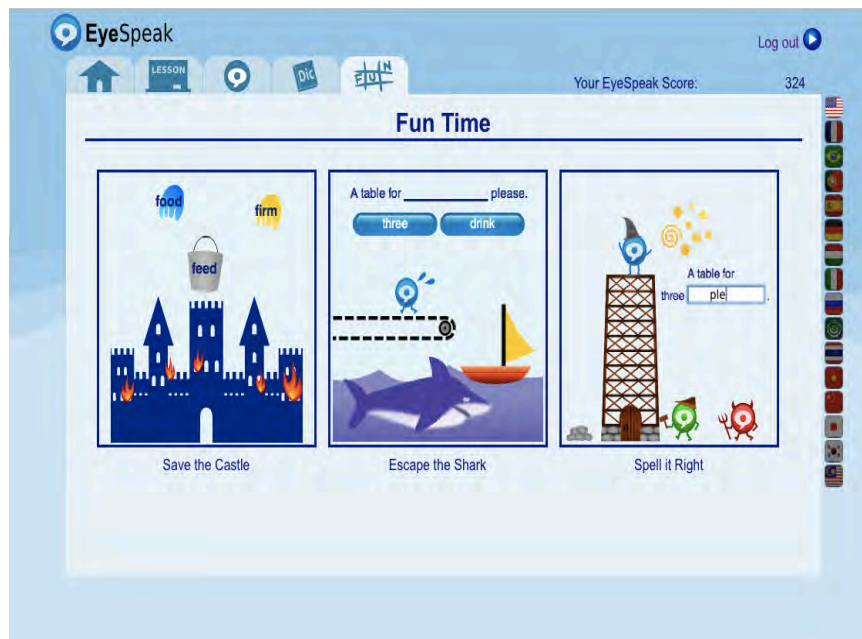


Figure 3.6. The Fun Time section with its three game categories

3.5 Instruments

In this study, several types of instruments were used. The instruments used for data collection were a test (students' pronunciation test), a Likert-scale rating (questionnaire) and an interview (students' interview). All instrument contents were verified by an evaluators' panel consisting of two professors and one assistant teacher (see Appendix A & Appendix B), Assistant Professor Fatimah Sabri (Master's degree holder in Linguistics from St. Andrews University, United Kingdom with thirty-four years experience teaching English language including ten years teaching phonetics and phonology) and Assistant Professor Ahmad Abdul Wahab (Master's degree holder in Linguistics from Baghdad University, Iraq with twenty-five years experience teaching English language) and an assistant teacher, Mustafa Mohamed (Master's degree holder from Sam Higginbottom Institute, India with five years experience teaching English). This was done to ensure the appropriateness of the test content, questionnaire items and interview questions. Two discussion

meetings were held. The first meeting was to give the panel the draft version of all the instruments and get their recommendations for needed improvements. The second meeting was to show the panel the final revised versions of the test, questionnaire and interview based on their comments to ensure that the versions were appropriate prior to the pilot study. At the end of this section, the validity and reliability of each instrument used for data collection will be discussed.

3.5.1 Test

To determine if using ASR EyeSpeak software had any effect on student speaking skills, specifically their English pronunciation, a pre-test and a post-test were used to compare how the pre-test and post-test scores differed.

The same type of achievement test (pronunciation test) was used for the pre-test and post-test and were used in both the experimental and control groups. The specific test used was intended to measure the students' achievement in learning English consonant sounds that are not found in Arabic sound system: /p/, /v/, /tʃ/, /ʒ/, /ŋ/ and /l/ dark. The test consisted of receptive and productive tests and was conducted by Assistant Professor Sabri. Before the treatment began, a pre-test was given to all students in both groups prior to the lecturer explaining and teaching them about these sounds in class.

The test contents were developed jointly by the researcher and Assistant Professor Fatimah Sabri who has research experience in linguistics. The construction of the test items was adopted from *English Pronunciation in Use* (Marks, 2007) and from *Better Pronunciation* (O'Conner, 2003). In the receptive test, students were required to answer all 11 questions, each of which was intended to measure specific sounds

through written or multiple choice responses (see Appendix C). In the 48-question productive test, the students were required to read four pairs of words targeted to test two consonant sounds (see Appendix D). The test that was used had been verified by Assistant Professor Fatimah Sabri, Assistant Professor Ahmad Abdul Wahab and Assistant Teacher Mustafa Mohamed in a pilot study; all necessary clarifications, revisions and corrections were done before the test was used in the study. The test was administered by the lecturer who taught English pronunciation to both the control and experimental groups.

3.5.2 Likert Scale Rating

Questionnaires are useful in investigating educational issues to gather information that is not directly observable, for example, the feelings, accomplishments and experiences of individuals (Gall, Borg, & Gall, 1996).

The questionnaire was administered to investigate the usefulness of EyeSpeak software regarding students' perceptions based on their interactive behaviour with the ASR learning environment. The technology acceptance model (TAM) framework was used to explain attitudes regarding the use of the particular software based on the perceived usefulness and ease of use of the technology. The questionnaire was based on Venkatesh et al.'s (2000) TAM principles, and the questionnaire was adopted from another study by Chen (2009). Modifications were made to the original questionnaire items to fit the current study.

A questionnaire using a 5-point Likert scale of measurement with closed-ended questions was administered in this study. Researchers (Jenkins & Taber, 1977; Mckelvie, 1978) reported that the 5-point Likert scale has a higher reliability of

scale, and similar studies were done (Chen & Wang, 2009; Neri, et al., 2006; Pi-Hua, 2006) that also used a 5-point Likert scale of measurement. The numeric coding order of the questionnaire consisted of the following: 5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree and 1 = strongly disagree. The questionnaire consisted of a cover letter, which explained to the students the purpose of the questionnaire (see Appendix E), and the questionnaire, which consisted of 19 questions (see Appendix F). The questions were divided into three variables: 1) *intention to use*, consisting of five questions about whether the students wanted to use the software in the pronunciation class or not, 2) *perceived usefulness* (PU), consisting of seven questions to gather information about the usefulness of the software and its features and 3) *perceived ease of use* (PEU), consisting of seven questions that provided information about students' impressions of using the software.

The adopted questionnaire categories were based on the TAM, which is one of the most popular theories relating to technology adoption. The TAM has been used mostly to define the attitudes about using a specific technology which is related to the PU and PEU of the technology (Schepers & Wetzels, 2006).

Using a questionnaire permits the students to respond thoughtfully without interference from the researcher. Also, it provides anonymity which increases the response rate that reflects genuinely held opinions. Therefore, using a questionnaire, as stated by Ary, Jacobs and Sorensen (2010), in which the purpose of using a scale is to measure value and opinion that is hard to obtain from other types of measurement, makes this possible.

3.5.3 Interview

The semi-structured interview is another method of collecting data in which the researcher is the interviewer. The semi-structured face-to-face interview allowed the researcher to ask additional questions that emerged based on the students' responses. The interview consisted of the cover letter which explained to the students the purpose for doing the interview (see Appendix G) and 14 open-ended questions (see Appendix H) designed to provide needed information about students' evaluations of the use of EyeSpeak in the pronunciation class. According to Ary, Jacobs and Sorensen (2010), 'the most important aspect of the interview is its flexibility' (p. 380). Therefore, the students' responses during the interview gave meaningful insights into the study and allowed the researcher to obtain in-depth information about the study. It also allowed the researcher to repeat the question when necessary if the student did not understand it. This way, the students did not have any barriers to answering the question, even if it was written in the FL. As explained by Ary, Jacobs and Sorensen (2010), by conducting interviews, the researcher can get more information because communication increases the likelihood of the participants answering and also encourages them to provide all the desired information. The students' responses to interview questions were recorded for the pilot study (see Appendix I) and for the actual study (see Appendix J). By doing this, the researcher was later able to listen to their responses if necessary, and this provided further information needed for data analysis.

3.5.4 Validity and Reliability of the Instruments

In this study, data triangulation was used by combining multiple methods to gather data: tests, interviews and a questionnaire. The data from the students' questionnaires and interviews supported the test results from the experiment which provided in-

depth information about the effectiveness of EyeSpeak in learning English pronunciation. This triangulation strengthened the research because the data then had increased credibility and validity. In order to be successful, research needs to maintain a high degree of validity and reliability. Cohen, Manion and Morrison (2011) define reliability as the trustworthiness and consistency of the measuring instrument over time. Furthermore, Cohen, Manion and Morrison (2011) declared that there are three definitions of validity. The first defines validity as the demonstration of a particular instrument that intended to measure what it is supposed to measure. The second definition claims that validity of the qualitative data is addressed through the depth and richness of the data achieved. The third definition claims that the validity of the quantitative data can be improved through an appropriate instrument, careful sampling and appropriate statistical use of data analysis.

Ary, Jacobs and Sorensen (2010) stated that validity is very important as it evaluates the measuring instrument. Validity refers to the truthfulness or the accuracy of the measurement. Therefore, it is vital to the research to reduce threats to an instrument's validity.

3.5.4.1 Test Validity and Reliability

In this study, using the test was part of the experimental procedure, and it was important to consider its validity. Lado (1964) described test validity as the appropriateness of the measurement that identifies teachers' educational objectives. Moreover, Harris (1969) states that a test has face and content validity if it is designed to measure the mastery of a particular domain of the study and is relevant to that domain.

The test used in this study measured what it was supposed to measure, pronunciation. The main focus of this study was to test the students' pronunciation specifically on the segmental feature of the consonant sounds of the English phonetic system that are absent in the Arabic phonetic system. In language testing, content validity is important because it ensures that the test adequately samples the material it is supposed to measure and that it supplies information about the nature of the test. As Al-Hamash et al. (1982) noted about test validation, 'a test can be more valid if it is based on analysis of the content of the subject or skill we are testing' (p. 17). Therefore, after preparing the initial form of the test contents, the researcher gave it to an evaluators' panel, consisting of Assistant Professor Fatimah Sabri, Assistant Professor Ahmad Abdul Wahab and Assistant Teacher Mustafa Mohamed, to ensure the content validity of the test, and the panel gave their opinion of the appropriateness of the test's questions. After the contents of the test items were assessed, the panel's recommendations were used to revise the test items. Their evaluation of the topic helped establish that the content validity of the test was suitable for testing English pronunciation, which was exactly what it was supposed to measure. Also, using the test in the pilot study to determine the clarity of the test's contents and whether the questions were understood by students not involved in this study further ensured the test's validity. To avoid the researcher's influence on the students' evaluation of the test, the pronunciation lecturer evaluated the students' answers which prevented any threat to the validation of the evaluation of the students' test scores.

Reliability is important as it measures the consistency of test forms, ratings and other types of measurements (Lado, 1972). Oller (1979) believes that 'reliability provides

consistency which secures validity and indicates how much confidence we can place in our results' (p. 4). According to Harmer (2001), a good test is one that provides consistent results. In practice, making the test instructions clear enhances reliability by narrowing the range of the diversity of responses and making sure that the test conditions are constant.

3.5.4.2 Questionnaire Validity and Reliability

In this study, in order to measure the validity of the questionnaire and to ensure content validity, the researcher gave the questionnaire to the evaluators' panel, which consisted of Assistant Professor Fatimah Sabri, Assistant Professor Ahmad Abdul Wahab and Assistant Teacher Mustafa Mohamed, to ascertain the validity of the questionnaire items and to get their recommendations for improvement. As for its construct validity, the questionnaire was designed to measure the usefulness of ASR software in the students' learning, based on the extended TAM principle of the PU of technology. The questionnaire was based on Venkatesh et al.'s (2000) TAM principles, and the questionnaire was adopted from a study by Chen (2009). Modifications were made to the original questionnaire items in order to fit the current study. The categories of the questionnaire, based on the extent of the TAM elements of PU and PEOU, ascertain an individual's intention to use technology. Venkatesh et al. (2000) conducted questionnaires in four studies over three time periods to test the reliability and the validity of the TAM. Their results showed a high reliability on all measurement scales with Cronbach's alpha coefficients exceeding 0.80. The high reliability and validity of the questionnaire supported its use in the current study.

Various methods can be used to estimate a test's reliability, such as Cronbach's alpha, equivalent forms and the test-retest. In this study, Cronbach's alpha was used to ensure that all subparts of the instrument measured the internal consistency, which is how closely related a set of items is considered to be a measure of scale reliability. Moreover, when the average of correlation is low, the alpha will be low because Cronbach's alpha increases when the number of items constantly increases. In this study, the results from the Cronbach alpha coefficients were calculated to measure the reliability (George & Mallery, 2016) of the questionnaire from the pilot study. The results from the questionnaire's reliability on the first category 'Intention to use' indicated excellent reliability as the value of Cronbach's alpha coefficient was $\alpha = 0.91$, the second category 'Perceived usefulness' indicated good reliability as the value of Cronbach's alpha coefficient was $\alpha = 0.83$ and the third category 'Perceived ease of use' indicated excellent reliability as the value of Cronbach's alpha coefficient was $\alpha = 0.92$. Table 3.2 presents the results of the questionnaire reliability analysis from the pilot study.

Table 3.2

Reliability of the Questionnaire from the Pilot Study

Scale	No. of Items	α
Intention to use	5	0.91
Perceived usefulness	7	0.83
Perceived ease of use	7	0.92

3.5.4.3 Interview Validity and Reliability

To ensure the validity of the interview questions, the researcher gave it to the evaluators' panel, consisting of Assistant Professor Fatimah Sabri, Assistant

Professor Ahmad Abdul Wahab and Assistant Teacher Mustafa Mohamed, to have them ascertain the validity of the contents of the interview and to get their recommendations for any needed improvements. In order to ensure the validity (trustworthiness) of the interview to demonstrate its truth value and to ensure credibility, the researcher tried to prevent using leading questions during the interview to limit the researcher biases. Also, using the voice recordings of the students' responses allowed the researcher to replay the recordings as often as necessary to get an accurate interpretation to help develop the preliminary findings. Two techniques, 'member checking' and 'peer review', were used. Johnson and Christensen (2014) defined the member checking technique as the discussion of the researcher's conclusions with the study's participants (p. 302). Therefore, after interpreting the transcript analyses of the students' interview responses, four of the students were asked to check the interpretation of the findings and the accuracy of the themes. The process involved taking the findings back to the students in written form and then discussing the findings to ensure the accuracy of the report. The technique of 'peer review' was also used; Johnson and Christensen (2014) defined peer review as the discussion of one's interpretations and conclusions with peers or colleagues (p. 303). The application of this technique enabled the auditor to determine if the interpretations and conclusions drawn from students' responses were accurate in terms of focus on the inquiry and not the biases of the researcher. Therefore, this technique was applied by asking Assistant Teacher Mustafa Mohamed to ensure accurate interpretation of the themes and appropriate representation of the findings, by giving him the recordings of the students' responses with the transcripts and the interpretation of the theme and representation

of the findings. In this way, simultaneously, both confirmability and dependability of the data were ensured.

3.6 Pilot Study

The term 'pilot study refers to a mini version of a full-scale study' (Van Teijlingen & Hundley, 2001). A pilot study is the preparatory trial of the research, which is essential to the development of any research study. The purpose of the pilot study used in this research was to determine if the implementation of the research programme achieved its objectives as planned. The benefits of piloting the test contents are that it ensures that the elements of the test's questions are understandable and clear and that the questionnaire and interview questions are completely comprehensible.

3.6.1 Participants of the Pilot Study

The main reason for the pilot study was to determine the data collection procedure and the timeline to be used. The pilot study of this research had different participants than those of the main study, but they were also students of the same first-year level studies enrolled in the Department of English at Al-Turath University College. The pilot study was carried out with 10 participants before the actual research procedure. A distinct benefit of a pilot study is the ability to reduce the number of treatment errors or unexpected problems which may be revealed in the actual study and which could affect the results of the findings (Ary, Jacobs, Irvine, & Walker, 2013). Some studies (Hill, 1998; Isaac & Michael, 1995) have suggested that the number of participants in a pilot study should be from 10 to 30 participants; in this pilot study, 10 randomly selected students were used.

3.6.2 Pilot Study Procedure

The pilot study was conducted in the four weeks from 10 January to 10 February 2016. There were three pronunciation classes per week, and students went to the lab to practise with EyeSpeak once per week. The study material was the assigned pronunciation book used in higher education of Iraq, *Better Pronunciation* (O'Conner, 2003).

The first step was to set the date and time for pre-testing: 10 January 2016 at 10:00 a.m. for 90 minutes. Their pronunciation lecturer was the assigned observer. The second day of the pronunciation class was conducted in the lab where the lecturer explained how to use EyeSpeak's sections and categories. The lecturer made sure that all the students knew how to use the software before the lecture ended. After the lecturer explained the software, students were allowed to explore the software's activities by themselves. Each student had his/her own account and headset, and the students had to log-in to their accounts each time they came to the lab. The lecturer then instructed them about the sounds they needed to work on that day using the EyeSpeak activities.

When the pilot study ended, the date of the test was set for the post-test: 10 February 2016. The same procedure as was done in the pre-test was repeated by the same observer at the same time, 10:00 a.m. for 90 minutes, and then the students' pronunciation lecturer scored and evaluated the students' pre- and post-tests. One day after the post-test, the researcher had a meeting with all the students to ascertain if any changes needed to be made in the interview questions or questionnaire. All students completed the questionnaire and returned it in an envelope to the

Department of English at Al-Turath University College. At the end of the pilot study, the researcher ensured that all the instruments, which included the test, questionnaire and interview, were appropriate, understandable and clear to the students; therefore, no changes were made relative to the content of the instruments. The interpretation of the data from the interview was given to Assistant Teacher Mustafa Mohamed, to ensure accurate interpretation of the data and appropriate representation of the findings.

3.6.3 Analysis of the Pilot Study

To analyse students' tests, a statistical analysis was conducted using a paired samples *t*-test to measure students' differences between their pre- and post-test scores. Cronbach's alpha was run on the data from the test to measure test reliability.

As for the questionnaire, all the raw data were entered into Excel (Microsoft, Redmond, WA, USA), and then the percentage of the students' answers for each question was calculated to obtain the questionnaire's results. The analysis of the contents used for the interview data was performed by coding and then arranging them in categories and groups to determine themes which emerged as a result of writing a summary of the data.

3.6.4 Results of the Pilot Study

3.6.4.1 Test Results

In order to measure the differences between the pre-test and post-test scores of the students in each of the following tests: receptive test, productive test and overall test, a paired sample *t*-test was used in the pilot study.

As for the receptive pre-test and post-test, a Shapiro-Wilk test was conducted to measure the normality distribution (Razali & Wah, 2011), and the result was not significant ($W = 0.96, p = .790$). A Levene's test was conducted to determine the equality of variance, and again the finding was not significant. This signified that the homogeneity of variance was met ($F[1, 18] = 0.24, p = .629$). The result from the t -test showed a significant difference in the means of the receptive pre-test and receptive post-test ($t[9] = -5.12, p < .00$). The mean was significantly lower in the receptive pre-test ($M = 25.00$) as compared with the receptive post-test ($M = 31.70$), as shown in Table 3.3.

Table 3.3

Paired Samples T-test for the Difference Between the Receptive Pre-test and Receptive Post-test of the Pilot Study

Receptive test	Frequency	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>P</i>
Pre-test	10	25.00	5.27	-5.12	9	< .001
Post-test	10	31.70	4.08	-5.12	9	< .001

As for the productive pre-test and post-test, the results of the Shapiro-Wilk test, which was conducted to measure the normality distribution, was not significant ($W = 0.96, p = .742$). A Levene's test was conducted to determine the equality of variance, and the finding was not significant. This signified that the homogeneity of variance was met ($F[1, 18] = 3.16, p = .092$). The result from the t -test showed a significant difference between the means of the productive pre-test and that of the productive post-test ($t[9] = -10.83, p < .001$). The mean was significantly lower in the productive pre-test ($M = 8.00$) as compared with the productive post-test ($M = 21.20$). Table 3.4 presents the results of the paired samples t -test.

Table 3.4

Paired Samples T-test for the Difference Between the Productive Pre-test and Productive Post-test of the Pilot Study

Productive test	Frequency	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>P</i>
Pre-test	10	8.00	2.26	-10.83	9	< .001
Post-test	10	21.20	5.31	-10.83	9	< .001

As for the overall average of the pre-test and post-test, which is the average of the receptive and productive tests, the Shapiro-Wilk test was used to measure the normality distribution, and the result was not significant ($W = 0.88, p = .123$). A Levene's test was conducted to evaluate the equality of variance, and the finding was not significant. This signified that the homogeneity of variance was met ($F[1, 20] = 1.93, p = .180$).

The results of the *t*-test showed a significant difference in the means of the overall pre-test and the overall post-test ($t[9] = -11.22, p < .001$). The mean was significantly lower in the overall pre-test ($M = 33.10$) as compared with the overall post-test ($M = 44.21$). Table 3.5 presents the results of the paired samples *t*-test. Figure 3.7 presents the means of the averages of the pre-tests and post-tests.

Table 3.5

Paired Samples T-test for the Difference Between the Overall Averages of the Receptive and Productive Pre-tests and Post-tests of the Pilot Study

Overall test	Frequency	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>P</i>
Pre-test	10	33.10	7.36	-11.22	9	< .001
Post-test	10	44.21	21.69	-11.22	9	< .001

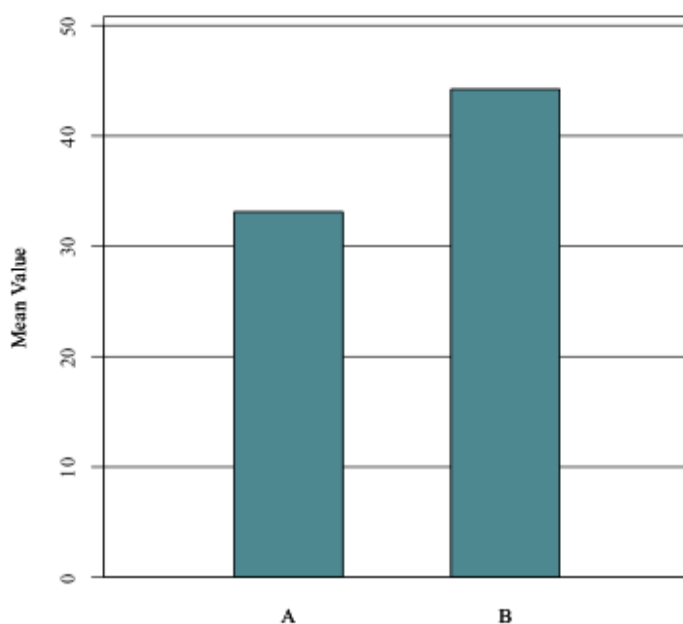


Figure 3.7. The means of the averages of both pronunciation tests from the pilot pre-test (A) and post-test (B)

3.6.4.2 The Pilot Study's Questionnaire Responses

All 10 participating students who enrolled in the pilot study answered the questionnaire, which was comprised of closed-ended questions presented on a 5-point Likert scale. These responses were analysed by entering the raw data into Microsoft Excel and determining the percentage of the students' responses for each question; then, descriptive statistics were run to confirm the results. Table 3.6 presents the student responses towards the usefulness of the EyeSpeak software for improving students' performance in pronunciation class, as the software indicates the student's ratings for each question and the percentage for each question. The standard value was considered irregular if the value skewness was less than -2 or greater than 2, and the value of kurtosis was considered when the variables differed from normal distribution where the value was equal to or greater than 3 (Westfall & Henning, 2013).

The questionnaire consisted of three general categories: the first category (intention to use), the second category (PU) and the third category (PEU). All of the students' responses revealed positivity in all these categories. The higher positive responses were on the second category (PU), especially on item 12, which was, 'Practising sound similarity in words raises my awareness to distinguish between the sounds', and the students' responses were as follows: 80% strongly agree, 20% agree, and 0% were neutral, disagree and strongly disagree, with an average of $M = 4.80$, $SD = 0.42$. Item 7 was 'After practising several times, I became more aware of the correctness of my pronunciation', and the students' responses were as follows: 70% strongly agree, 20% agree, 10% neutral and 0% were neutral, disagree and strongly disagree, with an average of $M = 4.60$, $SD = 0.70$. Item 6 was 'Using EyeSpeak improved my pronunciation', the students' responses were as follows: 60% strongly agree, 30% agree, 10% disagree and 0% were neutral and strongly disagree, with an average of $M = 4.40$, $SD = 0.97$. Item 8 was 'EyeSpeak helps me realise exactly where I mispronounce the English words', and the students' responses were as follows: 10% for strongly agree, 60% for agree, 20% for neutral, 10% for disagree and 0% for strongly disagree, with an average of $M = 3.70$, $SD = 0.82$. Item 9 was 'Listening to a native speaker model increases my ability to pronounce unfamiliar words', and the students' responses were as follows: 40% strongly agree, 60% agree and 0% were neutral, disagree and strongly disagree, with an average of $M = 4.40$, $SD = 0.52$. The second highest positive rating from the students' responses was on the first category (intention to use), especially on item 2, which was 'I like to practise more using EyeSpeak Software', and the students' responses were as follows: 20% strongly agree, 60% agree, 20% neutral, and 0% disagree and strongly disagree, with an average of $M = 4.00$, $SD = 0.67$.

Table 3.6

Questionnaire Question Categories and Students' Percentage Rates (Pilot Study)

Questions	Frequency and percentage					M	SD	Skewness	Kurtosis
	Strongly agree 5	Agree 4	Neutral 3	Disagree 2	Strongly disagree 1				
Intention to use									
1-I like using EyeSpeak in pronunciation class	4(40%)	4(40%)	1(10%)	1(10%)	0%	4.10	0.99	-0.91	-0.03
2- I like to practice more using EyeSpeak Software	2(20%)	6(60%)	2(20%)	0%	0%	4.00	0.67	0.00	-0.50
3- I recommend using EyeSpeak in pronunciation class	5(50%)	3(30%)	0%	1(10%)	1(10%)	4.00	1.41	-1.24	0.15
4-After using EyeSpeak software I feel more confident in speaking English	5(50%)	2(20%)	1(10%)	1(10%)	1(10%)	3.90	1.45	-0.97	-0.43
5-I intend to use EyeSpeak software in the future	5(50%)	4(40%)	1(10%)	0%	0%	4.40	0.70	-0.66	-0.63
Perceived usefulness									
6-Using EyeSpeak improves my pronunciation	6(60%)	3(30%)	0%	1(10%)	0%	4.40	0.97	-1.65	1.82
7- After practicing several times, I have become more aware of the correctness of my pronunciation	7(70%)	2(20%)	1(10%)	0%	0%	4.60	0.70	-1.40	0.61
8-EyeSpeak helps me realize where exactly I mispronounce the English words	1(10%)	6(60%)	2(20%)	1(10%)	0%	3.70	0.82	-0.68	0.15
9-Listening to native speaker model increase my ability to pronounce unfamiliar words	4(40%)	6(60%)	0%	0%	0%	4.40	0.52	0.41	-1.83
10-Listening to my own voice recording compared with native speaker model helps me improve my pronunciation	7(70%)	2(20%)	0%	1(10%)	0%	4.50	0.97	-1.91	2.48
11- Visual graphics for speech sound production show me where I did mispronounce the sound	5(50%)	2(20%)	2(20%)	1(10%)	0%	4.10	1.10	-0.73	-0.84
12- Practicing the sound similarity of words raise my awareness in distinguishing between the sounds	8(80%)	2(20%)	0%	0%	0%	4.80	0.42	-1.50	0.25
Perceived ease of use									
13- I enjoyed using EyeSpeak software	4(40%)	4(40%)	1(10%)	0%	1(10%)	4.00	1.25	-1.45	1.39
14- I didn't experience any difficulties in using EyeSpeak software	0%	6(60%)	2(20%)	1(10%)	1(10%)	3.30	1.06	-1.22	0.17
15- I find the program is easy to use	2(20%)	6(60%)	2(20%)	0%	0%	4.00	0.67	0.00	-0.50
16- I feel comfortable practicing my pronunciation using EyeSpeak software	4(40%)	3(30%)	2(20%)	1(10%)	0%	4.00	1.05	-0.60	-0.80
17- I'm not afraid of making pronunciation mistakes when using the EyeSpeak software	5(50%)	3(30%)	0%	1(10%)	1(10%)	4.00	1.41	-1.24	0.15
18-My interaction with EyeSpeak software is clear and understandable	3(30%)	5(50%)	1(10%)	0%	1(10%)	3.90	1.20	-1.44	1.55
19-The programme does not require a lot of mental effort from me	2(20%)	5(50%)	1(10%)	2(20%)	0%	3.70	1.06	-0.56	-0.78

The third highest positive rating from the students' responses was in the third category (PEU), especially in item 15, 'I find the programme is easy to use', and the students' response rates were as follows: 20% strongly agree, 60% agree, 20% neutral and 0% disagree and strongly disagree, with an average of $M = 4.00$, $SD = 0.67$. The lowest student rating was on item 14, which was 'I didn't experience any difficulties in using EyeSpeak software', and the students' responses were as follows: 0% strongly agree, 60% agree, 20% neutral, 10% disagree and 10% strongly disagree, with an average of $M = 3.30$, $SD = 1.06$.

In conclusion, the positive responses of students' ratings showed that practising pronunciation using EyeSpeak helps students to distinguish between sounds. Thus, this type of programme will help Iraqi students determine the differences between sounds in order to prevent any sound transference from Arabic to English in their speech. It also indicated that the use of EyeSpeak in pronunciation class will allow the students to understand the correct pronunciation and increase awareness regarding pronunciation mistakes. Listening to native speakers improved the students' pronunciation. Furthermore, Harmer (2001) notes that listening is the solution to unintelligibility. Listening increased students' interest in practising their pronunciation more with the use of EyeSpeak. The students' positive responses and the high reliability of the questionnaire items indicated that the questionnaire was clear and understandable and was a reliable measure for use in the actual study.

3.6.4.3 The Pilot Study's Interview Responses

The four students in the pilot study included two students with high test scores and two with low test scores, based on the pronunciation post-test scores. All the students expressed positive opinions regarding the effectiveness of using EyeSpeak.

In general, the students expressed awareness of their weaknesses in English pronunciation, as they provided accurate self-ratings concerning their pronunciation level. The students' responses showed that three of them, these are pseudonyms names (Mohamed, Fareed and Zina) had pronunciation issues based on reading word examples given in interview question 3 related to the following sounds: /p/, /v/, /tʃ/, /ŋ/, /z/ and /l/ dark. The students' responses showed a positive attitude based on their use of EyeSpeak, such as 'it is an enjoyable program' (Mohamed, 15 February 2016), 'I think it is interesting to learn pronunciation in a new entertaining way...have the chance to listen to the native speaker' (Fareed, 13 February 2016), 'it is very pleasant...make us learn good English pronunciation' (Reem, 16 February 2016) and 'exciting and feeling comfortable' (Zena, 15 February 2016).

The students also showed a positive view towards the usefulness of EyeSpeak software in the process of learning English pronunciation, relative to the software's features: 1) EyeSpeak provides correction and feedback, 2) it provides the ability to listen to English native speakers, 3) its activities show the sound differences in an easy and understandable way and 4) it provides a format that allows each student to practise as many times as needed. As one student stated, 'I listen to native pronunciation, and I can practise many words with this software' (Reem, 16 February 2016). The students also gave their opinion about the most effective activity. Some students (Mohamed, Fareed and Fatin) referred to the 'Similar Sounds' activity as the most effective in their learning of English pronunciation. One of the students (Zina) referred to the 'Word Practice' activity as the most helpful. Regarding EyeSpeak correction and feedback, all the students expressed that they liked the way that the software exhibited their pronunciation errors and provided

feedback. Two of the students (Mohamed and Fareed) indicated that the EyeSpeak correction and feedback feature is useful for their learning because the software indicates exactly what they mispronounced, while two other students (Reem and Zina) indicated that showing the sound wave of their pronunciation and comparing it with sound wave of the English native pronunciation was an effective way to show correction and feedback.

Based on all the students' responses to the interview, it was determined that EyeSpeak played a significant role in the students' learning of English pronunciation. The software provided students with the opportunities to listen to a native speaker and the practice time needed. The software's method of correcting errors and providing feedback allowed students to determine their pronunciation errors and practise until they achieved the correct pronunciation. Moreover, students' responses showed their enthusiasm towards learning English pronunciation using EyeSpeak because it provided them with a comfortable and stress-free environment.

The pilot study did not identify any practical problems in research procedures or research questions. The only problem that the researcher experienced was related to poor recording, which led the researcher to carefully check the voice recordings of the students' responses in the actual study. Also, based on the students' responses, which indicated that the interview questions were clear and understandable, no changes were made to the interview questions.

3.7 Data Collection Procedure

This study investigated whether using one tool of the CALL programme, the ASR EyeSpeak software, facilitates the process of learning English pronunciation and

whether the software helps students overcome their errors in English pronunciation. This section details how the data were collected. A brief summary of all data collection is provided in Table 3.7.

Table 3.7

A Brief Summary of Data Collection

Group	Pre-test		Teaching	Post-test		Questionnaire	Interview
	<i>Receptive test</i>	<i>Productive test</i>		<i>Receptive test</i>	<i>Productive test</i>		
Group (A) Experimental group	On 5 th of March 2016 at 10:00 a.m.	On 5 th of March 2016 at 11:45 a.m.	Traditional teaching method (13 class days) + (8 days) using ASR EyeSpeak software	On 27 th of April 2016 at 10:00 a.m.	On 27 th of April 2016 at 11:45 a.m.	Given to all 20 students on 27 th of April 2016	Interviewing on 28 th of April, 4th of May and 5 th of May 2016
Group (B) Control group	On 5 th of March 2016 at 10:00 a.m.	On 5 th of March 2016 at 11:45 a.m.	Traditional teaching method (21 class days)	On 27 th of April 2016 at 10:00 a.m.	On 27 th of April 2016 at 11:45 a.m.	—	—

3.7.1 Student Enrolment

This study was conducted in the Department of English of Al-Turath University College in Baghdad, Iraq. The study began with the selection of the students. A total of 40 randomly chosen students participated in the study, and all were first-year college students. The students were randomly assigned into two equal classes/groups: a control group (conventional teaching method) and an experimental Group (teaching with CALL, using ASR software).

3.7.2 Pre-test

Following the enrolment of the students into groups, on Saturday the 5th of March 2016 both the experimental group and the control group took a pre-test. Data were

collected from students' productive and receptive achievement test scores for both groups. Students' pre-test scores were compared to ensure that there was no significant difference between the students' scores in both groups. The academic evaluation grading score in Iraq is out of 100%, and the minimum passing grade is 50%, which was used to evaluate the students' pronunciation from the productive and receptive achievement tests. The tests for both the experimental group and the control group took place in the same classroom at 10:00 a.m. and were observed by their pronunciation lecturer at Al-Turath University College in the Department of English. The time of the test was 90 minutes. The productive test was conducted on the same day following the completion of the receptive test. The productive test procedure was started at 11:45 a.m. inside the classroom. The lecturer asked each student to enter the class and then to read a list of words displayed by the class projector, which consisted of 48 words that were divided into six categories; each category contained four pairs of words that were intended to measure two comparative sounds. The lecturer asked the student to read the words in one specific category at a time, and, after finishing each category, the lecturer assigned the student a score for that category. Then, after the student finished reading all the words on the entire list, the lecturer tallied all the scores to obtain the final productive test score.

3.7.3 Pronunciation Instruction

After the pre-test, both the experimental group and the control group began their eight-week (March-April, 2016) pronunciation classes. The students had three classes per week. The same pronunciation lecturer Assistant Professor Fatimah Sabri taught both groups to control any extraneous variables (e.g. the experience of the

lecturer, teaching style and age) that could affect the study's results; also, the researcher attended several lectures to make sure that the teacher's instruction was identical for both groups. The teaching materials were the same for both the Experimental Group and the control group: the textbook, *Better English Pronunciation* by J. D. O'Connor (2003). The only difference was that the experimental group had one lecture in the lab using the EyeSpeak software while the control group's three classes were all conducted in the classroom.

Integrating EyeSpeak software into teaching pronunciation was new in the Department of English at Al-Turath University College. The integration of the ASR software provides native speaker English pronunciation sources and several activities for students to practise, which make learning pronunciation a more accurate, rewarding and fun experience. Using the CAPT feature, ASR software can reduce language classroom anxiety. It can also improve pronunciation independently (Purushotma, 2005).

Both the experimental group and the control group had their 45 minute classes every Saturday, Wednesday and Thursday. Each week, the lecturer covered pairs of consonant sounds for both groups; Appendix K details the weekly syllabus, and Appendix L details an example of one day from the daily syllabus used in the study. The control group was taught using a traditional teaching method; the students spent three lectures in the classroom using a pronunciation book, and the lecturer provided the students with several words to practise. The same book and words were used for each group. The experimental group had one class per week in the lab each Wednesday and two days in the classroom each Saturday and Thursday. Each

student in the experimental group had computer-based pronunciation training using EyeSpeak software.

During the first class in the lab, the lecturer introduced the students to EyeSpeak and showed them how to use the software by describing the software sections and categories and making sure that all the students understood how to work with the software. Moreover, the students were given the opportunity to explore all the features in the software. Each student in the experimental group had his or her own headset and an account for the EyeSpeak software, which was needed to log into each lecture in the lab. Moreover, for lab classes, the lecturer introduced the students to what types of sounds they needed to practise in a certain activity in the EyeSpeak software. Students from the experimental group were required to work with the 'Speech' and 'Fun Time' sections. Under the Speech section, the students had to work with two categories, which were 'Similar Sounds' and 'Word Practice'.

The 'Similar Sounds' category allowed the students to practise selected sounds, which were presented through several paired words with similar pronunciations. The students had to select one pair of words, listen to the native speaker's pronunciation of that pair and then choose the correct word that had been pronounced. This type of drill was repeated five times to obtain the students' scores.

In the 'Word Practice' category, the students practised how to pronounce words under a certain selected sound. First, the students listened to the native speaker's pronunciation and then recorded their own pronunciation. Next, the EyeSpeak programme presented the student with a comparison of the student's pronunciation

with a native speaker model with detailed information, including similarity percentage and animated sound wave similarity for the pronunciation, pitch, timing and loudness, with an animated side figure of the speech organs showing the sound production of the native pronunciation as compared with the student's pronunciation.

The 'Fun Time' section involved rewarded activities for pronunciation finished quickly and with a high score. Therefore, only a few students in the experimental group practised in this section because of their different learning levels; some of the students learned more quickly than others. Similarly, in the control group, the lecturer gave students extra marks as a reward for those who obtained high scores from their participation in the class practice.

3.7.4 Post-test

On Wednesday, 27th of April 2016 during the last week of the classes, the students from both the groups took the post-test, which was the same test as the pre-test. Both groups took the test in the same classroom at 10:00 a.m., and the test observer was the groups' own pronunciation lecturer at Al-Turath University College in the Department of English. The duration of the test was 90 minutes. The productive test was conducted on the same day after completion of the receptive test. The productive test was conducted at 11:45 a.m. inside the classroom, and the lecturer allowed only one student at a time to enter the class for examination. The students were evaluated based on their ability to read a total of 48 words that were divided into six categories; each category contained four pairs of words that were intended to measure two comparative sounds. These words were displayed on a whiteboard using the class projector. The lecturer asked the student to read one category at a time to give the student a score for that category. After the student finished reading all the words, the

lecturer then later counted all the scores for each student to receive the final evaluation for the productive test.

3.7.5 Questionnaire

After each student from the experimental group finished their post-test, the lecturer handed each of them a questionnaire form to complete and then seal in an envelope that belonged to the researcher in the Department of English at Al-Turath University College. The questionnaire consisted of 19 items presented on a 5-point Likert scale (5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree and 1 = strongly disagree). The purpose of distributing the questionnaire to the students who were enrolled in a treatment class for using ASR was to evaluate the usefulness of the EyeSpeak software in the students' learning of English pronunciation. As it was based on students' experience with the ASR learning environment, the questionnaire was able to determine what features of the EyeSpeak software were most useful for the students in improving their English pronunciation. The questionnaire contained closed-ended questions and using it will enable a researcher to 'conveniently compare responses' (Creswell, 2012, p. 386).

3.7.6 Interview

At the end of the study, the data from students' interviews were collected to obtain a wider view and more information regarding the students' perception towards the effectiveness of ASR EyeSpeak software in their learning of English pronunciation. Open-ended questions allowed the researcher to acquire all the information needed from the students because it 'allows participants maximum flexibility for responding to the questions' (Creswell, 2008, p. 233). According to Merriam (1998), using interviews 'can provide access to feeling, thoughts, beliefs, or intentions' (p. 72).

The interviewer (i.e. the researcher) invited the students from the experimental group to participate in an interview related to their experience with the EyeSpeak software. The interviewer selected 13 students with different proficiency levels based on their scores obtained from the EyeSpeak software. The interviewer explained the purpose of the interview to the students and clarified that all their data would be confidential and only used for study purposes. Moreover, before the interview, the researcher provided each student with an 'Interview Cover Letter', which explained the study's confidentiality in written form. Each student read the letter and signed it to give the interviewer permission to start the interview.

On the interview day, which began one day after the post-test (see Figure 3.8 for the interview procedure). The interviews were conducted in the lab. The interviewer met with each student and asked him/her to read the Interview Cover Letter and sign it which granted the permission to record the student's responses; the interview was then started. The duration of each interview was different for each student. Some of the students provided more details while others' responses were quite short. Therefore, the interview session time was a maximum of 10 minutes and a minimum of 5 minutes. It took three days for all 13 students to be interviewed.

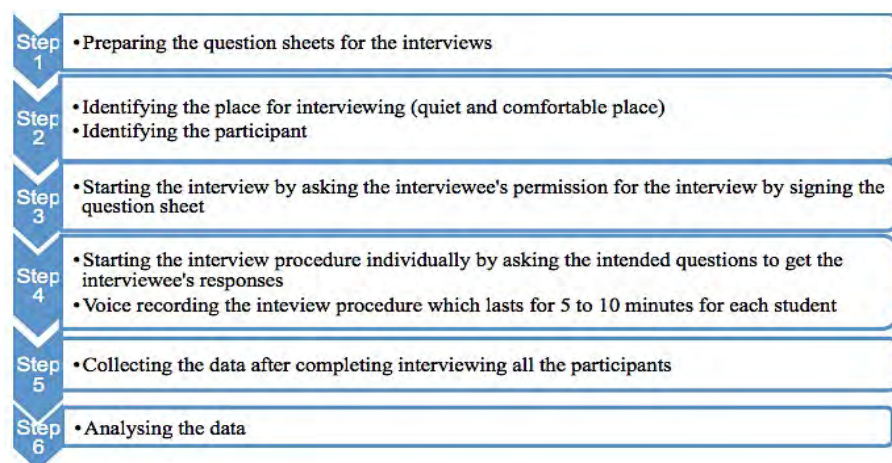


Figure 3.8. Interview procedure

The interviewer made sure to provide the students with a comfortable environment by being friendly, asking the questions clearly, being patient, paying attention and listening carefully to students' responses. Also, the students were allowed ample time to think before they responded. The interviewer also took notes during the interview. Moreover, some of the students with low proficiency in English did not understand certain questions, and this was problematic because, in efficient communication, one must first guarantee that the students understand the question to ensure they provide the intended responses (Foddy, 1993, p. 23). Therefore, the interviewer tried to explain the question in a simple way, and for the sake of interview flow, the interviewer sometimes had to translate the question into Arabic. Table 3.8 presents a summary of all data collection.

Table 3.8
A Summary of All Data Collection

Class	Al-Turath University College: first-year college students.	Experimental group (A): 20 students in a class (ages 17-22).	Control group (B): 20 students in a class (ages 17-22).
Duration of the study	8 weeks	Class A receives three hours of English pronunciation class per week. Each three-hour session consists of two hours of instruction in the traditional classroom using a pronunciation book (<i>Better Pronunciation</i> by Conner, 2003) and one hour of English pronunciation in the computer lab using computer software (EyeSpeak). This hour of laboratory-based practice was the focus of this research.	Class B receives three hours of English pronunciation class per week. These students are taught with the usual materials: the pronunciation book (<i>Better Pronunciation</i> by Conner, 2003) and visual aids such as photos. The students must listen to the teacher and do drilling activities.

Teacher	An expert lecturer who has been teaching this subject (pronunciation) for several years.	The same lecturer teaches both classes A and B.	
Research design	An experimental research design.		
Step 1	Students will not know about the experiment.	Students complete consent forms, and they are randomly sorted into classes.	Students complete consent forms, and they are randomly sorted into classes.
Step 2	Pre-test 5 th of March 2016	The students will be set for a pre-test to measure their knowledge level.	The students will be set for a pre-test to measure their knowledge level.
Step 3	Duration of eight weeks. The experiment starts at the end of the academic year 2015-2016.	The students are taught with software class activities and by listening to a native speaker. The lecturer guides the students.	The students are taught with convectional class material, which are books, visual aids (e.g. picture of speech organs and sound charts), listening to the teacher and class drilling.
Step 4	Post-test 27 th April 2016	The students are set for a post-test to measure whether there is any improvement in the pronunciation.	The students are set for a post-test to measure whether there is improvement in the student's pronunciation.
Step 5	Questionnaire (all students from the treatment group only) 27 th of April 2016	A questionnaire is given to 20 students; the researcher uses close-ended questions.	
Step 6	Interview (selected students from treatment group only) Starts on the 28 th of April 2016 and runs until the 5 th of May 2016.	The researcher interviews 13 students face-to-face using open-ended questions.	

3.8 Technique for Data Analysis

3.8.1 Analysis of Student Test Scores

In this study the pre-test-post-test method was conducted with the two groups in the experimental design. Data collected from the pre-test-post-test (achievement test) were analysed by comparing group means (scores), which, in this study, were those of two groups (experimental and control groups). All the row data were first entered from the students' test scores into an Excel file. The simple average function was used for all 40 scores, which were individually calculated for the pre-test and post-test.

To get the processed rating score, the researcher asked a statistics consultant, who is an expert in that field, to compare the score improvements of the two groups. The recommended statistic measurement was the *t*-test, which was the most appropriate method to evaluate the students' score differences in their English pronunciation. Therefore, a two-tailed *t*-test was conducted using SPSS Statistics software version 23 (IBM, Armonk, NY, USA). First, the data were run in a paired sample *t*-test to compare the students' scores for the pre-test and post-test for each group to identify improvements. Second, the data were run in an independent sample *t*-test to compare the score results for both groups in the pre-test and post-test to identify any difference between the results of the experimental group and the control group. The formula of the *t*-test was used to show the differences between the two means and to reach the *t*-value, which is the score obtained when a *t*-test is performed. The *t*-value represents the difference between the mean or average scores of the two groups. Also, three statistics tests were used in this study: the Shapiro-Wilk test to measure the normality distribution, Levene's test to determine the equality of variance

(homogeneity of variance) and Welch's *t*-test which is conducted when there are unequal variances (non-homogeneity of variance).

3.8.2 Analysis of Student Questionnaire

The post-class questionnaire was intended to evaluate the usefulness of the EyeSpeak software for learning English pronunciation. The questionnaire required the students from the experimental group to rate the effectiveness of the EyeSpeak software features based on their experience using it in English pronunciation class. The questionnaire included 19 questions presented on a 5-point Likert scale (5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree and 1 = strongly disagree). Also, the raw data were entered into an Excel file to calculate a group mean. To analyse the variance of the data from the questionnaire, descriptive statistics were used.

3.8.3 Analysis of Student Interviews

Analysing the content of the data from interviews involves the identification of core consistencies and meaning. The core meaning is determined by analysing and modifying the text content into 'patterns or themes' (Patton, 2015). There are several ways to analyse the text content. One way is to identify categories, and each component of interest is formalised as a 'coding category' (Hardy & Bryman, 2009). The other way of analysing the text content is thematic analysis, where the coding system depends on categories intended to capture the themes exhibited in the text. Therefore, starting with the text allows 'open coding' (Strauss & Corbin, 2014) and enables themes to emerge.

Several themes emerged from the interview data based on the students' responses to the open-ended questions. The analysis process included 1) naming the codes, 2)

arranging the codes into groups, 3) finding the relationships between them and 4) writing the summary (Miles, Huberman, & Saldaña, 2013). Creswell (2014) suggested a guideline for analysing the interview data, which illustrates and summarises the procedure, as shown in Figure 3.9.

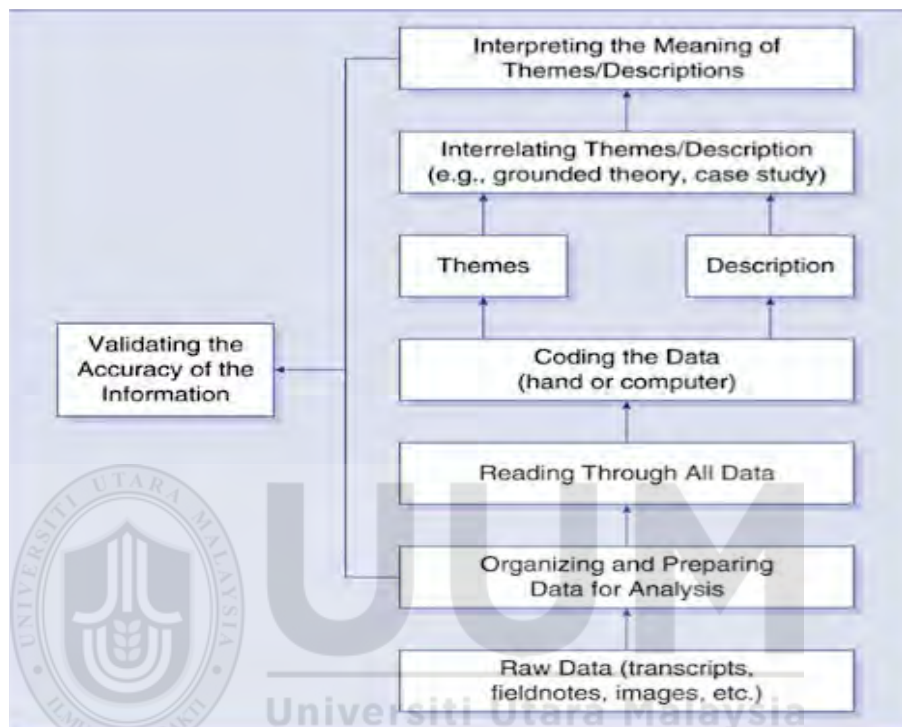


Figure 3.9. The guideline for analysing the interview data (Creswell, 2014, p. 247)

3.9 Validity and Reliability of the Study

Lincoln and Guba (1985) argue that ‘the idea of discovering the truth through the measures of reliability and validity is to establish confidence in the findings’. The conducted experiment part of the study used Ary, Jacobs, Irvine and Walker’s (2013) ‘true experimental design of randomised subject post-test only control group’ (p. 332). This experimental design controlled for most factors concerning internal validity, including ‘history, maturation, testing, instrumentation, statistical regression, selection bias, subject effects and diffusion’ (Ary, Jacobs, & Sorensen,

2010, p. 272). This section will explain, in detail, all the controlled threats in this study, which were the following:

- 1- History refers to any event outside the research that may affect the student's performance; in this study, using a randomization procedure minimised this risk.
- 2- Maturation refers to the natural psychological or biological changes that take place with ageing. Because the current study took only two months, maturation did not affect the result of the study; moreover, using randomization helped to ensure this.
- 3- Testing both the experimental group and the control group by comparing their scores indicated any changes that might arise because of the treatment, not because those changes were previously exposed to the test questions in the pre-test.
- 4- Instrumentation was achieved by using an identical pre-test and post-test; therefore, any changes were related to the independent variable rather than the instrument.
- 5- Statistical regression refers to the tendency for students who obtain high or low scores to score differently on the test; using randomization helped control for this variable without affecting the study.
- 6- Selection bias was controlled because the subject and assignment selection in this study were random.
- 7- Implementation refers to the experimenter bias effect, in another words, when the researcher unintentionally attempts to support a belief or theory. To avoid researcher bias, the researcher gave the students' responses from the pre-test

and post-test to their pronunciation lecturer Assistant Professor Fatimah Sabri to evaluate and score their achievement in both the tests.

- 8- Mortality means that student dropout may drastically affect the results. All the students in this study were committed, and only one of the students could not attend one lecture, which did not affect the study's results.
- 9- Subject effects refer to how students' attitudes can be a threat to internal validity; therefore, this study used a 'blind experiment' which is one where 'the subjects who are participating in the study are not aware of whether they are in the treatment group or the control group' (Rumsey, 2011, p. 61). A blind experiment attempts to control students' bias, to prevent students from the control group who know they are in an experiment from exerting extra effort in order to perform above their typical average.
- 10- Diffusion indicates that, if the treatment effects spread from the treatment group to the control group, this may affect the validation of the study; thus, this study used Gagné's principle of the Nine Events of Instruction to ensure that the implementation was appropriate. As for external validity, this study used random selection and randomly assigned groups, which are the best ways to control any threats to external validity.

To avoid any extraneous variable effects, the examination atmosphere provided a suitable, consistent environment. Therefore, the examination took place in a lab, which was deemed to be suitable concerning temperature and lighting and was isolated from any external sound. Also, the same test was used in the pre-test and post-test, and the test element covered in the experimental procedure was compatible with the content of the textbook (*Better English Pronunciation*). The same book was

taught in both the experimental and control groups. Also, the lecturer was the same person who taught pronunciation for both groups.

Determining the validity and reliability of this study ensured that the test measured what it was supposed to measure, which, in this study, was the pronunciation of Iraqi language learners. Establishing this validity and reliability indicated that the test's elements and study materials were suitable to the students' learning levels.

3.10 Ethical Considerations

Because the nature of experimental research seeks in-depth information about a phenomenon, the participants may be requested to discuss private matters related to their personal lives in the process of data collection. This requires a sufficient level of trust. Patton (2002) proposed a checklist of overall ethical issues that must be considered, such as reciprocity, assessment of risk, confidentiality, informed consent and data access and ownership. To protect the privacy of participants in this study, no confidential information was used and anonymity was guaranteed by giving all the students assumed names. The students were orally informed about what the researcher would do with the information they provided (questionnaires and interviews). Also, the students gave their permission for the study and provided their agreement by signing the official cover letter of the questionnaire and the interview. The students were informed that they were free to not participate in the interview or the questionnaire.

3.11 Summary

After conducting the data collection and analysis, which helped determine the importance of using and integrating video technology in language classes to improve

the process and results of language learning, the final step of the study will be recommendations for practically applying the study's results, which may concern anyone enrolled in the educational system in Iraq, well as ESL instructors in all parts of the world.



CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter will analyse and review the study's results and offer a brief overview of the several types of data collected (i.e. students' pronunciation test score, questionnaires and interviews) on the students' use of the ASR EyeSpeak programme to learn English pronunciation.

4.2 Brief Overview of Study

The key objective of this study was to investigate the effectiveness of EyeSpeak in helping Iraqi FL learners improve their pronunciation and overcome their errors. To measure students' improvement, English pronunciation tests were conducted at the beginning (pre-test) and end (post-test) for both groups of selected students. Individual student scores were then compared between the groups to determine any significant difference in the test scores of the students who received instruction with the software from those who did not. The second aim of this study was to examine the effect of using EyeSpeak on the Iraqi students' learning process by administering a close-ended questionnaire. In addition, an open-ended interview (face-to-face) was conducted to explore in-depth information on the usefulness of the EyeSpeak software in students' learning of English pronunciation.

4.3 Quantitative Findings

4.3.1 Experimental Treatment Results

Research Question 1

Is there any significant difference in Iraqi students' English pronunciation as a result of using the ASR EyeSpeak software?

To measure the effect of the ASR software on pronunciation performance, an experiment was conducted to test for significant differences in students' pronunciation performance between the experimental and control groups. Students in the experimental group used the EyeSpeak software once a week for two months, and those in the control group were taught using traditional teaching methods. To identify the differences, both groups were required to take the pre-test and post-test. The pre- and post-test scores were then analysed using a paired sample *t*-test for each group. The data were subjected to the Wilcoxon signed rank test to validate the pre- and post-test scores for each group. Then, data for both groups were analysed using the independent sample *t*-test to compare the pronunciation scores between the two groups.

4.3.1.1 Data Analysis for Control Group

4.3.1.1.1 Analysis of Control Group's Receptive Pre-test and Post-test

In order to measure the differences between the receptive pre-test and receptive post-test scores of the students, a paired sample *t*-test was conducted. A Shapiro-Wilk test was conducted to measure the normality of the distribution (Razali & Wah, 2011), and the result was not significant ($W = 0.91, p = .055$). Levene's test was conducted to determine the equality of variance (Levene, 1960), and the finding was not

significant. This signified that the homogeneity of variance was met ($F(1, 38) = 0.87, p = .356$). The result from the t -test showed the difference in the means of the receptive pre-test and the receptive post-test ($t(19) = -10.10, p < .001$). The mean was significantly lower in the receptive pre-test ($M = 26.05$) as compared with the receptive post-test ($M = 36.15$). Table 4.1 shows the analysis results between the receptive pre-test and receptive post-test.

Table 4.1

Paired Samples t-Test for the Differences between the Receptive Pre-test and Post-test (Control Group)

Receptive test	Frequency	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Pre-test	20	26.05	4.37	-10.10	19	< .001
Post-test	20	36.15	6.65	-10.10	19	< .001

As per the test results (see Table 4.2), the highest level of improvement was reported for the /ŋ/ sound, which increased from 40% in the pre-test to 74% in the post-test. The second highest was the improvement in the /tʃ/ sound, which increased from 19% in the pre-test to 52% in the post-test. There was a similar improvement level for the sounds /p/ and /ʒ/: the former improved from 42% in the pre-test to 70% in the post-test, and the latter from 14% in the pre-test to 42% in the post-test. The improvement levels for the sounds /l/ and /v/ were lower. As for the /l/ dark and /v/ sounds, they improved from 65% and 42% in the pre-tests to 78% and 52% in the post-tests, respectively.

Table 4.2

The Percentage of the Individual Sound Improvement between the Receptive Pre-test and Post-test (Control Group)

Sound	Receptive pre-test	Receptive post-test	Improvement differences
/ŋ/	40%	74%	34%
/tʃ/	19%	52%	33%
/p/	42%	70%	28%
/ʒ/	14%	42%	28%
/l/ dark	65%	78%	13%
/v/	42%	52%	10%

4.3.1.1.2 Analysis of Control Group's Productive Pre-test and Post-test

The same type of statistical analysis was used to measure the differences between the productive pre-test and productive post-test scores of the students, a paired sample *t*-test. Before the analysis, a Shapiro-Wilk test was conducted to measure the normality of the distribution (Razali & Wah, 2011) which indicated that the data were normally distributed, and the result was significant ($W = 0.73, p < .001$). Also, in order to conduct an alternative test for normality, a Chi-square test was conducted. Figure 4.1 illustrates the result of a quantile-quantile (Q-Q) scatterplot (DeCarlo, 1997) indicating the difference between the productive pre-test and productive post-test. Levene's test was conducted to determine the equality of variance (Levene, 1960), and the finding was not significant. This signified that the homogeneity of variance was met ($F(1, 38) = 0.88, p = .353$).

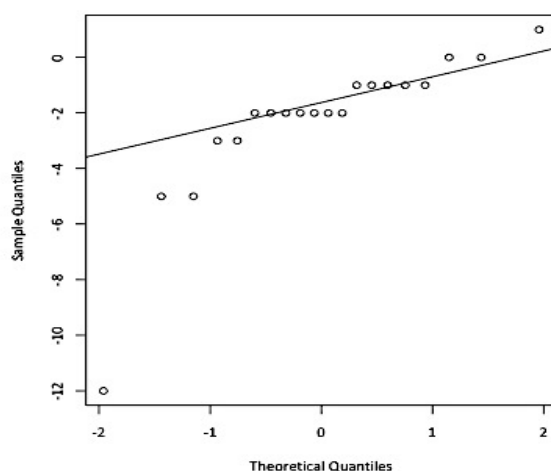


Figure 4.1. Q-Q scatterplot of the normality for the difference between the control group's productive pronunciation pre-test and post-test scores.

The result from the *t*-test showed a difference in the means of the productive pre-test and the productive post-test ($t(19) = -3.79, p = .001$). The mean was significantly lower in the productive pre-test ($M = 15.40$) as compared with the productive post-test ($M = 17.70$). Table 4.3 shows the differences between the productive pre-test and the productive post-test.

Table 4.3

Paired Samples t-Test for the Differences between the Productive Pre-test and Post-Test (Control Group)

Productive test	Frequency	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Pre-test	20	15.40	3.78	-3.79	19	.001
Post-test	20	17.70	5.37	-3.79	19	.001

4.3.1.1.3 Analysis of Control Group's Overall Pre-test and Post-test

A paired sample *t*-test was conducted to measure the differences between the overall pre-test and the overall post-test which included both the receptive and the productive scores of the students. A Shapiro-Wilk test was conducted to measure the

normality distribution (Razali & Wah, 2011), and the result was not significant ($W = 0.92, p = .087$). Levene's test was conducted to determine the equality of variance (Levene, 1960), and the finding was not significant. This signified that the homogeneity of variance was met ($F(1, 38) = 0.83, p = .369$). The result from the t -test showed a difference in the means of the overall pre-test and the overall post-test ($t(19) = -9.40, p < .001$). The mean was significantly lower in the overall pre-test ($M = 41.45$) as compared with the overall post-test ($M = 53.85$). Table 4.4 shows the differences between the overall pre-test and the overall post-test scores of the control group.

Table 4.4

Paired Samples t-Test for the Differences between the Overall Pre-test and Post-Test (Control Group)

Overall test	Frequency	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Pre-test	20	41.45	7.41	-9.40	19	< .001
Post-test	20	53.85	10.63	-9.40	19	< .001

4.3.1.2 Data Analysis for Experimental Group

4.3.1.2.1 Analysis of Experimental Group's Receptive Pre-test and Post-test

A paired sample t -test was used to measure the differences between the receptive pre-test and receptive post-test scores of the students. A Shapiro-Wilk test was conducted to measure the normality of the distribution (Razali & Wah, 2011) which indicated that the data were normally distributed, and the result revealed was significant ($W = 0.80, p < .001$), which indicated a normal distribution. Also, in order to conduct an alternative test for normality, a Chi-square test was conducted. Figure 4.2 illustrates the result of a quantile-quantile Q-Q scatterplot (DeCarlo, 1997) indicating the difference between the receptive pre-test and receptive post-test.

Levene's test was conducted to determine the equality of variance (Levene, 1960), and the finding was not significant. This signified that the homogeneity of variance was met ($F(1, 38) = 1.60, p = .213$).

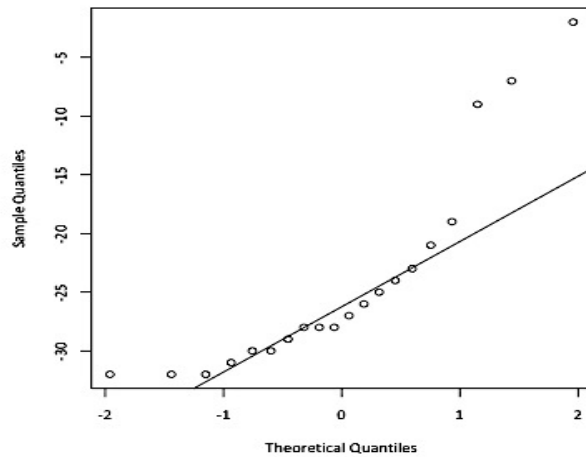


Figure 4.2. Q-Q scatterplot for the normality for the difference between the experimental group's receptive pre-test and post-test.

The result from the t -test showed a significant difference in the means of the receptive pre-test and the receptive post-test ($t(19) = -12.44, p < .001$). The mean was significantly lower in the receptive pre-test ($M = 27.70$) as compared with the receptive post-test ($M = 51.85$). Table 4.5 presents the results for the paired samples t -test.

Table 4.5

Paired Samples t-Test for the Differences between the Receptive Pre-test and Post-test (Experimental Group)

Receptive test	Frequency	M	SD	t	df	p
Pre-test	20	27.70	3.81	-12.44	19	< .001
Post-test	20	51.85	9.54	-12.44	19	< .001

The results for individual sounds (see Table 4.6) revealed that /tʃ/ had the highest level of improvement, which increased from 6% in the pre-test to 57% in the post-test. The second highest level of improvement was reported for /ʒ/, which increased from 6% to 48%. The results for /ŋ/ indicated an improvement from 50% to 90%. Minor improvements were also reported for /p/, /v/ and /l/, with increases from 60%, 55% and 70% in the pre-tests to 98%, 76% and 90% in the post-tests, respectively.

Table 4.6

The Percentage of the Individual Sound Improvement between the Receptive Pre-test and Post-test (Experimental Group)

Sound	Receptive pre-test	Receptive post-test	Improvement differences
/tʃ/	6%	57%	51%
/ʒ/	6%	48%	42%
/ŋ/	50%	90%	40%
/p/	60%	98%	38%
/v/	55%	76%	21%
/l/ dark	70%	90%	20%

4.3.1.2.2 Analysis of Experimental Group's Productive Pre-test and Post-test

A paired sample *t*-test was conducted to measure the differences between the productive pre-test and productive post-test scores of the students. A Shapiro-Wilk test was conducted to measure the normality distribution (Razali & Wah, 2011), and the result revealed was not significant ($W = 0.94, p = .232$).

Levene's test was conducted to determine the equality of variance (Levene, 1960), and the finding was significant. This signified that the homogeneity of variance was violated ($F(1, 38) = 7.48, p = .009$). Consequently, the results may not be reliable. Since equal variances cannot be assumed, Welch's *t*-test was conducted instead of the Student's *t*-test, which is more reliable when two samples have unequal variances

(Ruxton, 2006). The result from the *t*-test showed a significant difference in the means of the productive pre-test and the productive post-test ($t(19) = -8.84, p < .001$). The mean was significantly lower in the productive pre-test ($M = 13.20$) as compared with the productive post-test ($M = 24.45$). Table 4.7 shows the differences between productive pre-test and the productive post-test of the experimental group.

Table 4.7

Paired Samples t-Test for the Differences between the Productive Pre-test and Post-test (Experimental Group)

Productive test	Frequency	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Pre-test	20	13.20	3.41	-8.84	19	< .001
Post-test	20	24.45	7.66	-8.84	19	< .001

4.3.1.2.3 Analysis of Experimental Group's Overall Pre-test and Post-test

A paired sample *t*-test was conducted to measure the differences between the overall pre-test and overall post-test which includes both the receptive and the productive scores of the students of the experimental group. A Shapiro-Wilk test was conducted to measure the normality of the distribution (Razali & Wah, 2011), and the result revealed was significant ($W = 0.87, p = .011$), which indicated normal distribution. Also, in order to conduct an alternative test for normality, a Chi-square test was conducted. Figure 4.3 illustrates a quantile-quantile Q-Q scatterplot of the difference between the overall pre-test and overall post-test. Levene's test was conducted to determine the equality of variance (Levene, 1960), and the finding was significant. This signified that the homogeneity of variance was violated ($F(1, 38) = 4.91, p = .033$). Therefore, Welch's *t*-test was used instead of the Student's *t*-test, which is more reliable when two samples have unequal variances (Ruxton, 2006).

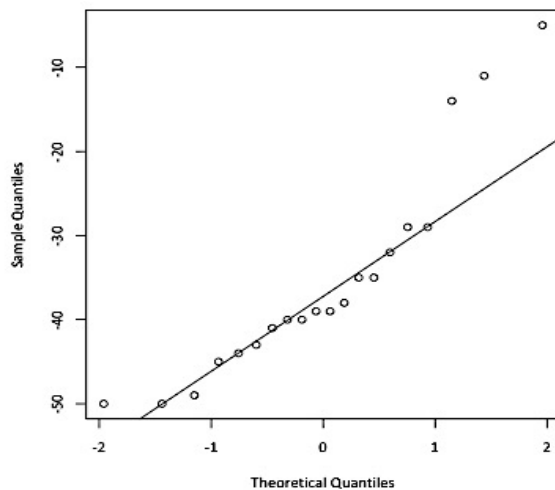


Figure 4.3. Q-Q scatterplot for the normality for the difference between the experimental group's overall pre-test and post-test.

The result from the *t*-test showed a significant difference in the means of the overall pre-test and the overall post-test ($t(19) = -12.57, p < .001$). The mean was significantly lower in the overall pre-test ($M = 40.90$) as compared with the overall post-test ($M = 76.30$). Table 4.8 presents the differences between the overall pre-test and the overall post-test of the experimental group.

Table 4.8

Paired Samples t-Test for the Differences between the Overall Pre-test and Post-test (Experimental Group)

Overall test	Frequency	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Pre-test	20	40.90	5.69	-12.57	19	< .001
Post-test	20	76.30	15.92	-12.57	19	< .001

4.3.1.3 Comparison between Experimental and Control Group

4.3.1.3.1 Analysis of the Experimental and Control Groups' Receptive Pre-tests

To examine whether there was any significant difference between the receptive pre-test between the experimental group (Group A) and the control group (Group B), an

independent sample *t*-test was conducted. A Shapiro-Wilk test was conducted to measure the normality of the distribution (Razali & Wah, 2011), and the results were not significant ($W = 0.97, p = .484$). Levene's test was conducted to determine the homogeneity of variance (Levene, 1960), and the result was not significant ($F(1, 38) = 1.35, p = .252$). This indicated that the assumption of homogeneity of variance was met.

The result of the independent samples *t*-test was not significant ($t(38) = -1.27, p = .211$). This indicates that the mean of the pre-test was not significantly different between the experimental group (Group A) and the control group (Group B) (see Table 4.9). This signifies that both groups had a similar pronunciation proficiency level before the experimental study started (see Figure 4. 4).

Table 4.9

Independent Samples t-Test for the Differences between the Receptive Pre-test of the Experimental Group (Group A) and the Control Group (Group B)

Group	Receptive test	Frequency	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Experimental (Group A)	Pre-test	20	27.70	3.81	-1.27	38	.211
Control (Group B)	Pre-test	20	26.05	4.37	-1.27	38	.211

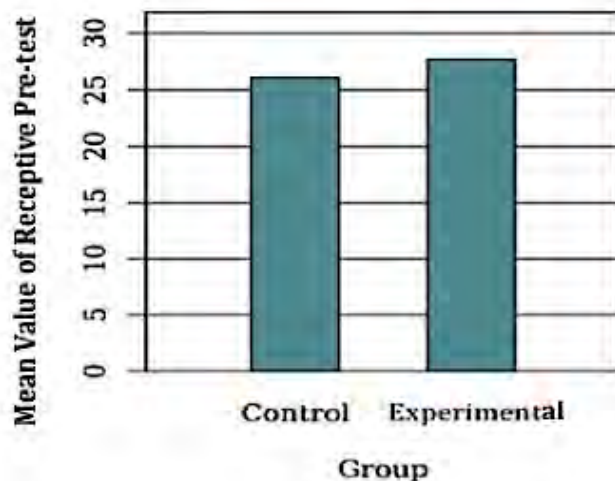


Figure 4.4. The mean values for the receptive pre-test of the control and experimental groups.

4.3.1.3.2 Analysis of the Experimental and Control Groups' Receptive Post-tests

To examine whether there was any significant difference between the receptive post-tests of the experimental group (Group A) and the control group (Group B), an independent sample *t*-test was conducted. A Shapiro-Wilk test was conducted to measure normal distribution (Razali & Wah, 2011). The results of the Shapiro-Wilk test were significant ($W = 0.85, p < .001$). This signifies that the normality of the post-test cannot be assumed. Therefore, an alternative way to test the assumption of normality was used by plotting the quantiles of the model residuals against the quantiles of a Chi-square distribution, also called a quantile-quantile Q-Q scatterplot (DeCarlo, 1997). For the assumption of normality to be met, the quantiles of the residuals must not strongly deviate from the theoretical quantiles. Strong deviations could indicate that the parameter estimates are unreliable. Figure 4.5 presents the Q-Q scatterplot of the post-test. Levene's test was conducted to determine the homogeneity of variance (Levene, 1960), and the result of Levene's test was not significant, ($F(1, 38) = 0.05, p = .820$), indicating that the assumption of homogeneity of variance was met.

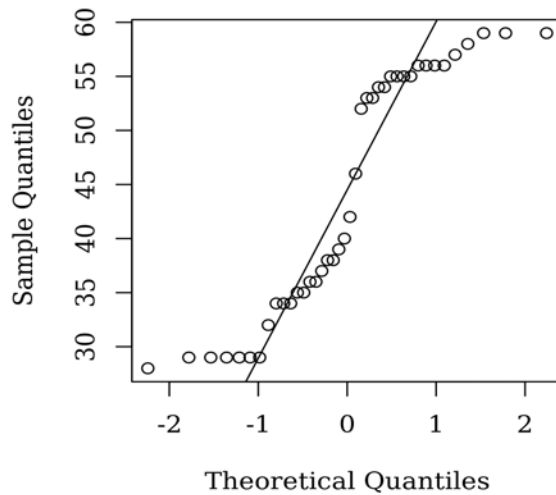


Figure 4.5. Q-Q scatterplot for the normality for the differences between the experimental and control groups' receptive post-tests.

The result of the independent samples t -test was significant, ($t(38) = -6.04, p < .001$), indicating the null hypothesis could be rejected. This suggests the mean of the post-test was significantly different between the control and experimental groups. The mean of the post-test in the control group (Group B) was significantly lower than the mean of post-test in the experimental group (Group A) (See Table 4.10). Figure 4.6 presents the mean differences between the receptive post-tests of the two groups.

Table 4.10

Independent Samples t -Test for the Difference between the Receptive Post-test of the Experimental Group (Group A) and the Control Group (Group B)

Group	Receptive test	Frequency	M	SD	t	df	p
Experimental (Group A)	Post-test	20	51.85	9.54	-6.04	38	< .001
Control (Group B)	Post-test	20	36.15	6.65	-6.04	38	< .001

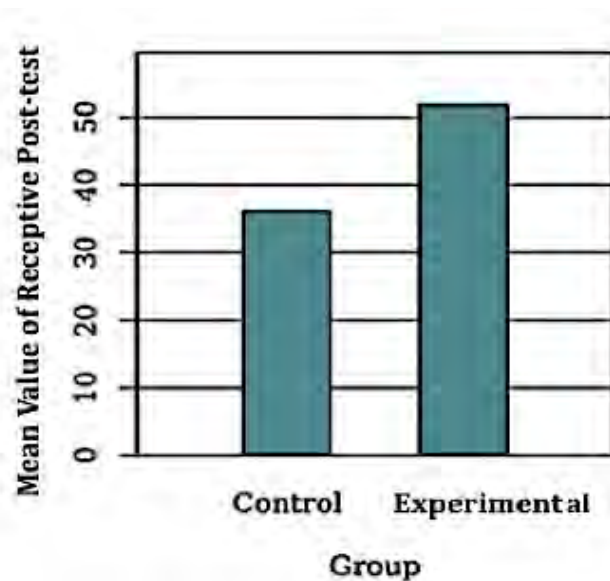


Figure 4.6. The mean values of the receptive post-tests for the control and experimental groups.

4.3.1.3.3 Analysis of the Experimental and Control Groups' Productive Pre-tests

To examine whether there was any significant difference between the productive pre-test between the experimental group (Group A) and the control group (Group B), an independent sample *t*-test was conducted. A Shapiro-Wilk test was conducted to measure normal distribution (Razali & Wah, 2011). The results of the Shapiro-Wilk test were significant ($W = 0.94, p = .025$). This indicates that productive pre-test was unlikely to have been produced by a normal distribution; thus, normality could not be assumed. Therefore, an alternative way to test the assumption of normality was used by plotting the quantiles of the model residuals against the quantiles of a Chi-square distribution, which is the a quantile-quantile Q-Q scatterplot. Figure 4.7 presents the Q-Q scatterplot of the productive pre-test. Levene's test was conducted to measure the homogeneity of variance (Levene, 1960), and the result was not significant ($F(1, 38) = 0.29, p = .593$), indicating that the assumption of homogeneity of variance was met.

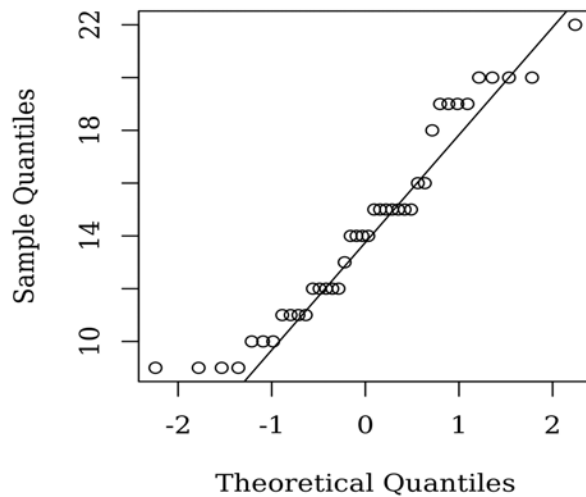


Figure 4.7. Q-Q scatterplot for the normality for the differences between the experimental and control groups' productive pre-tests.

The result of the independent samples t -test was not significant, ($t(38) = 1.93$, $p = .061$). This indicated that the mean of the productive pre-test was not significantly different between the experimental and the control groups (see Table 4.11). This signified that both groups had a similar pronunciation proficiency level before the experimental study started (see Figure 4. 8).

Table 4.11

Independent Samples t -Test for the Difference between the Productive Pre-test of the Experimental Group (Group A) and the Control Group (Group B)

Group	Productive test	Frequency	M	SD	t	df	p
Experimental (Group A)	Pre-test	20	13.20	3.41	1.93	38	.061
Control (Group B)	Pre-test	20	15.40	3.78	1.93	38	.061

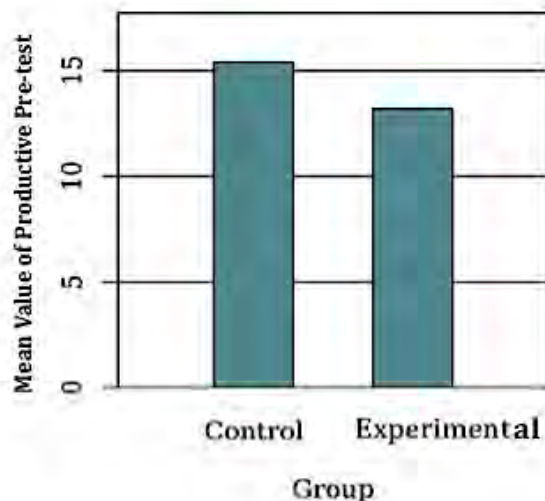


Figure 4.8. The mean values for the productive pre-tests of the experimental and control groups.

4.3.1.3.4 Analysis of the Experimental and Control Groups' Productive Post-tests

To examine whether there was any significant difference between the productive post-test of the experimental group (Group A) and the control group (Group B), an independent sample *t*-test was conducted. A Shapiro-Wilk test was conducted to measure the normality of the distribution (Razali & Wah, 2011). The results of the Shapiro-Wilk test were significant ($W = 0.94$, $p = .047$). This indicated that the normality of the productive post-test could not be assumed. Therefore, an alternative test for the assumption of normality was done by plotting the quantiles of the model residuals against the quantiles of a Chi-square distribution, which is a quantile-quantile Q-Q scatterplot. For the assumption of normality to be met, the quantiles of the residuals must not strongly deviate from the theoretical quantiles. Strong deviations could indicate that the parameter estimates are unreliable. Figure 4.9 presents a Q-Q scatterplot of the productive post-test. Levene's test was conducted to determine the homogeneity of variance (Levene, 1960), and the result of Levene's

test was not significant ($F(1, 38) = 2.25, p = .142$), indicating that the assumption of homogeneity of variance was met.

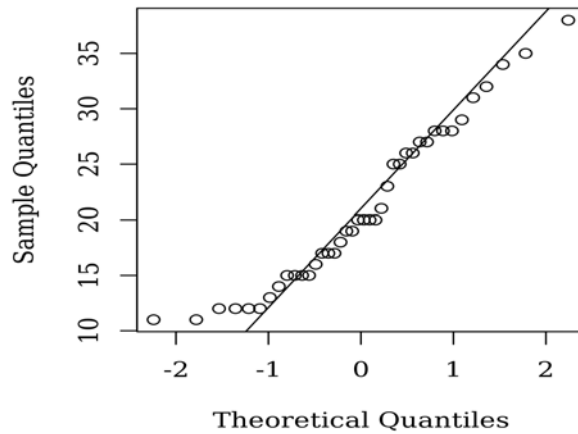


Figure 4.9. Q-Q scatterplot for the normality for the differences between the experimental and control groups' of the productive post-test.

The result of the independent samples t -test was significant ($t(38) = -3.23, p = .003$), indicating the null hypothesis could be rejected. This indicated that the mean of the productive post-test was significantly different between the control and experimental groups. Table 4.12 presents the results of the independent samples t -test. The mean of the productive post-test in the control group was significantly lower than that of the experimental group. Figure 4.10 presents the mean values of the productive post-tests of the experimental and control groups.

Table 4.12

Independent Samples t -Test for the Difference between the Productive Post-test of the Experimental Group (Group A) and the Control Group (Group B)

Group	Productive test	Frequency	M	SD	t	df	P
Experimental (Group A)	Post-test	20	24.45	7.66	-3.23	38	.003
Control (Group B)	Post-test	20	17.70	5.37	-3.23	38	.003

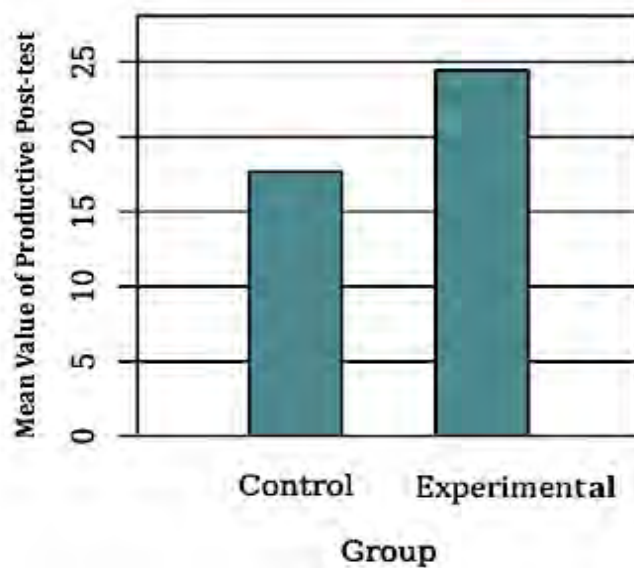


Figure 4.10. The mean values of the productive post-test for the control and experimental groups.

4.3.1.3.5 Analysis of the Experimental and Control Groups' Overall Pre-tests

To measure the differences between the overall pre-test scores of the experimental group (Group A) and those of the control group (Group B), an independent samples *t*-test was used. A Shapiro-Wilk test was conducted to measure the normality of distribution (Razali & Wah, 2011), and the result revealed was not significant ($W = 0.99, p = .894$). Levene's test was conducted to determine the equality of variance (Levene, 1960), and the finding was not significant. This signified that the homogeneity of variance was met ($F(1, 38) = 2.07, p = .159$).

The result from the independent samples *t*-test was not significant ($t(38) = 0.26, p = .794$), indicating that the mean of the overall pre-test did not significantly differ between the groups. This indicated no significant difference in the pre-test between both groups and similar levels of pronunciation proficiency before the treatment. Table 4.13 presents the results for the pre-tests of the two groups.

Table 4.13

Independent Samples t-Test for the Difference between Experimental (Group A) and Control (Group B) Group's Overall Pre-test

Group	Overall test	Frequency	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>P</i>
Experimental (Group A)	Pre-test	20	40.90	5.69	0.26	38	.794
Control (Group B)	Pre-test	20	41.45	5.69	0.26	38	.794

4.3.1.3.6 Analysis of the Experimental and Control Group's Overall Post-tests

An independent samples *t*-test was conducted to measure the differences between the overall post-tests of the two groups. A Shapiro-Wilk test was conducted to measure the normality distribution (Razali & Wah, 2011), and the result was significant ($W = 0.93$, $p = .012$). Also, a Chi-square was used as an alternative method to test the normality of the variance. Figure 4.11 presents a Q-Q scatterplot for the overall post-test for both groups. Levene's test was conducted to determine the equality of variance (Levene, 1960), and the finding was not significant. This meant that the homogeneity of variance was met ($F(1, 38) = 0.87$, $p = .355$).

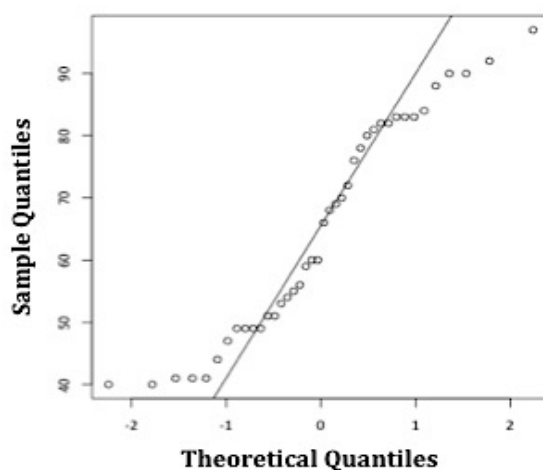


Figure 4.11. Q-Q scatterplot for the normality of the control and experimental groups' overall post-test.

The result from the *t*-test showed a significant difference in the means of the overall post-test between both groups ($t(38) = -5.24, p < .001$), indicating that the null hypothesis could be rejected. The mean was significantly lower in the overall post-test of the control group ($M = 53.85$) as compared with that of the experimental ($M = 76.30$). Table 4.14 shows the differences between the overall post-test of the control and the experimental groups.

Table 4.14

Independent Samples t-Test for the Difference between the Experimental (Group A) and Control (Group B) Groups' Overall Post-test

Group	Overall test	Frequency	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Experimental (Group A)	Post-test	20	76.30	15.92	-5.24	38	< .001
Control (Group B)	Post-test	20	53.85	10.63	-5.24	38	< .001

4.3.2 Findings from Student Questionnaires

Research Question 2

How do Iraqi students perceive EyeSpeak software in term of usefulness and ease of use in the learning process?

The focus of this part of the study was to investigate the students' perception towards the ASR EyeSpeak software in terms of usefulness and ease of use, based on TAM principles, in learning English language pronunciation. At the end of the test, students were asked to report their opinions about the EyeSpeak software through a close-ended questionnaire. The data were then subjected to a Cronbach's alpha statistic test as a guideline to ensure the reliability (George & Mallery, 2016) of the questionnaire. The findings from the reliability test revealed that the first category 'intention to use' indicated good reliability as the value of Cronbach's alpha

coefficient was ($\alpha = 0.84$); the second category ‘perceived usefulness’ indicated good reliability as the value of Cronbach’s alpha coefficient was ($\alpha = 0.90$); and the third category ‘perceived ease of use’ indicated good reliability as the value of Cronbach’s alpha coefficient was ($\alpha = 0.89$). Table 4.15 presents the results of the questionnaire reliability analysis of the study.

Table 4.15

Questionnaire Reliability Results

Scale	No. of Items	α
Intention to use	5	0.84
Perceived usefulness	7	0.90
Perceived ease of use	7	0.89

The questionnaire comprised 19 questions divided into three categories. The first category had five questions that addressed the students’ intention to use EyeSpeak in the future, the second contained seven questions on students’ perceived usefulness of the EyeSpeak software, and the third had seven questions on students’ perception of the ease of software use. All 20 participating students who enrolled in the study provided responses to the questionnaire and revealed a positive attitude towards the intention to use, perceived usefulness and perceived ease of use as it shown in Figure 4.12.

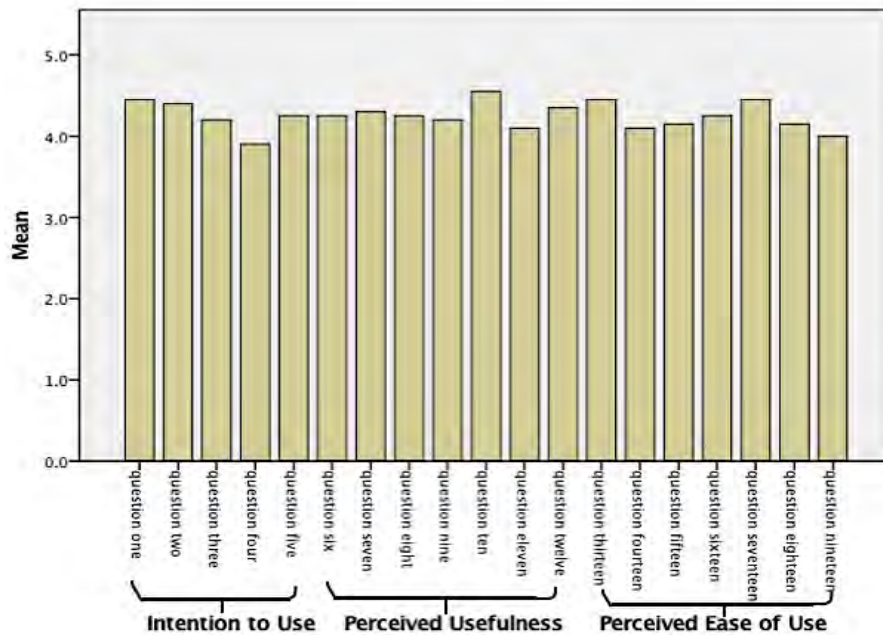


Figure 4.12. Summary of students' questionnaire response rates.

The questions for all three categories and the students' scores per question are presented in Table 4.16, which also provides the values for both skewness and kurtosis. The standard value was considered irregular if the value of skewness was less than -2 or greater than 2 . The value of kurtosis, which considered the variables, differed from the normal distribution if it was equal to or greater than 3 (Westfall & Henning, 2013).

Table 4.16

Questionnaire Questions and Students' Response Rate

Question	Frequency and percentage					M	SD	Skewness	Kurtosis
	Strongly agree 5	Agree 4	Neutral 3	Disagree 2	Strongly disagree 1				
Intention to use									
1-I like using EyeSpeak in pronunciation class	11 (55%)	7 (35%)	2(10%)	0%	0%	4.45	0.69	-0.82	-0.47
2- I like to practice more using EyeSpeak Software	10 (50%)	8 (40%)	2(10%)	0%	0%	4.40	0.68	-0.66	-0.63
3- I recommend using EyeSpeak in pronunciation class	7 (35%)	10 (50%)	3(15%)	0%	0%	4.20	0.70	-0.27	-0.85
4-After using EyeSpeak software I feel more confident in speaking English	5 (25%)	8 (40%)	7(35%)	0%	0%	3.90	0.79	0.17	-1.29
5-I intend to use EyeSpeak software in the future	10 (50%)	5 (25%)	5(25%)	0%	0%	4.25	0.85	-0.49	-1.37
Perceived usefulness									
6-Using EyeSpeak improve my pronunciation	6 (30%)	13 (65%)	1(5%)	0%	0%	4.25	0.55	0.12	-0.34
7- After practicing several times, I become more aware of the correctness of my pronunciation	8 (40%)	10 (50%)	2(10%)	0%	0%	4.30	0.66	-0.37	-0.71
8-EyeSpeak help me realize where exactly I mispronounce the English words	6 (30%)	13 (65%)	1(5%)	0%	0%	4.25	0.55	0.12	-0.34
9-Listening to native speaker model increase my ability to pronounce unfamiliar words	8 (40%)	8 (40%)	4(20%)	0%	0%	4.20	0.77	-0.34	-1.15
10-Listening to my own voice recording compared with native speaker model help me improve my pronunciation	11 (55%)	9 (45%)	0%	0%	0%	4.55	0.51	-0.20	-1.96
11- Visual graphic for speech sound production show me where I did mispronounce the sound	9 (45%)	5 (25%)	5(25%)	1(5%)	0%	4.10	0.97	-0.56	-0.94
12- Practicing sound similarity in words raise my awareness to distinguished between the sounds	11 (55%)	5 (25%)	4(20%)	0%	0%	4.35	0.81	-0.71	-1.05
Perceived ease of use									
13- I enjoyed using EyeSpeak software	12 (60%)	5 (25%)	3(15%)	0%	0%	4.45	0.76	-0.94	-0.57
14- I didn't experience any difficulties in using EyeSpeak software	7 (35%)	8 (40%)	4(20%)	1(5%)	0%	4.10	0.91	-0.62	-0.55
15- I find the program is easy to use	8 (40%)	7 (35%)	5(25%)	0%	0%	4.15	0.81	-0.27	-1.36
16- I feel comfortable practice my pronunciation with EyeSpeak software	7 (35%)	11 (55%)	2(10%)	0%	0%	4.25	0.64	-0.23	-0.62
17- I'm not afraid of doing pronunciation mistake with the use of EyeSpeak software	11 (55%)	7 (35%)	2(10%)	0%	0%	4.45	0.69	-0.82	-0.47
18-My interaction with EyeSpeak software is clear and understandable	8 (40%)	8 (40%)	3(15%)	1(5%)	0%	4.15	0.88	-0.77	-0.09
19-The programme doesn't require a lot of mental effort from me	5 (25%)	12 (60%)	2(10%)	0%	1 (5%)	4.00	0.92	-1.68	3.88

4.3.2.1 Intention to Use

The findings for the first category were as follows. For item 1, 'I like using EyeSpeak in pronunciation class', the students' responses were (55%) strongly agree, (35%) agree, (10%) neutral, (0%) disagree and (0%) strongly disagree, with an average of $M = 4.45$, $SD = 0.69$. For item 2, 'I like to practice more using EyeSpeak software', the responses were (50%) strongly agree, (40%) agree, (10%) neutral, (0%) disagree and (0%) strongly disagree, with an average of $M = 4.40$, $SD = 0.68$. For item 3, 'I recommend using EyeSpeak in pronunciation class', the responses were (35%) strongly agree, (50%) agree, (15%) neutral, (0%) disagree and (0%) strongly disagree, with an average of $M = 4.20$, $SD = 0.70$. For item 4, 'After using EyeSpeak software, I feel more confident in speaking English', the responses were (25%) strongly agree, (40%) agree, (35%) neutral, (0%) disagree and (0%) strongly disagree, with an average of $M = 3.90$, $SD = 0.79$. For item 5, 'I intend to use EyeSpeak software in the future', the responses were (50%) strongly agree, (25%) agree, (25%) neutral, (0%) disagree and (0%) strongly disagree, with an average of $M = 4.25$, $SD = 0.85$.

The students' positive ratings indicated that they liked using EyeSpeak in the class and for their practice sessions, and this positivity encouraged the integration of EyeSpeak software in future classes. It also suggested that the students felt more confident about their English-speaking skills after using the software. All of their responses indicated their eagerness to use the software as a learning tool to improve their pronunciation.

4.3.2.2 Perceived Usefulness

In the second category, for item 6, 'Using EyeSpeak improves my pronunciation',

the students' responses were (30%) strongly agree, (65%) agree, (5%) neutral, (0%) disagree and (0%) strongly disagree, with an average of $M = 4.25$, $SD = 0.55$). For item 7, 'After practising several times, I have become more aware of the correctness of my pronunciations', the responses were (40%) strongly agree, (50%) agree, (10%) neutral, (0%) disagree and (0%) strongly disagree, with an average of $M = 4.30$, $SD = 0.66$. For item 8, 'EyeSpeak helps me realize where exactly I mispronounce English words', the responses were (30%) strongly agree, (65%) agree, (5%) neutral, (0%) disagree and (0%) strongly disagree, with an average of $M = 4.25$, $SD = 0.55$. For item 9, 'Listening to a native speaker model increases my ability to pronounce unfamiliar words', the responses were (40%) strongly agree, (40%) agree, (20%) neutral, (0%) disagree and (0%) strongly disagree, with an average of $M = 4.20$, $SD = 0.77$. For item 10, 'Listening to my own voice recording compared with the native speaker model helps me improve my pronunciation', the responses were (55%) strongly agree, (45%) agree, (0%) neutral, (0%) disagree and (0%) strongly disagree, with an average of $M = 4.55$, $SD = 0.51$. For item 11, 'Visual graphics for speech sound productions show me where I did mispronounce the sound', the responses were (45%) strongly agree, (25%) agree, (25%) neutral, (5%) disagree and (0%) strongly disagree, with an average of ($M = 4.10$, $SD = 0.97$). As for item 12, 'Practicing the sound similarity of words raises my awareness in distinguishing between the sounds', the responses were (55%) strongly agree, (25%) agree, (20%) neutral, (0%) disagree and (0%) strongly disagree, with an average of $M = 4.35$, $SD = 0.81$.

The students' positive response rates showed that using EyeSpeak in pronunciation class helped them improve their English pronunciation as it corrected the students'

pronunciation and increased their awareness of mistakes. Also, listening to a native speaker of English allowed the students to enhance the quality of their pronunciations. Students' responses to item 10 indicate a positive view, and we can therefore conclude that the recording of students' pronunciations and comparing them with those of a native speaker was considered EyeSpeak's most useful feature. The students also gave a positive rating to EyeSpeak's visual graphics which helped them in their learning of pronunciation. Also, they gave a positive rating to the usefulness of the specific EyeSpeak feature which allowed them to distinguish between sounds. This was particularly useful in the practice sessions of the Iraqi students because it helped them to recognize the differences between sounds and prevent sound transference from Arabic to English in their speech.

4.3.2.3 Ease of Use

The results for the third category were as follows. For item 13, 'I enjoyed using EyeSpeak software', the students' responses were (60%) strongly agree, (25%) agree (15%) neutral, (0%) disagree and (0%) strongly disagree, with an average of $M = 4.45$, $SD = 0.76$. As for item 14, 'I didn't experience any difficulties in using EyeSpeak software', the responses were (35%) strongly agree, (40%) agree, (20%) neutral, (5%) disagree and (0%) strongly disagree, with an average of $M = 4.10$, $SD = 0.91$. For item 15, 'I find the programme is easy to use', the responses were (40%) strongly agree, (35%) agree, (25%) neutral, (0%) disagree and (0%) strongly disagree, with an average of $M = 4.15$, $SD = 0.81$. For item 16, 'I feel comfortable practicing my pronunciation using the EyeSpeak software', the responses were (35%) strongly agree, (55%) agree, (10%) neutral, (0%) disagree and (0%) strongly disagree, with an average of $M = 4.25$, $SD = 0.64$. For item 17, 'I'm not afraid of

making pronunciation mistakes when using EyeSpeak software', the responses were (55%) strongly agree, (35%) agree, (10%) neutral, (0%) disagree and (0%) strongly disagree, with an average of $M = 4.45$, $SD = 0.69$. As for item 18, 'My interaction with EyeSpeak software is clear and understandable', the responses were (40%) strongly agree, (40%) agree, (15%) neutral, (5%) disagree and (0%) strongly disagree, with an average of $M = 4.15$, $SD = 0.88$. For item 19, 'The programme does not require a lot of mental effort from me', the responses were (25%) strongly agree, (60%) agree, (10%) neutral, (0%) disagree and (5%) strongly disagree, with an average of $M = 4.00$, $SD = 0.92$.

The results showed a positive view towards the EyeSpeak software in terms of ease of use; however, in the students' responses for item 14, one student reported facing difficulties in using the software. Students' overall responses demonstrated the positive view that they perceived EyeSpeak as enjoyable, easy to use and comfortable in terms of their pronunciation practice. Also, they perceived the use of EyeSpeak as more convenient in correcting students' pronunciation. Their responses revealed that most considered the use of EyeSpeak easy and understandable, and therefore not requiring considerable mental effort. Only student admitted to difficulties in using the software, based on students' responses to item 19.

4.4 Qualitative Findings

4.4.1 Students' Responses to Open-ended Interview

Research Question 3

What is the students' evaluation of the efficacy of using EyeSpeak software in pronunciation class?

Qualitatively analysing the study, for example, by administering interviews, allowed us to represent students' perspectives (Yin, 2011, p. 7). In addition, interview data provided in-depth information which otherwise could not have been observed. According to Gay, Milla and Airasian (2009, p. 7), collecting qualitative data serves a crucial function as it presents the data in a comprehensive and narrative way to gain insights into a particular phenomenon of interest and 'give[s] a rich description of the object of inquiry' (Boudah, 2011, p. 127).

The purpose of the interview was to collect information about the students' evaluation of EyeSpeak software in the pronunciation class. The interview questions expanded the researcher's knowledge on whether the students were aware of their problems, the sounds considered difficult, whether EyeSpeak software helped them overcome their pronunciation errors on the basis of feedback and the activities or features believed to be the most helpful. This section will detail information pertinent to these questions.

At the end of the study, students were requested to report their opinions on the use of EyeSpeak software in pronunciation class. The interview comprised 14 open-ended questions based on the effectiveness of the EyeSpeak software in the process of learning English pronunciations.

This section presents a brief overview of the eight themes that emerged from the students' interview data: 1) students' self-evaluation of their pronunciation skills, 2) students' unawareness of their pronunciation problems, 3) strategies used to improve pronunciation, 4) students' feeling towards using technology to improve pronunciation, 5) students' impressions of EyeSpeak, 6) students' feedback about

using EyeSpeak in learning pronunciation, 7) students' views of EyeSpeak's 'Similar Sounds' and 'Word Practice' activities and the feedback received and 8) students' suggestions about using EyeSpeak. This section will explain, in detail, each of these themes based on the evidence collected from the students' responses.

4.4.1.1 Students' Self-evaluation of Their Pronunciation Skills

On the basis of the interview responses, this subsection details the students' self-evaluation of their English pronunciation level. The students' responses to interview question 1 showed that most of them gave themselves a high rating for their English pronunciation self-evaluation. Only three students (Sami, Zainab and Tamer) gave themselves a low rating for their English pronunciation self-evaluation. Table 4.17 shows the ratings for all the students involved. Their pronunciation self-evaluation level was an important indicator of their self-awareness regarding their weaknesses in English pronunciation.

Table 4.17.

Students' English Pronunciation Self-evaluation Ratings

Name	Age	Self-evaluation score	Keyword
Ahmad	19	8	Good
Ayman	20	6	Average
Basel	20	9	Very good
Fatin	22	7/9	Above average/Very good
Mays	17	7	Above average
Mazen	18	9	Very good
Malik	20	---	Very good
Munir	20	8/9	Good/Very good
Anwar	21	8	Good
Saber	22	7/8	Above average/Good
Sami	22	5	Below average
Zainab	20	5	Below average
Tamer	20	5	Below average

4.4.1.2 Students' Unawareness of Their Pronunciation Problems

The students' realization of their English pronunciation problems is considered a part of their improvement. Students' awareness of their pronunciation weaknesses is the first step towards improvement and success and allows them to focus on improving their pronunciations. A noteworthy finding was that the students gave higher evaluations of their pronunciation skills than were shown by their actual pronunciation performance.

The interview included questions regarding whether students faced problems with certain sounds. Five of the students (Ayman, Fatin, Mays, Mohammed and Munir) stated they did not face any difficulty. On the other hand, one student (Mays) faced an issue with the /p/ sound; one student (Ahmad) with two vowel sounds, /ɪ/ and /ɒ/; one student (Saber) with sound transcription; one student (Anwar) with two consonant sounds, /p/ and /b/; one student (Zainab) with word syllables; and four students (Basel, Malik, Sami, and Tamer) with long words. While most of the students gave a higher evaluation for their pronunciation ability and claimed to have no problem with pronunciations, some mispronounced various sounds, which was demonstrated in the activity requiring them to read certain words. The details are as follows:

- Ayman mispronounced the /ŋ/ sound in the word 'sing' by replacing it with two sounds /nk/ and, therefore, said /sɪnk/ instead of /sɪŋ/.
- Fatin mispronounced two sounds, /tʃ/ and /ŋ/. She replaced the /tʃ/ sound with that of /dʒ/ in the word 'church', pronouncing it as /tʃɜːtʃ/ instead of /tʃɜːdʒ/; and she replaced the /ŋ/ sound with those of /ng/ in the word 'sing', changing it from /sɪŋ/ into /sɪng/.

- Mays mispronounced the /ʒ/ sound. She replaced the /ʒ/ sound with that of /s/ in the words ‘garbage’ and ‘measurable’. Thus, she mispronounced /meʒərəbl/ as /mi:sərəbl/.
- Malik mispronounced two sounds, /p/ and /v/. He replaced the /p/ sound in the words ‘people’ and ‘paper’ with that of /b/ sound, changing them from /pi:pl/ to /bi:bl/ and from /peɪpə/ to /beɪbə/. He also mispronounced the word ‘oppress’, saying /bæbət/ instead of /əpres/. Second, he mispronounced the sound /v/ in the words ‘victim’ and ‘measurable’ as /f/ and /s/, changing them from /vɪktɪm/ to /fæt../.
- Anwar mispronounced two sounds, /v/ and /ʒ/. He substituted the /v/ sound in the word ‘victim’ with the /f/ sound, pronouncing it as /fɪktɪm/ instead of /vɪktɪm/. Second, he replaced the /ʒ/ sound in the word ‘measurable’ with that of /z/, saying it as /mɪz..rəbl/ rather than /meʒərəbl/.
- Basel mispronounced two sounds, /p/ and /ŋ/. He replaced the /p/ sound in the words ‘people’, ‘pleasure’ and ‘paper’ with that of /b/, changing the words from /pi:pl/ to /pi:bl/, /pleʒə/ to /bleʒə/ and /peɪpə/ to /peɪbə/, respectively. He also mispronounced the /ŋ/ sound in the words ‘king’ and ‘sing’ with two sounds, /ng/ and /k/, changing them from /kɪŋ/ to /kɪng/ and from /sɪŋ/ to /sɪnk/.
- Mazen pronounced all of the six tested consonant sounds correctly.
- Saber mispronounced two sounds: /tʃ/ and /ʒ/. He mispronounced the /tʃ/ sound in the words ‘chips’ and ‘church’ as /ʃ/ and /dʒ/, saying them as /ʃɪps/ instead of /tʃɪps/ and /tʃɑ:dʒ/ rather than /tʃɜ:tʃ/. Second, he replaced the /ʒ/ sound in the word ‘measurable’ with that of /z/, mispronouncing it as /mɪz..rəbl/ instead of /meʒərəbl/.

- Munir mispronounced two sounds, /v/ and /ŋ/. He substituted the /v/ sound in the word ‘victim’ with that of /f/, changing it from /vɪktɪm/ to /fɪktɪm/. Second, he replaced the /ŋ/ sound in the word ‘sing’ with two sounds /nk/, mispronouncing it as /sɪnk/ instead of /sɪŋ/.
- Sami mispronounced three sounds, /p/, /ŋ/ and /tʃ/. First, he replaced the /p/ sound in the words ‘people’ and ‘paper’ with that of /b/, changing them from /pi:pl/ to /bi:bl/ and from /peɪpə/ to /beɪbə/. Second, he substituted the /ŋ/ sound in the words ‘king’ and ‘sing’ with two sounds, /ng/ and /nk/, changing their pronunciations from /kɪŋ/ to /kɪng/ and from /sɪŋ/ to /sɪnk/. Finally, he replaced the /tʃ/ sound in the word ‘church’ with that of /dʒ/, changing it from /tʃɜ:tʃ/ to /tʃa:dʒ/.
- Zainab mispronounced three sounds, /p/, /ʒ/ and /v/. First, she replaced the /p/ sound in the word ‘people’ with that of /b/, mispronouncing it as /pi:pl/ instead of /pi:bl/. Second, she changed the /ʒ/ sound in the words ‘pleasure’ and ‘measurable’ to those of /dʒ/ and /z/, mispronouncing them as /pleɪdʒə/ instead of /pleʒə/ and /mɪz..rəbl/ rather than /meʒərəbl/. Third, she replaced the /v/ sound in the word ‘victim’ with that of /f/, changing it from /vɪktɪm/ to /fɪktɪm/.
- Zaid mispronounced two sounds, /ŋ/, and /p/. He replaced the sounds of /ŋ/ and /p/ with those of /nk/ and /b/ in the words ‘sing’ and ‘oppress’, changing them from /sɪŋ/ to /sɪnk/ and from /əpres/ into /əbreɪs/.
- Ahmad pronounced all the words correctly without mispronouncing any sounds.

The above summary reveals that some of the students mispronounced certain sounds, and that can be linked to their responses to the interview questions on proficiency level and problems with these particular sounds. Their mispronunciation of specific words demonstrated pronunciation mistakes, issues and weaknesses. An analysis of the students' pronunciation performance allows for the following conclusions:

1. The sound that recorded the highest mispronunciation rate was the /ŋ/ sound with six students mispronouncing it, five of whom replaced it with two sounds /nk/, and one who did so with /ng/.
2. The second highest was the /p/ sound with five students replacing it with the /b/ sound.
3. The third highest were /ʒ/ and /v/. Four students mispronounced /ʒ/: one replaced it with the /dʒ/ sound, two with the /z/ sound, and one with the /s/ sound. Also, four students mispronounced /v/ by replacing it with the /f/ sound.
4. The least mispronounced sound was the /tʃ/ sound. Three students replaced it with the /dʒ/ sound.

It appears that some of the students replaced the English sound with the nearest Arabic sound, which evidences the influence of one's mother tongue on the learning of a FL. In particular, the Arabic sound system lacks six consonant sounds of the English language. These six consonant sounds (/tʃ/, /v/, /p/, /ʒ/, /ŋ/ and /l/ dark) were the main focus of this study. In addition, a comprehensive overview of the responses revealed that two students (Sami and Zainab) had the highest level of mispronouncing the sounds, while nine students (Ayman, Fatin, Mays, Malik, Anwar, Basel, Saber, Munir and Zaid) had very few pronunciation mistakes as they

did not mispronounce all the tested consonant sounds in all the words, which indicated that they pronounced the rest of the tested consonant sounds correctly. Ahmad who claimed he faced an issue with the /t/ sound pronounced it correctly. Anwar also reported issues with the /p/ and /b/ sounds, but pronounced them correctly, although he mispronounced other sounds. On the other hand, four students (Ayman, Fatin, Mays and Munir) who claimed that they did not face any issues with pronunciation during their reading sessions, in fact, did make various mistakes. Ayman mispronounced one sound, Fatin mispronounced two sounds, Mays mispronounced one sound and Munir mispronounced two sounds. This allowed us to conclude that these four students were not realistically self-aware of their pronunciation problems with certain sounds. Therefore, some of the students needed more time with the use of the software to help them realize and focus on improvement. The overview of the findings indicated that the sound that the students mispronounced the least in their reading of the example words in the interview was the /tʃ/ sound. It was this sound in the receptive post-test that had the highest level of improvement, which indicated that the findings from the interview confirmed the results from the students' tests. Similarly, the /z/ sound, which was the sound with second highest improvement rate in the students' post-test as well as in the interview responses, was shown to be the second least mispronounced sound, which also confirmed the results from the students' post-test.

4.4.1.3 Strategies Used to Improve Pronunciation

The results clearly indicated that most students had the willingness to improve their pronunciation and that each student may have adopted his or her own technique. For example, some students employed English native sources, such as watching movies,

listening to music or broadcasts, communicating with native speakers via the Internet and reading stories and magazines. Of all the participating students, five (Sami, Basel, Mays, Ahmad and Munir) listened to native songs, five (Ahmad, Fatin, Saber, Zainab and Anwar) communicated with their colleagues and family, three (Mays, Malik and Munir) watched movies, one (Anwar) communicated with a native speaker over the Internet, one (Ayman) listened to the broadcasting programme 'Voice of America' and two (Tamer and Mazen) read stories and magazines.

4.4.1.4 Students' Feelings towards Using Technology to Improve Pronunciation

The students were asked whether they had any previous experience using any type of technology in their learning process to improve their pronunciation and if they liked using computers and software. This previous experience could have affected the study's results. However, none of the students had used any type of computer software. In addition, most students felt comfortable using a computer and new software, except one: 'I hate the computer, but I feel comfortable using EyeSpeak with other students' (Anwar's response to question 5; 4 May 2016).

4.4.1.5 Students' Impressions of EyeSpeak

This subsection sheds light on students' experience using the EyeSpeak software in pronunciation class. All of the 13 students offered positive responses, some of which are detailed below. Most of the students expressed their positive opinions using words such as 'good', 'easy' and 'comfortable'.

- Ahmad stated, 'it is modern to use software and it helps me pronounce sounds' (Ahmad's response to question (7); 4 May 2016).
- Ayman said that using EyeSpeak in class 'was good and it's interesting when I use it with my friends' (Ayman's response to question (7); 4 May 2016).

- Mazen described the learning process using EyeSpeak as ‘a better way to learn pronunciations’ (Mazen’s response to question (7); 4 May 2016).
- Anwar described it as interesting, motivational and inspiring: ‘it is so interesting. It inspires and motivates me to learn new pronunciations in English’ (Anwar’s response to question (7); 4 May 2016).
- Saber described the EyeSpeak software as an ‘amazing programme. I enjoy using it’ (Saber’s response to question 7; 5 May 2016).
- Zainab pointed out the importance of having EyeSpeak in pronunciation class: it ‘is a very important programme and helps us improve our pronunciation’ (Zainab’s response to question 7; 4 May 2016).

The following are responses to the question based on their feelings towards the use of EyeSpeak in the learning process. More specifically, Ahmad and Ayman reported being comfortable in using EyeSpeak and felt that it improved their pronunciation. Basel, Tamer, Malik and Munir ‘felt good’ using the software. Fatin and Mays mentioned it as an easy-to-use tool. Anwar and Mazen deemed that using EyeSpeak was an ‘interesting’ experience. Sami, Mays and Tamer considered using the EyeSpeak software as ‘helpful’ because it corrected their pronunciation. Other students were more detailed in their responses. Munir felt ‘great’ because he was able to learn more using the software. Saber said ‘it’s an amazing programme. I enjoy using it’ and ‘it improves my pronunciation skill, my listening skill’, which can be directly associated with the improvement he experienced (Saber’s response to question 8; 5 May 2016). Only Zainab offered contradictory responses as she responded positively to question 7, saying that the programme ‘is a very important programme and helps us improve our pronunciation’, while, at the same time, she

gave a negative response to question 8: ‘I feel some stress and anxiety at the same time’ (Zainab’s response to question 8; 4 May 2016).

4.4.1.6 Students’ Feedback about Using EyeSpeak in Learning Pronunciation

When the students were asked if EyeSpeak helped them to learn pronunciation, all the students responded positively. Anwar referred to it as the reason he consistently practices his pronunciation. Ahmad explained it as helpful by saying that ‘many activities help me pronounce the word correctly’ (Ahmad’s response to question 9; 4 May 2016). Munir stated that he sometimes was unable to clearly hear the lecturer, and the clear voice of the native speaker was therefore a helpful tool: ‘I don’t hear his voice, but with this programme, I can put on my headphones to listen to the actual pronunciation...I know there is nothing wrong with doing it, so I think it’s really helpful for me’ (Munir’s response to question 9; 28 April 2016). Mays mentioned a reason similar to that of Munir and Tamer who considered EyeSpeak helpful because of its native speakers: ‘Some words are difficult, but with native speakers, it becomes easier’ (Tamer’s response to question 9; 5 May 2016).

Therefore, we can understand that the software provided the students with the opportunity to have individual practice sessions and sharpened their ability to realize their mistakes. In addition, the clear native speaker and use of a headset allowed students to repeat the sound as many times as they needed.

4.4.1.7 Students’ Views of EyeSpeak’s ‘Similar Sounds’ and ‘Word Practice’ Activities and the Feedback Received

Students were asked to list the most helpful activities in their learning of English pronunciation. Ten students mentioned the ‘Similar Sounds’ activities, two noted the

‘Word Practice’ activities, and two highlighted that listening, in general, was the most helpful.

Next, students were asked to discuss how the EyeSpeak software’s feedback and corrections helped them learn English pronunciation. Four students (Basel, Fatin, Sami and Tamer) offered generic responses: two described the feedback as ‘helpful’, and two considered it to be ‘good’ and ‘very good’, respectively. The remainder of the students offered more detailed information, which can be summarized under five categories: 1) method of feedback, 2) native speaker’s voice, 3) identification of mistakes, 4) being comfortable and less embarrassed and 5) interesting way of learning.

First, students appreciated ‘the method of feedback’ because the software presented activity-specific corrections in an easy and understandable manner. Ahmad explained that in the ‘Similar Sounds’ activities, the native speaker compared two similar sounds and then asked users to choose the correct word, which helped him the most because it allowed him to not only realize the difference between two similar sounds but also pronounce it as well as the native speakers. Similarly, Anwar pointed out that the ‘Similar Sounds’ activities made him more aware about sound differences, especially between two words with similar sounds. Munir stated, ‘We all have a problem with voices. Like, sometimes, I say “vine” and “fine”. If I don’t pronounce it with a /v/ sound, the person I am speaking with will not understand what I’m saying. So, that was really helpful’ (Munir’s response to question 12; 28 April 2016)

Second, three students positively reacted to the use of the ‘native speaker’ as a good source. The clear pronunciations by the native speaker helped students in improving their English pronunciation: ‘I hear the sound very clearly’ (Mays’s response to question 11; 4 May 2016). Similarly, Munir claimed that ‘the corrections are very useful, and when the native speaker in the software speaks the sentences, I have to repeat them and then they are compared with what the native speaker said’ (Munir’s response to question 12; 28 April 2016). When asked to give a reason for improvements in pronunciation, Malik answered that it was ‘listening to the native speaker’ (Malik’s response to question 11; 4 May 2016). Saber also mentioned listening to a native speaker as a reason for improvement in his pronunciation and listening skills: ‘The programme...improves my pronunciation....improves my listening skills’ (Saber’s response to question 12; 5 May 2016).

Third, ‘identification of mistakes’ also received significantly positive views from students in terms of improving their pronunciation: ‘...when I make a mistake...it corrects my pronunciation; that helps me’ (Ayman’s response to question 11; 4 May 2016) and ‘the programme points out my mistakes’ (Samer’s response to question 12; 5 May 2016). Regarding this effect, Neri, Cucchiarini and Strik (2001) stated that ‘the most effective feedback forms are those that not only indicate the correct form but that stimulate the students to produce the correct form themselves... elicitation will prove to be the most effective form of feedback for pronunciation too’ (p. 43).

Fourth, ‘being comfortable and less embarrassed’ was considered important in the students’ learning process. According to Picciano (2009), a major benefit is that students experience learning in ways ‘they are most comfortable while also challenging them to experience and learn in other ways as well’ (p.7). Therefore,

allowing students to learn in a comfortable environment is vital in teaching a FL as correcting students in front of an entire class can sometimes be embarrassing. However, each student received individual feedback for his or her practice session, thus increasing the students' willingness to learn. Mazen commented that 'correction in front of EyeSpeak is better than in class' (Mazen's response to question 11; 4 May 2016).

Fifth, 'interesting way of learning' was cited as another positive feature of EyeSpeak: 'I think it's cool and helps me in many things ...with fun ideas ... and makes me learn a pronunciation better' (Munir's response to question 11; 28 April 2016). A student also stated that it 'is like a game. I enjoy it too much' (Anwar's answer to question 12; 4 May 2016).

In addition, when asked their opinion on the effective features of EyeSpeak, five students (Mazen, Mays, Basel, Ayman and Anwar) highlighted the 'Similar Sounds' activities. Four students (Samer, Sami, Tamer and Fatin) considered general listening as the most effective method. Fatin emphasized the speaking and listening features as helpful: 'the listening and the speaking... they complete each other' (Fatin's response to question 13; 4 May 2016). Munir, on the other hand, mentioned the recording feature and identification of mistakes as the most helpful features. Four students (Ahmad, Anwar, Zainab, Malik and Ayman) gave similar responses related to practising similar-sounding words as the best feature of EyeSpeak.

4.4.1.8 Students' Suggestions about Using EyeSpeak

In general, all students demonstrated a positive attitude towards EyeSpeak when asked to give overall opinions of the software as a learning tool. In general, students

offered the following responses: 'perfect' (Basel's response to question 14; 4 May 2016); a 'good programme' (Malik's response to question 14; 4 May 2016); a 'great programme' (Samer's response to question 14; 5 May 2016); 'very useful' (Fatin's response to question 14; 4 May 2016); 'really interesting that this software is used in class... this programme is easier and allows greater practice than books' (Anwar's response to question 14; 4 May 2016); 'I suggest listening to the EyeSpeak programme' (Sami's response to question 14; 4 May 2016); 'everything I need is in the programme' (Mays's response to question 14; 4 May 2016); 'I think it is cool and doesn't need anything and....a great way to make us learn pronunciations' (Munir's response to question 14; 28 April 2016); and 'I see this software is very useful for us' (Ahmad's response to question 14; 4 May 2016). Thus, it appears that all the students are likely to continue using the EyeSpeak software in class to learn English pronunciation. Some students even expressed enthusiasm about using the software in their future classes: 'give new lessons with the software' (Mazen's response to question 14; 4 May 2016); 'I have to use it in the future' (Ahmad's response to question 14; 4 May 2016); and 'I will try to use it because it is very interesting' (Anwar's response to question 14; 4 May 2016).

Finally, the students were asked to give their recommendations and suggestions with respect to the software. The objective of this question was to obtain more information that could be shared with the pronunciation lecturer, who could then respond to these suggestions and use the software to more effectively to teach English pronunciation to FL students in future classes. The recommendations are as follows. Zainab suggested live conversations with a native lecturer: 'Adding a teacher with whom we can talk with if we face any problem could help us' (Zainab's

response to question 14; 4 May 2016). Ayman and Ahmad stated the need for conversation videos: 'I think conversation videos will be useful. When we want to learn, we don't have to learn using traditional methods' (Ayman's response to question 14; 4 May 2016). Ahmad mentioned videos as a practice exercise in which he could guess the characters in the video: 'They should add a video in which we have to listen to very long sentences without writing them down and then write it using the software. The videos can also give us feedback on our writing skills' (Ahmad's response to question 14; 4 May 2016).

In sum, the students positively responded to learning English pronunciation with help from the EyeSpeak software, which allowed them to improve their pronunciation and, therefore, their spoken English. Most of the students felt comfortable using EyeSpeak and appreciated the software's method of feedback and corrections, which increased their confidence and made them feel less embarrassed when mispronouncing a word, unlike when they speak in class. This feature not only improved their English pronunciation, but also increased their willingness to learn. Imitating the native speaker is another positive feature that gave students the opportunity to repeat words until they got them right. Generally, the students were enthusiastic and felt confident in using the software for their learning process.

CHAPTER FIVE

DISCUSSION

5.1 Introduction

This chapter summarizes the study's findings, relates the findings to those of previous, which are described in the literature review, and uses the findings to answer the research questions.

The first question that guided this research was as follows: *Is there any significant difference in Iraqi students' English pronunciation as a result of using ASR (EyeSpeak) software?* This question involves obtaining more information concerning the effectiveness of using ASR EyeSpeak software in pronunciation classes. In addition, the first question asked whether using EyeSpeak would help Iraqi EFL college students learn English pronunciation and overcome their pronunciation mistakes, which stem from the differences in the consonant sound system between the Arabic and English languages. The second research question was as follows: *How do Iraqi students perceive EyeSpeak software in term of usefulness and ease of use in the learning process?* This question asks how the students' perceived the EyeSpeak software in terms of its usefulness and ease of use in the learning process. This question was based on the Technology Acceptance Model (TAM) theory, as there are two types of principles used to assess user acceptance of new technology: 'perceived usefulness' (PU) and 'perceived ease of use' (PEOU). Both PEOU and PU are important in determining the behavioural intention (BI) to use and effect individual performance. The third question was as follows: *What is the students' evaluation of the efficacy of using EyeSpeak software in pronunciation class?* This

question asks how students evaluated the use of the EyeSpeak software in pronunciation class. Answering this question will provide in-depth information regarding students' experience of using EyeSpeak software in pronunciation class, as students' evaluations provide information about activities, correction, feedback and the software in general.

5.2 A Brief Explanation of the Findings

The primary aim of this study is to determine the effectiveness of using the ASR EyeSpeak software in learning English pronunciation among Iraqi EFL learners from Al-Turath University College, Baghdad, Iraq. To this end, an experimental study with a randomised pre-test-post-test with control group design was conducted over a two-month period. Forty participants were randomly selected from the first-year college students and randomly assigned into two classes (20 students for each class). One class (the control group) used the traditional instructional teaching method only, and the other class (experimental group) used it in addition to the automatic speech recognition (ASR) EyeSpeak software.

A paired sample t-test was run to determine the differences between the pre-test and post-test of the students' pronunciation performance of the control group and experimental group. The findings revealed that (Group A), which was the experimental group, improved significantly more compared to the (Group B), which was the control group. Both groups were taught by the same lecturer and used the same materials; the only difference was the incorporation of the software. Thus, the improvement in pronunciation is directly related to the effectiveness of integrating ASR into the foreign language classroom setting. The findings of this study were

similar to and confirm those of Seferoğlu's (2005) study, which found from the pre-test-post-test result that the students who used pronunciation training software scored higher than those who did not use the pronunciation training software. Chapella (2001) confirmed that using class-based technology such as automatic speech recognition (ASR) in teaching English pronunciation improves individuals' outcome performance.

A questionnaire was used to investigate the students' perception of the EyeSpeak software in terms of its usefulness and ease of use in the process of learning English pronunciation. According to the responses to the questionnaire, the students provided positive feedback regarding the usefulness of using ASR in pronunciation class; these responses were parallel with the opinions the students expressed in their interviews. A semi-structured interview was conducted to obtain students' opinions of the EyeSpeak software based on their experience of using it and to determine how students evaluated the use of the software in pronunciation class. The findings from the questionnaire and the interviews show that the students had a positive view of the ASR EyeSpeak software, as the students considered the software quite helpful to them during the learning process. This shows that using the EyeSpeak software significantly aided the students in their pronunciation skills. This encourages the use of the software in future classes.

5.2.1 The Effectiveness of the ASR EyeSpeak Software on Students' Pronunciation

The importance of using computer assisted language learning (CALL) technology in educational settings is directly linked to facilitating students' learning. The use of CALL is essential in a language learning setting and is especially important in the

foreign language classroom. CALL programs, such as ASR, have a positive impact on teaching pronunciation (Chapelle, 2001) because they allow an individual learner to practice the correct pronunciation of the target language. Several studies (Chapelle, 2001; Chen, 2004; Lee, 2008) have encouraged teachers to use ASR as an essential tool in the process of teaching and learning pronunciation. The recommendation of using ASR technology in language classrooms is associated with the advantages that it offers to learners (Butler-Pascoe & Wiburg, 2003; Harless, Zier, & Duncan, 1999; Kim, 2006). Using ASR software allows the instructor to identify the learner's pronunciation issues, which can be difficult to do in a traditional classroom, especially when there are many students in the class. It also provides a stress-free learning environment and encourages the timid learner to practice speaking the target language (Neri, Cucchiari, & Strik, 2001). Using the ASR software assists the overall learning process and enhances oral skills in particular. Clear and intelligible pronunciation can make communication easier, while poor pronunciation will mislead the listener (Celce-Murcia, Brinton, & Goodwin, 2010).

This study focused on EFL college students' pronunciation of English because poor pronunciation affects the students' speaking skills in the target language (Fraser, 1999; Nunan, 1988). In the case of Arab learners, many factors may lead to poor pronunciation, as explained in Chapter One. These factors are associated with 1) mother tongue interference, 2) phonetic system difference and 3) lack of practising the target language in a real-life context. The focus of this study is on the difference in the consonant sound systems between the English and Arabic languages. According to Swan and Smith (2001), "while English has 22 vowels and diphthongs to 24 consonants, Arabic has only eight vowels and diphthongs (three short, three

long and two diphthongs) to 32 consonants” (p. 196). Because of the phonetic system differences, learners replace the English sound that cannot be found in their mother tongue with the nearest sound in Arabic.

This study investigated the effect of using ASR software in teaching English pronunciation to Iraqi first-year college students at Al-Turath University College in the Department of English in Baghdad, Iraq. The results of the experimental study revealed that there is a significant difference between students who enrol in an ASR class and those who enrol in a traditional class. After two months of using ASR EyeSpeak software, the students’ pronunciation of English consonant sounds that are not found in Arabic was measured. The results encouraged the use of the software, as the students who used the software improved their pronunciation proficiency level. ASR offers the learner time to listen to native speakers and practice pronunciation, providing them with corrections and immediate feedback in a variety of forms. This assists in the process of learning English pronunciation and allows students to become independent learners (Kenworthy, 1987). A similar finding by Mohsin (2012) pointed out the important role of using CALL-based ASR software because this software showed an improvement in students' pronunciation at the level of individual sounds. Eskenazi, Tomokiyo and Wang (2000) demonstrated that using CALL pronunciation training software allowed the students to master sounds that were previously difficult for them to produce when pronouncing English words.

Other studies (Kim, 2006; Neri, Cucchiarini, & Strik, 2008) have shown that ASR is effective in teaching pronunciation, especially for second or foreign language learners, as these studies indicated that students who use the ASR software improve

their pronunciation significantly. The current study demonstrated that using ASR EyeSpeak software was an effective tool in helping students learn English pronunciation and allowed them to recognise their mistakes. The students who enrolled in the ASR class scored significantly better than those who enrolled in a class using a traditional teaching method. The test scores were valid because both groups were given the same materials and had the same lecturer, and the pre-test showed little or no difference between the groups. The results of the post-test revealed that the students who experienced the ASR teaching method had higher scores than the other group, which indicates that the software helped the students in the former group improve their pronunciation. Witt (2012), however, argued that using the ASR EyeSpeak software may not help students' pronunciation, as the software provides scores only on the word level and not on the phoneme level.

5.2.2 Students' Perception of the EyeSpeak Software in Terms of Usefulness and Ease of Use for Improving Pronunciation

The use of Automatic speech recognition (ASR) has become an important element in the process of teaching and learning English pronunciation. Several studies (Chapelle, 2001; Neri, Cucchiaroni, & Strik, 2001; Butler-Pascoe & Wiburg, 2003; Kim, 2006; Pennington, 1996; McCrocklin, 2014) recommend the use of ASR as essential to the process of learning pronunciation. Al-Qudah's (2012) study revealed that ASR is quite useful in improving learners' pronunciation. Foreign language learners find it helpful to use ASR in learning the target language because it indicates a positive outcome for improving pronunciation (Kim, 2006). Intelligible pronunciation is important in order for the listener to easily understand the message. Learning accurate pronunciation is difficult for university-level foreign language learners because of the difficulties related to the interpretation of foreign accents.

However, learning pronunciation with the use of ASR as a part of the teaching method opens new possibilities for student learning. ASR offers a conducive environment that provides the students with activities to conduct and time to practice in a stress-free environment. A study by Kim (2006) revealed that ASR was a helpful tool for teaching pronunciation because the students had the opportunity to listen to native English speakers. Moreover, the ASR software gives the learners the opportunity to listen to self-pronunciation, practice speaking and compare their pronunciation to that of native speakers, thus providing a variety of corrections and feedback. Derwing, Munro and Carbonaro (2000) declared that using ASR software is quite useful because of its ability to recognise and identify students' pronunciation mistakes.

Therefore, a traditional teaching method combined with ASR modules most effectively identifies the issues that learners face. ASR can be quite useful, as it focuses on pronunciation and self-directed learning, which stimulates the learning process. The usefulness of ASR software was demonstrated not only by its effect on test scores but also by the positive responses the students expressed on the questionnaires.

The findings revealed that the highest positive rating was on item (10): *Listening to my own voice recording compared with the native speaker model helps me improve my pronunciation.* The students' responses to this question indicate that the students felt the ASR EyeSpeak software's feature of listening to the native speaker and comparing the student's voice record was EyeSpeak's most useful feature. A similar study by Witt (2012) showed a similar finding, stating that EyeSpeak software

contains useful feedback features that compare the native speaker's sound production with the student's sound production.

Students also indicated positive ratings on item (1): *I like using EyeSpeak in pronunciation class*, item (13): *I enjoy using EyeSpeak software* and item (17): *I'm not afraid of making pronunciation mistakes when using EyeSpeak software*. These positive student responses indicate that using the ASR (EyeSpeak) software made the students feel more comfortable, provided a stress-free environment and made the lessons more enjoyable. Neri, Cucchiarini and Strik (2001) stated that using ASR can also encourage shy students not to be embarrassed when speaking the target language. This was reinforced in the study by the students' positive responses, as the students indicated that they feel more comfortable and less afraid of committing a mistake when using the software.

The third highest rating of the students' responses was on item (2): *I like to practice more when I use EyeSpeak software*, which indicates that students find the ASR EyeSpeak software useful during the learning process. A similar study by Nylén (2009) found that the students had a positive attitude about using EyeSpeak as a tutor and their rating scores indicated a significant improvement in speaking skills. The students' positive responses on item (12): *Practising the sound similarity of words raises my awareness in distinguishing sounds*, indicates that EyeSpeak helps them become aware of their mistakes and allows them to differentiate between sounds. Chapelle (2001) mentioned that using ASR in teaching English allows students to discover their own individual pronunciation problems.

The lowest rating from the student questionnaire was on item (4): *After using*

EyeSpeak software I feel more confident in speaking English. Also, a few students responded negatively to item (19): *The program doesn't require a lot of mental effort.* The negative responses can be overcome with teacher assistance. In summarising this section, the students' perception of the ASR EyeSpeak software revealed that the software is useful in learning pronunciation. Most of the students believed that using the software improved their pronunciation and made them aware of their mistakes.

5.2.3 Students' Evaluation of the ASR EyeSpeak Software in Pronunciation Class

ASR provides effective pronunciation training when it is used in conjunction with the classroom teacher. The software gives the students the opportunity to practice, enhance and support the pronunciation-learning process. The students believed that the EyeSpeak software features that helped them the most were recording, correction feedback and repetition. The teacher's presence is beneficial in learning with ASR software because it helps to reduce the anxiety of technophobic learners (Komissarchik & Komissarchik, 2000). A focus on pronunciation should be advanced to accomplish the goals and objectives of the education system and produce successful students who can speak the target language accurately. Being aware of the effectiveness of ASR software features can help accomplish the desired goals. During this study, an interview was conducted to explore the students' evaluation of the use of ASR in pronunciation class. The following sections discuss the findings from the interviews regarding the students' evaluation of the EyeSpeak software, which include: 1) students' interaction with the EyeSpeak software, 2) pronunciation learning potential with EyeSpeak, 3) students' evaluation of EyeSpeak activities and 4) students' evaluation of EyeSpeak correction and feedback.

5.2.3.1 Students' Interaction with EyeSpeak software

The responses to the interviews revealed that all the students felt comfortable with using the ASR EyeSpeak software. They also had positive views about using the software in the pronunciation class, as the students explained that they were satisfied, the software captured their interest and it motivated them to learn. The students enjoyed the learning process when using the software. In addition to describing the software as easy to use, not one of the students experienced any difficulties in learning how to use the EyeSpeak software and all of the students seemed comfortable with using it. In a similar study, Nylén (2009) indicated that students have a positive attitude towards using EyeSpeak software in teaching pronunciation. Therefore, the students' responses revealed their interactions with the software were easy, comfortable, interesting, motivating and important to have in the pronunciation class. The students believed that using EyeSpeak in pronunciation class is essential for their learning process.

5.2.3.2 Pronunciation Learning Potential with EyeSpeak

Moreover, all the students' responses to the interviews revealed that using ASR EyeSpeak software helped them learn English pronunciation. Nylén (2009) claimed that there is a significant improvement in students' speaking skills after using EyeSpeak. In part of interview question three, the students were required to read 17 words; this was done to determine the students' pronunciation production after two months of using EyeSpeak in pronunciation class. The students' responses showed few pronunciation mistakes, as nine of the students mispronounced one or two sounds, while the other two students did not make any pronunciation mistakes. Only two students demonstrated three or more pronunciation mistakes. The students'

responses revealed that /tʃ/ was the sound the students were least likely to mispronounce when reading the 7 words, and this sound scored the highest level of improvement in the post-test score from the pre-test score of the experimental group. Therefore, the improvement of students' pronunciation that showed in the post-test also showed in the interview reading performance, which indicates that the findings from the interview confirm the results of the students' post-test.

The /ʒ/ sound was the second sound that the students were least likely to mispronounce during the interview, and this sound was also the second highest score of students' improvement in the post-test, which indicates that the findings of the interview confirm the results from the students' post-test. Similarly, few students committed mistakes when pronouncing the /v/, /p/ and /ŋ/ sounds during the interview; moreover, the post-test score indicates a slight improvement on these sounds. Not one of the students mispronounced the /l/ dark during the interview, which also indicates students' improvement.

Thus, using the EyeSpeak software in the process of teaching English pronunciation for EFL Iraqi learners revealed improvement in students' pronunciation performance, and it reduced the pronunciation errors that can be made when transferring from the mother tongue language (Arabic) to English. Chapelle (2001) mentioned that using ASR in teaching English has a positive impact on an individual's pronunciation performance because it allows an individual learner to practice the correct pronunciation of the target language. Therefore, because this study indicated that students' pronunciation improved after using the EyeSpeak software for two months, long-term use of the software may have more potential for pronunciation improvement.

5.2.3.3 Students' Evaluation of EyeSpeak Activities

The benefits of using ASR involve the ability to more effectively produce speech sounds by offering practice features, evaluating students' pronunciation and providing feedback. ASR activities deliver significant benefits in helping students improve their pronunciation because engaging in these activities allows students to receive information through visual and auditory approaches. Trylong (1987) provided evidence regarding the process of information input for learners, which showed the percentages of gained information through the five senses; the two senses that obtained the highest percentages were: visual (83%) and auditory (11%). Moreover, this reflects that using the ASR EyeSpeak software in students' pronunciation practice is beneficial for their learning process, as they gain knowledge visually and auditorily, which allows the students to listen to a speaker model and practice their pronunciation production. It has been shown that visual cues have a significant effect on the improvement of speech production and perception (Flege, 1988).

This study mainly focuses on determining whether the use of the ASR EyeSpeak software improves students' pronunciation. Therefore, the EyeSpeak activities that were used in this study were the ones which focused on pronunciation skills. These activities are found in the 'speech' section of the software and include 'similar sounds' and 'word practice' activities. Such activities also appear in the 'fun' section of the software, which includes three games. These games are only used as a positive reinforcement for those who score higher in the activities for their pronunciation performance.

In the interview, the students were asked which EyeSpeak activity helped them the most in their learning of English pronunciation. The findings from the students' interview responses indicate that 11 students from a total of 13 students who participated in the interview referred to the 'similar sounds' activities as the most effective in their learning process of English pronunciation, while 2 students referred to the 'word practice' activities as the most effective in their learning.

In the 'similar sounds' activities, the software compares two pair words with similar sounds in order to distinguish the differences between sounds when the students record and listen to their pronunciation as compared to that of a native English speaker. Participating in this activity allowed the students to distinguish between sounds. In the 'word practice' activities, the students select one English sound and provide several words and phrases that have the sound selected. Then, the students must listen to the word and record their pronunciation of that word. The software compares the students' pronunciation with that of a native English speaker and shows the learner an animated sound wave and animated figure of a human mouth making that sound. Engaging in this activity allowed the students to test their English pronunciation against that of a native speaker. Hincks (2003) evaluated the programme features of the ASR software and found that comparing students' pronunciation with that of a native speaker was the most effective feature of the software. The students could also select certain words to listen to as many times as necessary, and they could learn anywhere and at any time. The general findings indicate that the 'similar sounds' activities are the most helpful for Iraqis students in their learning of English pronunciation. Thus, to learn accurate English pronunciation, students must be able to distinguish between sounds through listening and practicing.

5.2.3.4 Students' Evaluation of EyeSpeak Correction and Feedback

Chun (1998) summarized the benefits of using ASR software in teaching FL learners, explaining that the software provides various types of feedback, such as auditory, visual and contextual modalities, which help students to understand their errors as well as to improve their pronunciation performance. Neri, Cucchiarini and Strik (2001) stated that ASR could ultimately diagnose pronunciation errors and instantly give feedback.

EyeSpeak provides comprehensible feedback by providing visual feedback on pronunciation features such as pronunciation, timing, loudness and pitch. Students listen to a native speaker's recording, say the word and receive immediate audio-visual feedback from the system. The immediate feedback is significant in limiting repetition of the students' errors (Eskenazi, 1999). The students and the natives' speech patterns are shown on the screen, and this enables students to easily compare them to determine whether the relevant features are matched. EyeSpeak offers two important visualisation feedback styles. It visualises the sound wavelengths of the students and the native speaker's speech by showing the pronunciation, pitch, loudness and timing. It also provides an animated cutaway side view of the human mouth showing the production of sounds (the consonant and the vowel) by exhibiting the place of articulation for each sound. Neri et al. (2002) indicated that feedback should concentrate on specific individual pronunciation errors which influence the learner's intelligibility.

The software's correction and feedback helped the students become more aware of where they mispronounced a word. The correction process with the software is less embarrassing for the students than correction in class. Feedback is vital for foreign

language learners because it helps them overcome their pronunciation errors and instructs them in improving their pronunciation. Several studies have mentioned the importance of correction and feedback in the process of developing English pronunciation (Neri et al., 2004; Richards et al., 2002). The work of Hsia et al. (2004) also supported the use of ASR for student correction. The main issue is whether to treat or disregard the students' errors. While most agree that it is important to correct students' errors at the time they occur, particularly for foreign language learners of English pronunciation (Lightbown & Spada, 1999), pronunciation teachers, especially those who have many students in their classes, report that it is time-consuming and hard to correct all the students' errors.

On the other hand, teaching with EyeSpeak provides unambiguous correction and feedback in audio and visual forms. According to Celce-Murcia (1996), audio feedback is the most effective feature of CALL software. During the interviews, many students reported that listening to a native speaker was effective during the pronunciation process and it helped them learn how to pronounce each sound in a word accurately. Visual feedback, which involves showing an animated graphic of the speech sounds, assists learners in trying to match the native speaker (Beatty, 2003). The sound wave illustrated in the EyeSpeak correction, which compares the student's pronunciation and the native speaker pronunciation, allowed the students to realise the differences and similarities between the compared pronunciations. Witt (2012) stated that EyeSpeak software provides useful feedback features, such as displaying the student's tongue position as compared to the native speaker's tongue position when producing specific words. The students enjoy comparing their pronunciation with that of a native speaker. The EyeSpeak software also contains a

scoring feature that the students find helpful because it motivates them to challenge one another and to compete for the highest score, which improves their pronunciation. However, Witt (2012) pointed out that the EyeSpeak scores evaluate the entire pronunciation, which may not help students understand pronunciation errors at the phoneme level.

Because this study found that students' pronunciation improved after two months of using EyeSpeak, it is recommended that EyeSpeak be used for a longer period of time in order for students to gain additional improvement. The software program is suitable for all levels of learning because it has a variety of features. Even so, Ai (2013) criticised the ASR software's visual feedback because it does not provide information on how to improve pronunciation, which encourages the students to try to produce the accurate pronunciation several times and may lead to fossilisation (Eskenazi, 1999). To solve the problem, Ai (2013) suggested that using forced alignment may help students recognise the wrong phoneme and then discover when to increase or reduce emphasis, loudness or pitch.

In conclusion, using ASR for practising and correcting students' pronunciation is a safe and comfortable means by which students can learn without fear, thus reducing their stress of making pronunciation errors in front of the teacher and their colleagues (Celce-Murcia, 2000). The feedback is effective in that it allows the students to become aware of where exactly they make a mistake in their pronunciation and how to correct it with practice drills, feedback and reflective exercises (Richards et al., 2002).

5.8 Suggestions for Further Study

Future research with similar research topics may wish to consider the following suggestions:

- 1) Include a larger number of participants (i.e., more than 40 students) and include participants from different universities.
- 2) Although this study focused on a segmental feature of English pronunciation (testing the pronunciation of consonant sounds), future studies may examine the effectiveness of EyeSpeak software on students' pronunciation of both segmental and suprasegmental features.
- 3) Conduct the study over a longer period of time (i.e., longer than two months) .

5.6 Limitations of the Study

The limitation of this study is that it was restricted to Iraqi EFL first-year students enrolled in Al-Turath University College during the academic year of 2015–2016. Also, the small number of students (40) may have affected the generalizability of the findings. The students only received instruction 45 minutes twice per week for 8 weeks, but because of difficulties with Internet connectivity one day and computer dysfunctions another day, two classes received only 35–30 minutes of instruction.

5.7 Conclusion

Given the results of its student tests and interview responses, this study demonstrated the effectiveness of using ASR EyeSpeak software to teach English pronunciation to Iraqi EFL college students. Moreover, EyeSpeak gave the students the practice that the students needed, which involved distinguishing between sounds as well as giving the students immediate correction and comprehensible feedback. In this way, the students felt comfortable and improved their pronunciation

performance. The findings also indicate that the EyeSpeak software was useful and easy to use in the learning process, as the students' provided positive ratings of the software on the questionnaire.



CHAPTER SIX

CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS

6.1 Introduction

This final chapter summarizes the findings of the study and is divided into four sections. The first section provides the conclusions drawn from the findings derived from answering each of the research questions. The second section reviews the pedagogical implications and their impact on the learning a FL using traditional teaching methods and integrated ASR software. The third section provides recommendations for further studies. The end of the chapter provides the concluding summary of the study.

6.2 Conclusions of the Findings

This study's goal was to determine if ASR EyeSpeak software improves Iraqi college students' English pronunciation by enhancing the traditional language instruction with the use of ASR technology. The study aimed to answer essential three questions. The questions and the answers obtained through the research project are as follows:

Question 1: *Is there any significant difference in Iraqi students' English pronunciation as a result of using ASR (EyeSpeak) software?*

Using ASR EyeSpeak software in teaching English pronunciation to Iraqi college students enriched the students' experiences and assisted in their learning process.

The students' pronunciation improvement was indicated by their test scores. The students' post-test scores were significantly higher than their pre-test scores after using the EyeSpeak software, as well as higher than those of the group in which the instructor used only traditional teaching methods. These findings proved that using EyeSpeak software improved English pronunciation of Iraqi EFL college students. Chapella (2001) confirmed that using class-based technology, such as ASR, in teaching English pronunciation improves individuals' performance outcomes. The improvement of students' pronunciation on the sound level indicated that those students who were taught with EyeSpeak software improved more than those who were not taught with it, as supported by the test score percentage differences between the pre-test and the post-test (see Table 6.1). In terms of specific sounds, students who were taught with EyeSpeak software had their greatest improvement on the sound /tʃ/, followed by improvements in the sounds /ʒ/, /ŋ/, /p/, /l/ dark and /v/, in that order.

Table 6.1

The Percentage of Sound Improvement between Those Who Used EyeSpeak and Those Who Were Taught with Traditional Methods

Sound	Students' improvement	
	Traditional teaching methods	Traditional teaching methods + EyeSpeak
/ŋ/	34%	40%
/tʃ/	33%	51%
/p/	28%	38%
/ʒ/	28%	42%
/l/ dark	13%	20%
/v/	10%	21%

The significant differences between those taught with the traditional methods and the students who were taught with EyeSpeak software is significant, which indicates that using the software improved their pronunciation and helped them overcome their pronunciation errors from the negative transfer of the sound system differences from their mother tongue language (Arabic) into English pronunciation. The findings encourage educators as well as institutions to use ASR EyeSpeak software in teaching English pronunciation.

Question 2: How do Iraqi students perceive EyeSpeak software in terms of usefulness and ease of use in the learning process?

Based on the students' ratings on the usefulness and ease of use of EyeSpeak software based on their experience of using it in learning English pronunciation, the findings revealed that the students' found EyeSpeak software helpful in the process of learning. They considered it extremely helpful that the software provided an English native speaker model and that it offered correction and feedback to aid them in enhancing their pronunciation production. The students' believed that using EyeSpeak in the pronunciation class made them feel confident, comfortable and unafraid of making pronunciation mistakes, compared to their experiences in the traditional class. Neri, Cucchiarini and Strik (2001) stated that using ASR can also encourage shy students not to be embarrassed when speaking the TL. The students found that using EyeSpeak helped them to distinguish between sounds, which allowed them to raise their awareness, as well as giving them time for individual practice of their pronunciation production and to determine their pronunciation problem. Chapelle (2001) mentioned that using ASR in teaching English allows the students to discover their individual pronunciation problems. The students also found

that the software was enjoyable, understandable and easy to use, and they felt that it did not require undue mental effort on their part. This encouraged them to learn with the use of the software.

Question 3: What is the students' evaluation of the efficacy of using EyeSpeak software in pronunciation class?

Exploring the students' evaluations and getting more in-depth information about the effectiveness of the software in the pronunciation class was a means to understand the potential learning that the EyeSpeak could offer to language learners. Reviewing the students' evaluations of which activities or features in the software helped them the most in learning English pronunciation was an essential component of this study. The findings showed that all the students were satisfied and motivated to use the software in the pronunciation class. The students stated that the software allowed them to listen to English native speaker pronunciation models and offered them all the practice that they wanted, both of which they lack in the traditional classroom. They believed that these features gave them more time to test their pronunciation production and compare it with the English native speaker models' pronunciation. The students' practice with the software allowed them to better distinguish between sounds, and this helped them realise the differences between the sounds and led them to be more aware of their errors, which assisted them in reducing their pronunciation errors. The students' pronunciation improvement was not only revealed in their production performance, in general, but also in their improvement on the sound level, which was evidenced by their test scores and their ability to correctly pronounce the word examples in the interview. Their improvement on the sound

level in the interview confirmed their test results, as they made fewer pronunciation mistakes in the interviews for those sounds for which they had scored at the higher levels of improvement on their tests.

Most all of the students who participated in this study considered the ‘Similar Sounds’ activities in the software as the most effective activity in their learning English pronunciation, while only two students believed that ‘Word Practice’ activities were the most effective in their learning. The students also liked the way that EyeSpeak gave them correction and feedback. They also mentioned that the correction with the use of EyeSpeak was better than the correction in the traditional class because it showed individual students exactly where they made mistakes in a clear and understandable way. They enjoyed the variety of ways that the software gave correction and feedback with visual, animated figures of human speech organs which showed the production of each sound and the animated sound wave as compared with those of a native speaker of English. Several studies have mentioned the importance of correction and feedback in the process of developing English pronunciation (Neri et al., 2004; Richards et al., 2002). These features that offer visible correction and feedback helped the students with their English pronunciation. The students believed that using the ASR EyeSpeak software made positive changes in improving their English pronunciation, and they believed that the software fit their personal needs in learning English pronunciation. With the use of the software, they enjoyed the learning process, as well as how the programme showed them their mistakes, provided immediate correction and offered prompt feedback in an easy, stress-free environment and in understandable way. The students believed that listening to a native speaker of English and practising were both important and

essential for their learning process and improved their English pronunciation production.

6.3 Pedagogical Implications

In this study, ASR EyeSpeak software was used and shown to be effective. Future studies could examine the effectiveness of other software programmes which offer ASR features. As stated by Levis (2007), the most effective feature of ASR is the immediate feedback which offers the learners correction on their pronunciation performance (p. 192). Similarly, Neri, Cucchiarini, Strik and Boves (2002) agree on the importance of feedback by stating that the ideal system is one that provides the learners with immediate feedback (p. 458). The findings of this study show that EyeSpeak software was very beneficial for the students as it provided the students with visual feedback and offered other helpful features.

The study provides strong evidence for the effectiveness of using ASR software in pronunciation classes for EFL learners. Also, the positive responses from the students during the interviews indicate the importance of integrating ASR software into classes. All the students believed that using ASR to teach English pronunciation helped them learn and improve their pronunciation. Many students felt that practising with the ASR software, in conjunction with traditional teaching methods, allowed them to learn successfully. To achieve an authentic teaching setting, the teacher should be aware of the needs of the students and the strategies that best fit their learning needs. As noted in the interviews, using computer software will maximise the students' learning and motivate them during the process. The results of the student tests from both groups indicated that ASR aided in learning. The audio and

visual feedback are essential and particularly effective, which is difficult to achieve in the traditional classroom.

6.4 Recommendations for Teachers to Assist Iraqi College Students by Integrating Pronunciation Software in the Teaching or the Learning Processes

The responses to the first research question were provided mostly by the students' test scores. Research questions one and two focused on the effectiveness and the usefulness of EyeSpeak software in learning English pronunciation. The third research question focused on the students' evaluation of using EyeSpeak in the pronunciation class. The findings of this study provide evidence that using ASR EyeSpeak software improved Iraqi college students' learning of English pronunciation. Learning English pronunciation with EyeSpeak software encouraged and motivated the students to learn because they enjoyed the process of learning in a free-stress environment and found it easier to understand from the software correction and feedback exactly where they made mistakes in their pronunciation production. The advantages that the software offered to the students by providing individualized practice, immediately showing their mistakes, giving them correction and feedback, as well as allowing them to listen to native speakers of English pronunciation, enhanced their learning. The findings also indicate that the students found the software easy to use and that it provided clear and understandable feedback. Based on the findings of this study, the researcher strongly recommends the use of ASR technology, specifically the EyeSpeak programme, in the process of teaching and learning English pronunciation particularly for EFL learners. Therefore, it will be beneficial for both Iraqi learners and educators if ASR EyeSpeak software is integrated into language learning. The findings of this study encourage higher

education, colleges and other institutions in Iraq to consider the integration of ASR technology as part of the teaching-learning process because it is beneficial and effective in improving learning outcomes.

However, there are some issues that may cause problems for teachers when they use pronunciation software to support teaching. This part of the chapter concentrates on these issues: first, better classroom management, including computer laboratory discipline and dealing with the students with high and low motivation; second, the preparation needed for a computer laboratory class; and third, the role of the teacher in the computer laboratory, including the teacher's tasks, preparation time and arrangements needed during use of the software.

6.4.1 Better Classroom Management in the Computer Laboratory

The most successful learning is achieved when students follow the instructions of the teacher as the main source of the guidance and supervision of their learning. According to Beatty (2003), students with high proficiency usually are the ones who concentrate on developing their own learning, while students with low proficiency tend to ignore the responsibility for their learning (p. 162). Those students with low pronunciation proficiency who enrolled in this study tended to be distracted while using the software by playing games instead of practising in the computer laboratory. However, the students were quiet when they accessed the computer because they started to explore the software and use the software's features and practice exercises. It was discovered that the main issue was not physical discipline but pedagogical discipline, that is, the discipline of the students' learning by the instructors and the expectation that the students will begin to be independent in their own learning.

6.4.2 Preparation Needed for Computer Laboratory Class

Using the software in the laboratory may take time, from operating the computer to logging in each student account. Thus, it will be helpful for the teacher to save time when handling all these technical preparations (e.g. power the computers on, turn on the lights, check the Internet connection etc.) by doing these things before the laboratory class begins. These preparations could take 5–10 minutes away from the class time. Therefore, it will be better for the teacher to consider these preparations before the laboratory class begins. If possible, it is recommended that the teacher prepare the software for the student log-ons before the class begins since this preparation sometimes takes five minutes away from class time. It is also recommended that the teacher ask the university to supply a spare headset in case one is damaged.

6.4.3 The Roles of the Teacher during the Use of the Software in the Computer Laboratory

The importance of the role of the teacher is undeniable in the process of student learning. The teacher's roles can be as a director, controller or facilitator. In the process of learning with the use of the software, the teacher is not assumed to be the only source of knowledge for the learners. In this learning environment, the students have the opportunity to explore and learn on their own. But, at the same time, it is important for the teachers to pay more attention to those students with lower proficiency levels because they can sometimes get distracted and wander far away from the learning objectives. They may mostly use the software's more entertaining components as young people often like to play games instead of practising and concentrating on learning. However, the teacher's supervision should not, in any

way, make the students feel uncomfortable. To ensure this, one suggestion is to allow them time to use the fun sections of the programme after they get a higher score in their practice; in this way, the class will be a more enjoyable experience, as well as an encouragement for them to score better on the practice exercises. Otherwise, they will need constant reminders to concentrate on their learning tasks. In respect to laboratory preparation, the teacher should prepare an alternative plan in advance in case of any technological failures, such as Internet connection and computer functionality problems.

In each laboratory class, one of the most important tasks is for the teacher to explain the learning objectives and activities that the students will need to work on with the software. This introduction will help them realise the purpose of the lessons that need to be learned. Also, the teacher's supervision is important in the laboratory class to ensure the flow of the lessons, assist the students when they need help and ensure that they are using the correct features of the software for the activities.

6.5 Summary

This study focused on the improvement of learning English pronunciation by combining traditional teaching methods with the advantages derived from implementing ASR EyeSpeak pronunciation software. The findings from investigating the effectiveness and the usefulness of EyeSpeak software revealed a beneficial impact on the students' learning of English pronunciation. These findings can help to build knowledge about the beneficial effects of the use of ASR as a complementary instructional tool in teaching pronunciation. In addition, colleges and other institutions may use the findings of this study as they provide credible evidence

about the value of integrating ASR technology, such as the use of EyeSpeak, in the classroom. Therefore, this study may provide helpful information for teachers and scholars who are interested in investigating the usefulness of this type of software in similar fields.



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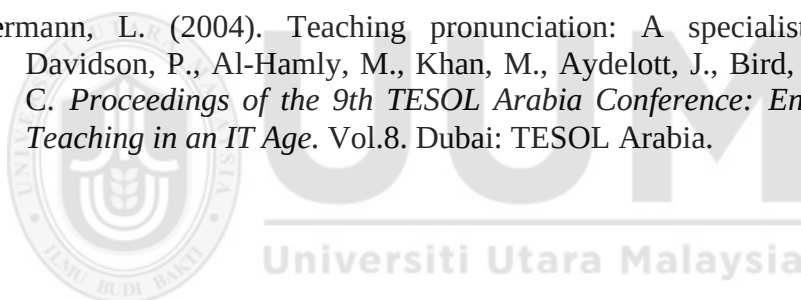
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Appendix A

Validation Approval Letter



PEJABAT PEMBANGUNAN PELAJAR DAN ALUMNI
Student Development & Alumni Office
College of Arts and Sciences
Universiti Utara Malaysia

Assistant Professor Ahmad Abdul
Wahab
Linguistics lecturer
University of Baghdad
Baghdad, Iraq

Assistant Professor Fatimah Sabri Al-
Shiraida
Linguistics lecturer
Al-Turath University College
Baghdad, Iraq

Assistant Teacher Mustafa Mohamed Rasheed
Linguistics lecturer
Al-Turath University College
Baghdad, Iraq

Dear Colleagues,

Greetings!

The undersigned is a 7th year Doctor of Philosophy student of Universiti Utara Malaysia undertaking a research entitled **THE EFFECTIVENESS OF AUTOMATIC SPEECH RECOGNITION SOFTWARE ON THE PRONUNCIATION OF EFL STUDENTS IN A COLLEGE IN IRAQ.**

With your expertise, I am humbly asking your permission to validate the attached lesson plan, pronunciation test questions, questionnaire items and interview questions, for the study by giving me your approval below.

Thank you for your assistance in this matter

Respectfully yours,

Lina Fathi Sidig
Researcher

Assistant Professor Ahmad Abdul Wahab:

Assistant Professor Fatimah Sabri Al-Shiraida:

Assistant Teacher Mustafa Mohamed Rasheed:

Appendix B

Validation letter/ Validation tool



Assistant Professor Ahmad Abdul Wahab
Linguistics lecturer
University of Baghdad
Baghdad, Iraq

Dear Asst. Prof. Ahmad,

Greetings!

The undersigned is a 7th year Doctor of Philosophy student of Universiti Utara Malaysia undertaking a research entitled **THE EFFECTIVENESS OF AUTOMATIC SPEECH RECOGNITION SOFTWARE ON THE PRONUNCIATION OF EFL STUDENTS IN A COLLEGE IN IRAQ.**

With your expertise, I am humbly asking your permission to validate the attached lesson plan, pronunciation test questions, questionnaire items and interview questions, for the study using the attached rating tool.

I'm looking forward that my request would merit your positive responses.

Thank you for your assistance in this matter

Respectfully yours,

Lina Fathi Sidig
Researcher

Assistant Professor Ahmad Abdul Wahab
Adviser

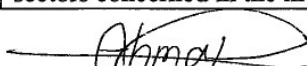
**THE EFFECTIVENESS OF AUTOMATIC SPEECH RECOGNITION
SOFTWARE ON THE PRONUNCIATION OF EFL STUDENTS IN A COLLEGE
IN IRAQ**

Direction: this tool asks for your evaluation of the lesson plan, pronunciation test questions, questionnaire items and interview questions to be used in the data gathering for the investigation stated above, to establish its validity. You are requested to give your honest assessment using the criteria stated below; please check (✓) only one from the selection.

Scale	Interpretation	Description
5	Very high valid	The pronunciation tests are valid and can provide unbiased data for the investigation, allowing 0-5% error
4	High valid	The pronunciation tests are valid and can provide unbiased data for the investigation, allowing 8-10% error
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2	Less valid	The pronunciation tests are valid and can provide unbiased data for the investigation, allowing 16-20% error
1	Not valid at all	The pronunciation tests are valid and can provide unbiased data for the investigation, allowing 21-25% error

Validators' Pronunciation Test

Indicators	Rating				
	5	4	3	2	1
The pronunciation tests fit with the variables under investigation, thus measuring what it tends to measure	✓				
The pronunciation tests have the capability to measure items of variables within a given item frame	✓				
The pronunciation tests have the ability to distinguish the characteristics or the properties of differing attributes of subjects under study	✓				
The pronunciation tests have the ability to gather factual data, eliminating biases and subjectivity	✓				
The pronunciation tests are framed in a clear, simple, in order to avoid risk of error.	✓				
The pronunciation tests are capable of generating data that will be of value and practical use to the sectors concerned in the investigation.	✓				



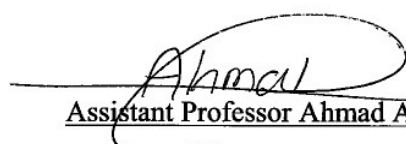
Assistant Professor Ahmad Abdul Wahab

Signature over printed name of the validator

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Validators' Questionnaire

Indicators	Rating				
	5	4	3	2	1
The questionnaire fits with the variables under investigation, thus measuring what it tends to measure	✓				
The questionnaire has the capability to measure items of variables within a given item frame	✓				
The questionnaire has the ability to distinguish the characteristics or the properties of differing attributes of subjects under study		✓			
The questionnaire has the ability to gather factual data, eliminating biases and subjectivity	✓				
The questionnaire is framed in a clear, simple, in order to avoid risk of error.	✓				
The questionnaire is capable of generating data that will be of value and practical use to the sectors concerned in the investigation.	✓				



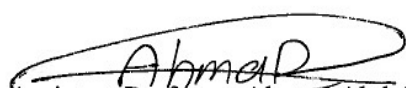
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Validators' Interview

Indicators	Rating				
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The interview fits with the variables under investigation, thus measuring what it tends to measure	✓				
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The interview has the ability to distinguish the characteristics or the properties of differing attributes of subjects under study	✓				
The interview has the ability to gather factual data, eliminating biases and subjectivity	✓				
The interview is framed in a clear, simple, in order to avoid risk of error.	✓				
The interview is capable of generating data that will be of value and practical use to the sectors concerned in the investigation.		✓			

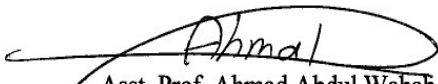

 Assistant Professor Ahmad Abdul Wahab

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Use the following checklist based on the integration of ASR EyeSpeak software in pronunciation class to evaluate the quality of the technology integrated lesson plan. You are requested to give your honest evaluation using the criteria stated below; please check (✓) only one from the selection.

Validators' Pronunciation Daily Lesson Plan

Yes	No	Unclear	Phase 1: Lesson Objectives and Assessments
✓			1-Objectives are clear statements of performances that students are required to do to demonstrate learning.
✓			2-Student Objectives reflect measures that are usually required for the topic/area of pronunciation.
✓			3-An assessment plan and instruments are given; assessment instruments are well designed.
✓			4-There is a clear match between student objectives and assessments.
Yes	No	Unclear	Phase 2: Technology Integration strategies
✓			5-An individual approach strategy for using the technology resources is specified and described.
✓			6-The technology-based activities of EyeSpeak software are essential in helping students accomplish the lesson objectives.


 Asst. Prof. Ahmad Abdul Wahab

Signature over printed name of the validator



PEJABAT PEMBANGUNAN PELAJAR DAN ALUMNI
Student Development & Alumni Office
College of Arts and Sciences

Universiti Utara Malaysia

Assistant Professor Fatimah Sabri Al-Shiraida
Linguistics lecturer
Al-Turath University College
Baghdad, Iraq

Dear Asst. Prof. Fatimah,

Greetings!

The undersigned is a 7th year Doctor of Philosophy student of Universiti Utara Malaysia undertaking a research entitled **THE EFFECTIVENESS OF AUTOMATIC SPEECH RECOGNITION SOFTWARE ON THE PRONUNCIATION OF EFL STUDENTS IN A COLLEGE IN IRAQ.**

With your expertise, I am humbly asking your permission to validate the attached lesson plan, pronunciation test questions, questionnaire items and interview questions, for the study using the attached rating tool.

I'm looking forward that my request would merit your positive responses.

Thank you for your assistance in this matter

Respectfully yours,

Lina Fathi Sidig
Researcher


Assistant Professor Fatimah Sabri Al-Shiraida
Adviser

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Validators' Pronunciation Test

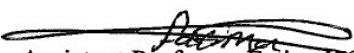
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The pronunciation tests have the ability to gather factual data, eliminating biases and subjectivity	✓				
The pronunciation tests are framed in a clear, simple, in order to avoid risk of error.		✓			
The pronunciation tests are capable of generating data that will be of value and practical use to the sectors concerned in the investigation.	✓				


 Assistant Professor Fatimah Sabri Al-Shiraida
 Signature over printed name of the validator

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Validators' Questionnaire

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The questionnaire has the capability to measure items of variables within a given item frame		✓			
The questionnaire has the ability to distinguish the characteristics or the properties of differing attributes of subjects under study		✓			
The questionnaire has the ability to gather factual data, eliminating biases and subjectivity		✓			
The questionnaire is framed in a clear, simple, in order to avoid risk of error.		✓			
The questionnaire is capable of generating data that will be of value and practical use to the sectors concerned in the investigation.		✓			

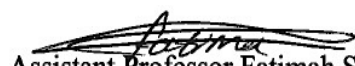

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The interview has the ability to gather factual data, eliminating biases and subjectivity		✓			
The interview is framed in a clear, simple, in order to avoid risk of error.		✓			
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✓			4-There is a clear match between student objectives and assessments.
Yes	No	Unclear	Phase 2: Technology Integration strategies
✓			5-An individual approach strategy for using the technology resources is specified and described.
✓			6-The technology-based activities of EyeSpeak software are essential in helping students accomplish the lesson objectives.


Asst. Prof. Fatimah Sabri Al-Shiraida

Signature over printed name of the validator



PEJABAT PEMBANGUNAN PELAJAR DAN ALUMNI
Student Development & Alumni Office
College of Arts and Sciences

Universiti Utara Malaysia

Assistant Teacher Mustafa Mohamed Rasheed
Linguistics lecturer
Al-Turath University College
Baghdad, Iraq

Dear Asst. Teacher Mustafa,

Greetings!

The undersigned is a 7th year Doctor of Philosophy student of Universiti Utara Malaysia undertaking a research entitled **THE EFFECTIVENESS OF AUTOMATIC SPEECH RECOGNITION SOFTWARE ON THE PRONUNCIATION OF EFL STUDENTS IN A COLLEGE IN IRAQ.**

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Lina Fathi Sidig
Researcher

Assistant Teacher Mustafa Mohamed Rasheed
Adviser

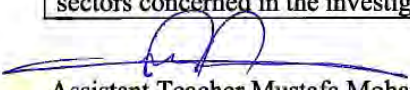
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Validators' Pronunciation Test

Indicators	Rating				
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The pronunciation tests have the capability to measure items of variables within a given item frame	✓				
The pronunciation tests have the ability to distinguish the characteristics or the properties of differing attributes of subjects under study	✓				
The pronunciation tests have the ability to gather factual data, eliminating biases and subjectivity	✓				
The pronunciation tests are framed in a clear, simple, in order to avoid risk of error.	✓				
The pronunciation tests are capable of generating data that will be of value and practical use to the sectors concerned in the investigation.	✓				


Assistant Teacher Mustafa Mohamed Rasheed
Signature over printed name of the validator

Scale	Interpretation	Description
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Validators' Questionnaire

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The questionnaire fits with the variables under investigation, thus measuring what it tends to measure	✓				
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The questionnaire has the ability to gather factual data, eliminating biases and subjectivity	✓				
The questionnaire is framed in a clear, simple, in order to avoid risk of error.	✓				
The questionnaire is capable of generating data that will be of value and practical use to the sectors concerned in the investigation.		✓			



Assistant Teacher Mustafa Mohamed Rasheed

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Validators' Interview

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The interview is framed in a clear, simple, in order to avoid risk of error.		✓			
The interview is capable of generating data that will be of value and practical use to the sectors concerned in the investigation.	✓				



Assistant Teacher Mustafa Mohamed Rasheed

Signature over printed name of the validator

Use the following checklist based on the integration of ASR EyeSpeak software in pronunciation class to evaluate the quality of the technology integrated lesson plan. You are requested to give your honest evaluation using the criteria stated below; please check (✓) only one from the selection.

Validators' Pronunciation Daily Lesson Plan

Yes	No	Unclear	Phase 1: Lesson Objectives and Assessments
✓			1-Objectives are clear statements of performances that students are required to do to demonstrate learning.
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Yes	No	Unclear	Phase 2: Technology Integration strategies
✓			5-An individual approach strategy for using the technology resources is specified and described.
✓			6-The technology-based activities of EyeSpeak software are essential in helping students accomplish the lesson objectives.


Asst. Teacher Mustafa Mohamed Rasheed

Signature over printed name of the validator

Appendix C

Pronunciation Receptive Test

Answer all the following questions:

1- In one word in each group, the 'b' or 'p' is not pronounced. Circle the word.

Example **double** **doubt** **Dublin**

- | | | |
|-------------|------------|---------|
| 1- lamb | label | lab |
| 2- crab | robbed | climb |
| 3- cup | cupboard | copy |
| 4- recipe | repeat | receipt |
| 5- possibly | psychology | special |

2- Write these words in ordinary spelling by choosing them from the words in the box.

back	buy	boot	piece	put	pay	purse	book	pack
but								

- 1- /pi:s/ _____
- 2- /baɪ/ _____
- 3- /pɜ:s/ _____
- 4- /peɪ/ _____
- 5- /bʌt/ _____
- 6- /pæk/ _____
- 7- /bɔ:t/ _____
- 8- /pʊt/ _____
- 9- /bæk/ _____
- 10- /bʊk/ _____

3- Write these words in ordinary spelling.

Example /mɔ:/ ___more___

- 1- /rɒŋ/ _____
- 2- /drɪŋk/ _____
- 3- /ʌŋkl/ _____
- 4- /θɪŋ/ _____
- 5- /strɒŋgə/ _____

4- Write the correct words that contain the /ŋ/ in the column below:

banged ran sung thing sun strong win sink

/ŋ/
1- -----
2- -----
3- -----
4- -----
5- -----

5- Write these words in ordinary spelling.

Example /fəʊn/ phone

- 1- /faɪv/ _____
- 2- /vɪzɪt/ _____
- 3- /fɜːst/ _____
- 4- /friː/ _____
- 5- /liːv/ _____

6- How many /f/ sounds and how many /v/ sounds are there when you say these numbers? Write the number for each sound.

Example: 55 _3 /f/ and 1/v/_

- 1) 512 _____
- 2) 745 _____
- 3) 5 _____
- 4) 175 _____
- 5) 474 _____

7- Write the correct words that contain the /ʃ/ sound in the column below:

ocean sort precious mesh person sugar ruse sock station

/ʃ/
1- -----
2- -----
3- -----
4- -----
5- -----

8- Write these words in ordinary spelling.

Example: / ruːʒ/ _____rouge_____

- 1- /kləʊʒə/ _____
- 2- /berʒ/ _____
- 3- /gæraːʒ/ _____
- 4- /pleʒə/ _____
- 5- /rvʒən/ _____

9- Read the words and circle the odd one out.

Example larger generally guess

1- village	get	Germany
2- <u>coach</u>	<u>check</u>	<u>Christmas</u>
3- June	vegetable	give
4- station	Russian	picture
5- <u>Chef</u>	<u>chain</u>	<u>chest</u>

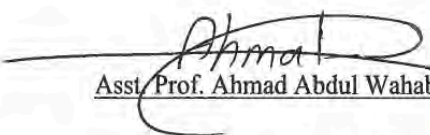
10- Write these words in the correct column.

Chin invasion wishing gin choice jeer ship usual choke ash
joke vision mission Jane measure cheer kitchen illusion shed pigeon

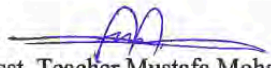
Contain /dʒ/	Contain /ʒ/	Contain /tʃ/	Contain /ʃ/

11- Put the letter D if the /l/ sound is dark and L if the /l/ sound is light in the following words:

- 1-tool -----
- 2-mile -----
- 3-like -----
- 4-owl -----
- 5-light -----
- 6-sell -----
- 7-lost -----
- 8-called -----
- 9-field -----
- 10-late -----


Asst. Prof. Ahmad Abdul Wahab


Asst. Prof. Fatimah Sabri Al-Shraida


Asst. Teacher Mustafa Mohamed Rasheed

Note: Signature over printed name of the validator

Appendix D

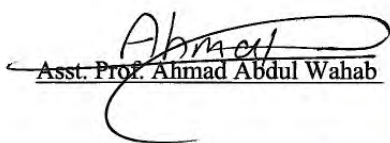
Pronunciation Productive Test

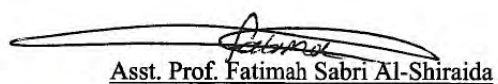
Q/ pronounce the following words:

Cap	Cab	Rang	Ran	Measure	Major
Bark	Park	Thin	Thing	Ledger	Leisure
Grab	Wrap	Wing	Win	Jeep	Treasure
Pear	Bear	Sung	Sun	Explosion	Manage
Fairy	Vary	Shoe	Chew	Low	All
View	Few	Washing	Watching	Till	Leaf
Strife	Strive	Catch	Cash	Let	fools
Leave	Leaf	Sheep	Cheap	Miles	Look



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Asst. Prof. Ahmad Abdul Wahab


Asst. Prof. Fatimah Sabri Al-Shiraida


Asst. Teacher Mustafa Mohamed Rasheed

Note: Signature over printed name of the validator

Appendix E



PEJABAT PEMBANGUNAN PELAJAR DAN ALUMNI
Student Development & Alumni Office
College of Arts and Sciences

Universiti Utara Malaysia

Questionnaire Cover Letter

Date:

Dear Participant

My name is Lina Fathi Sidig and I am a Ph.D student at Universiti Utara Malaysia. For my final thesis, I am examining the effect of using ASR EyeSpeak software on students' English pronunciation in Al-Turath University College. Because you are one of the students who enrolls in pronunciation class that integrated EyeSpeak software in the department of English language, I am asking for your cooperation to take part in doing survey in this research study by completing the attached surveys.

The following questionnaire will require approximately 10 minutes to complete. There is no compensation for responding nor is there any known risk. In order to ensure that all information will remain confidential, please do not include your name. Copies of the research will be submitted to my Universiti Utara Malaysia instructors and to the library of the same university. Please answer all questions as honestly as possible and return the completed questionnaires promptly to the English department office.

Thank you for taking the time to assist me in my educational endeavors. The data collected will provide useful information regarding the effectiveness of integrating ASR Eyespeak software on students' English language pronunciation. Completion and return of the questionnaire will indicate your willingness to participate in this study. If you require additional information or have questions, please contact me at the number listed below.

Sincerely,

Lina Fathi Sidig

Contact No. 07715998943

Email: lheart41@yahoo.com

Supervisors: Prof. Dr. Ahmed Jelani Shaari.

Email: Jelani@uum.edu.my

Appendix F

Questionnaire

Please circle the appropriate response for each item according to the following 5-point scale:

5= strongly agree

4= agree

3= neutral

2=disagree

1=strongly disagree

Intention to use	5	4	3	2	1
1-I like using EyeSpeak in pronunciation class					
2- I like to practice more when I use EyeSpeak Software					
3- I recommend using EyeSpeak in pronunciation class					
4-After using EyeSpeak software I feel more confident in speaking English					
5-I intend to use EyeSpeak software in the future					
Perceived usefulness	5	4	3	2	1
6-Using EyeSpeak improves my pronunciation					
7- After practicing several times, I have become more aware of the correctness of my pronunciation					
8-EyeSpeak helps me realize where exactly I mispronounce the English words					
9-Listening to native speaker model increases my ability to pronounce unfamiliar words					
10-Listening to my own voice recording compared with the native speaker model helps me improve my pronunciation					
11- Visual graphics for speech sound productions show me where I did mispronounce the sound					
12- Practicing the sound similarity of words raises my awareness in distinguishing between the sounds					
Perceived ease of use	5	4	3	2	1
13- I enjoyed using the EyeSpeak software					
14- I didn't experience any difficulties in using the EyeSpeak software					
15- I find the program is easy to use					
16- I feel comfortable practicing my pronunciation using the EyeSpeak software					
17- I'm not afraid of making pronunciation mistakes when using EyeSpeak software					
18-My interaction with EyeSpeak software is clear and understandable					
19-The program does not require a lot of mental effort from me					

Asst. Prof. Ahmad Abdul Wahab

Asst. Prof. Fatimah Sabri Al-Shiraida

Asst. Teacher Mustafa Mohamed Rasheed

Note: Signature over printed name of the validator

Appendix G



PEJABAT PEMBANGUNAN PELAJAR DAN ALUMNI
Student Development & Alumni Office
College of Arts and Sciences

Universiti Utara Malaysia

Interview Cover Letter

"I hereby give my permission for Lina Fathi Sidig to interview me and quote my responses in a scholarly research paper. I understand that this research paper will be submitted to Prof. Madya Dr. Ahmed Jelani Shaari at the University Utara Malaysia. I understand that I waive any claim to copyright to this material should the student ever publish it in a scholarly journal or in electronic format online. I understand that Miss Lina Sidig [will / will not] maintain my anonymity as a part of this interview. I hereby give my permission in the form of my signature below."

Signature_____

Date_____

Appendix H

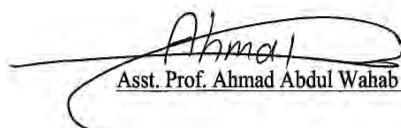


PEJABAT PEMBANGUNAN PELAJAR DAN ALUMNI
Student Development & Alumni Office
College of Arts and Sciences

Universiti Utara Malaysia

Interview Questions

- Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?
- Q2- What do you think is your biggest problem, if any, in English pronunciation?
- Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.
- Q4- What do you do to help your pronunciation outside the class?
- Q5- Have you used a language learning software or speech recognition software before?
- Q6- Do you generally feel comfortable using computer or new software?
- Q7- What do you think about using the EyeSpeak software in pronunciation class?
- Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?
- Q9- Do you think EyeSpeak software is helpful for your pronunciation and why?
- Q10- What kind of Eyespeak activities you have practice did help you the most?
- Q11- How does the feedback of this program help you to learn English pronunciation?
- Q12- Do you like the ways in which the program give you correction and feedback?
- Q13- Which feature in EyeSpeak software would you consider to be the most effective in improving your pronunciation?
- Q14- Do you have any suggestions or recommendations you would like to say about EyeSpeak software as a tool for pronunciation learning?


Asst. Prof. Ahmad Abdul Wahab


Asst. Prof. Fatimah Sabri Al-Shiraida


Asst. Teacher Mustafa Mohamed Rasheed

Note: Signature over printed name of the validator

Appendix I



PEJABAT PEMBANGUNAN PELAJAR DAN ALUMNI
Student Development & Alumni Office
College of Arts and Sciences

Universiti Utara Malaysia

Students' Interview responses (Pilot study)

Name: Mohamed

Age: 18

Pilot Group

Test marks: pretest 31 – posttest 44 (out of 100)

Level: first year student

Question	Response	Keyword
Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?	6	Average
Q2- What do you think is your biggest problem in English pronunciation, if any?	I believe that pronouncing the long words is very difficult for me.	Pronouncing long words
Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.	Yes, /p/ People /bi:bl/ , seven /sefən/ Pleasure /bleʒə/, king /kɪŋ/ Hat /hæt/, chips /tʃɪps/ Garbage /gɑ:bɪdʒ/, victim /fɪktɪm/ Paper /peɪbə/, church /tʃɜ:dʒ/ Ink /ɪŋk/, measurable /meɪrɛʒ..əbl/ Hash /hæʃ/, image /ɪmɪdʒ/ Sing /sɪŋ/, lava /lə:və/ Oppress /əpres/	Problem with /p/ Mispronounce with these sounds: /p/ /tʃ/ /v/
Q4- What do you do to help your pronunciation outside the class?	Uhhh I try to speak English with my colleagues. Interviewer: Do you find speaking English with your friends is easy or	Talk with colleagues

	difficult? It is difficult to remember the translate of the Arabic words in English. Also my pronunciation is not good specially in pronouncing the long words.	
Q5- Have you used language learning software or speech recognition software before?	No, this is my first time	Haven't used software before.
Q6- Do you usually feel comfortable using computer or new software?	Yes, I like using computer. Interviewer: What about using new software? I like it if I understand how to use it, I don't like using complicated software.	Feel comfortable using new software for a change
Q7- What do you think about using EyeSpeak software in pronunciation class?	I like it, it is enjoyable program.	Enjoyable to use.
Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?	I love the way to learn with Eyespeak. Interviewer: You mentioned earlier that you don't like using complicated software, how do see EyeSpeak software? I find it very easy to use that's why I like it very much	Loved Eyespeak
Q9-Do you think EyeSpeak software is helpful for your pronunciation and why?	Yeah, it is very helpful to show me the correct pronunciation by native speaker	Helpful
Q10- What kind of Eyespeak activities you have practice did help you the most?	I love love sound similarity practice is very useful for me.	Very useful activity (similar sounds)
Q11- How does the feedback of this program help you to learn English pronunciation?	It shows me my mistakes then I aware of my mistakes and try to correct it and avoid doing it again.	Showing the mistakes
Q12- Do you like the ways in which the program give you correction and feedback?	Yes, it is very nice way to show me the correct pronunciation of showing animated human mouth and how to produce sounds also the wave and how to compare it with the native speaker.	Like Eyespeak's feedback & correction

Q13- Which feature in EyeSpeak software would you consider to be the most effective in improving your pronunciation?	I think Similar sounds activity	similar sounds
Q14- Do you have any suggestion or recommendation you would like to say about EyeSpeak software as a tool for pronunciation learning?	I hope we can continue in using Eyespeak in the pronunciation class and give us few minutes to practice with games also as a bounce for the higher score.	Eager to use it in the future class. Want to have time play the game in Eyespeak



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Students' Interview responses (Pilot study)

Name: Fareed

Age: 19

Pilot Group

Test marks: pretest 35 - posttest 60 (out of 100)

Level: 1st year student

Question	Response	Keyword
Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?	7	Above average
Q2- What do you think is your biggest problem in English pronunciation, if any?	I don't have a problem but I'm in the learning process.	No problem in pronunciation
Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.	No People /pi:pl/ , seven /sefən/ Pleasure /pleʒə/, king /kɪŋ/ Hat /hæt/, chips /tʃɪps/ Garbage /gɑ:bɪdʒ/ , victim /vɪktɪm/ Paper /peɪpə/, church /tʃɜ:tʃ/ Ink /ɪŋk/, measurable /meʒərəbl/ Hash /hæʃ/, image /ɪmɪdʒ/ Sing /sɪŋk/ , lava /lə:fə/ Oppress /əpres/	Few mispronounce words with this sound: /v/ /ŋ/
Q4- What do you do to help your pronunciation outside the class?	mmm.. I listen to music. Interviewer: Do you think listening to music help you improve your pronunciation? I think it improved since I start listening to the native speaker of English songs.	Listening to music

Q5- Have you used language learning software or speech recognition software before?	No.	Have not use any software before
Q6- Do you usually feel comfortable using computer or new software?	Yes, I use computer always.	Comfortable with computers & new software
Q7- What do you think about using EyeSpeak software in pronunciation class?	I think interesting to learn pronunciation in new entertaining way. Interviewer: could you please tell me in which way you think EyeSpeak is interesting? I enjoy using it, especially.. [uhh].. because we have the chance to listen to the native speaker.	Interesting & entertaining
Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?	Feel good and excited toward learning pronunciation with this software. Interviewer: do you feel good because it help you in improve your pronunciation or because it is just fun and easy to use? It is fun to use but with the EyeSpeak my speaking skill in general improved and much better because I know my mistakes now.	Feeling Good & exciting
Q9-Do you think EyeSpeak software is helpful for your pronunciation and why?	I believe this software help me improve my pronunciation because every time I make a mistake, the program show me where exactly I did wrong.	Helpful because showing the mistakes
Q10- What kind of Eyespeak activities you have practice did help you the most?	I think Similar sounds is the best	similar sounds
Q11- How does the feedback of this program help you to learn English pronunciation?	It helps me because I see which sound I pronounced it wrong.	Showing the mistakes
Q12- Do you like the ways in which the program give you correction and feedback?	Yes, very much	Like the way of correction
Q13- Which feature in EyeSpeak software would	The comparison between my pronunciation with the native by	Comparing with the native

you consider to be the most effective in improving your pronunciation?	showing.	
Q14- Do you have any suggestion or recommendation you would like to say about EyeSpeak software as a tool for pronunciation learning?	Actually, I don't have any suggestion about the program because this is what we really need for learning pronunciation interesting way with listening to native speaker	



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Students' Interview responses (Pilot study)

Name: Reem

Age: 20

Pilot Group

Test marks: pretest 37 - posttest 63 (out of 100)

Level: First year student

Question	Response	Keyword
Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?	8	Good
Q2- What do you think is your biggest problem in English pronunciation, if any?	No problem with my pronunciation.	No problem
Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.	No. People /pi:pl/ , seven /sevən/ Pleasure /pleʒə/, king /kɪŋ/ Hat /hæt/, chips /tʃɪps/ Garbage /gɑːbɪdʒ/, victim /vɪktɪm/ Paper /peɪpə/, church /tʃɜːtʃ/ Ink /ɪŋk/, measurable /meʒərəbl/ Hash /hæʃ/, image /ɪmɪdʒ/ Sing /sɪŋ/, lava /lɑːvə/ Oppress /əpres/	No pronunciation mistakes
Q4- What do you do to help your pronunciation outside the class?	I try to participate a lot in the class. To use my English language	Speak English in the class

Q5- Have you used language learning software or speech recognition software before?	No, I haven't	Have not use any software
Q6- Do you usually feel comfortable using computer or new software?	Yes, I feel comfortable.	comfortable
Q7- What do you think about using EyeSpeak software in pronunciation class?	First, it is very pleasant and second, make us learn good English pronunciation. I like it. Interviewer: in your opinion which one is better in learning English pronunciation with this software or without it? No, I like it very much and ofcourse with the software, we are listening to native speaker of English also it is great way in showing us the mistakes we do while speaking.	Learn in entertaining way
Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?	Feeling pleased and I start to like pronunciation class because of this program.	Pleased
Q9-Do you think EyeSpeak software is helpful for your pronunciation and why?	Yeah definitely because I listen to native pronunciation. Interviewer: do you think listening to native speaker is enough to help you learn? Not just listening, I know it is important but I can practice many words with this software as I said before it show us the mistakes in a great and understandable way.	Helpful because of serveral time practicing
Q10- What kind of Eyespeak activities you have practice did help you the most?	Similar sounds very good and interesting	Similar sounds
Q11- How does the feedback of this program help you to learn English pronunciation?	Because I practice many times until I get it right and I can see the sound of my pronunciation and how much similar to the native speaker.	Practising many times compared with native
Q12- Do you like the ways in which the program give	Yes I like it very much, it great way to correct our pronunciation.	Like the way of giving

you correction and feedback?		correction
Q13- Which feature in EyeSpeak software would you consider to be the most effective in improving your pronunciation?	Listening to native and the practice in a nice way.	Listening to native
Q14- Do you have any suggestion or recommendation you would like to say about EyeSpeak software as a tool for pronunciation learning?	No	



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Students' Interview responses (Pilot study)

Name: Zina
Age: 18
Pilot Group
Test marks: pretest 29- posttest 48 (out of 100)
Level: first year student

Question	Response	Keyword
Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?	5	Below average
Q2- What do you think is your biggest problem in English pronunciation, if any?	Sometimes I pronounced the word wrong.	Just mispronounced few words
Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.	Maybe /v/, I always pronounced it as /f/ People /pi: b l/ , seven /se f ən/ Pleasure /pleʒə/, king /kɪŋ/ Hat /hæt/, chips /tʃɪps/ Garbage /gɑːbɪdʒ/, victim /vɪktɪm/ Paper /peɪpə/, church /tʃ ^a : dʒ / Ink /ɪŋk/, measurable /mɪ ^z rəbl/ Hash /hæʃ/, image /ɪmɪdʒ/ Sing /sɪŋ/, lava /lɑ: f ə/ Oppress /əpres/	Mispronounce some words with these sounds: /p/ /v/ /ʒ/ /tʃ/
Q4- What do you do to help your pronunciation outside the class?	I communicate with my friends in English	Communicate in English with friends

Q5- Have you used language learning software or speech recognition software before?	No I didn't	Have not use any software
Q6- Do you usually feel comfortable using computer or new software?	No problem at all	Comfortable with computer & new software
Q7- What do you think about using EyeSpeak software in pronunciation class?	Uhhh .. it is good to learn in new way.	Good way to learn with Eyespeak
Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?	Uh. Exciting and feeling comfortable. Interviewer: can yu tell me why you feel like this way? This is new way to learn that make me feel happy.	Feel exciting & comfortable
Q9-Do you think EyeSpeak software is helpful for your pronunciation and why?	It is very helpful. I learn faster and understand the sound differences and how it pronounce much better with Eyespeak because it visualised it for me.	Helpful. Understand sound differences
Q10- What kind of Eyespeak activities you have practice did help you the most?	All are good but I think word practice is the best.	Word practice
Q11- How does the feedback of this program help you to learn English pronunciation?	When the program shows me with sound wave and compares it with native in this way make me realise my mistakes	Use sound wave, native speaker & correct mistakes
Q12- Do you like the ways in which the program give you correction and feedback?	Of course I like it. Interviewer: could you please be more specific? Well from my experience using this software I understand better from the comparison that the software make between my pronunciation and the native speaker of English, yeah I think this is why I like it.	Like the way of correction
Q13- Which feature in EyeSpeak software would you consider to be the most effective in improving your pronunciation?	I think listening to the native speaker and showing animated sound wave compared with the native speaker.	Listening and animated sound wave

Q14- Do you have any suggestion or recommendation you would like to say about EyeSpeak software as a tool for pronunciation learning?	I don't have any.	
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Appendix J



PEJABAT PEMBANGUNAN PELAJAR DAN ALUMNI
Student Development & Alumni Office
College of Arts and Sciences
Universiti Utara Malaysia

Students' Interview responses (Actual Study)

Name: Ahmad
Age: 19
Group A (Experiment group)
Test marks: pretest 42 – posttest 92 (out of 100)
Level: first year student

Question	Response	Keyword
Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?	I will say 8	good
Q2- What do you think is your biggest problem in English pronunciation, if any?	I think I have less problem with the short words like /i:/ or /ɔ:/	Problem with /i:/ and /ɔ:/
Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.	Yes, there is maybe some difficult uh..uh.. difficult sound like ɔ: always difficult for me. People /pi:pl/ , seven /sevən/ Pleasure /pleʒə/, king /kɪŋ/ Hat /hæt/, chips /tʃɪps/ Garbage /gɑ:bɪdʒ/, victim /vɪktɪm/ Paper /peɪpə/, church /tʃɜ:tʃ/ Ink /ɪŋk/, measurable /meʒərəbl/ Hash /hæʃ/, image /ɪmɪdʒ/ Sing /sɪŋ/, lava /lə:və/ Oppress /əpres/	Good pronnciation
Q4- What do you do to help your pronunciation outside the class?	I always keep in touch with my friend and communicate with each other by english so I always uh..uh used to uh..uh..speak english with them and maybe I always listen to english music	Communication And exposure

	by the official band and I uh..uh.. looked at the lyrics of the music and see what difficult words if there is too many maybe words I can't hear it. Interviewer: so tell me about your friends are they native speaker of english language? No, my friends are nature like me but we are always communicate with each other to pronounce it good.	
Q5- Have you used language learning software or speech recognition software before?	No, it's my first time	Haven't used software before.
Q6- Do you usually feel comfortable using computer or new software?	Yeah, I see is something change to use computer and to learn it.	Feel comfortable using new software for a change
Q7- What do you think about using EyeSpeak software in pronunciation class?	I see it's something modern to use software and help me to pronounce sounds.	Modern to use software
Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?	I feel comfortable but when I listen to sounds improve my pronounce.	Comfortable
Q9-Do you think EyeSpeak software is helpful for your pronunciation and why?	Yes, there is too many activities help me to pronounce the word correctly	Helpful
Q10- What kind of Eyespeak activities you have practice did help you the most?	I see the similar sound is very useful for us	Very useful activity (similar sounds)
Q11- How does the feedback of this program help you to learn English pronunciation?	I see the activities when I listen to the speakers when it speech the sound and I have to hear it and also a similar two sounds and I have to choose one of them	The feedback that help is when the software giving two words with nearest sound to choose the

		correct one.
Q12- Do you like the ways in which the program give you correction and feedback?	Yes, it is very help uh.. it is very useful to give us a correction and when the native speaker by the software speak the sentences then I have to speak it like it then compare it between me and the native speaker.	Helpful and useful
Q13- Which feature in EyeSpeak software would you consider to be the most effective in improving your pronunciation?	Uhh there is the difficlut symboles like the short /ɔ:/ or the short /i:/ or I when I make practice help me to improve it and to know what it mean.	Help to improve the difficult sounds like : short /ɔ:/ & short /i:/
Q14- Do you have any suggestion or recommendation you would like to say about EyeSpeak software as a tool for pronunciation learning?	Maybe there is an idea they have to put a video and we have to listen to very long sentences without any write on the screen then we have to write it on the software and we have to see what's the official videos with our writing. Interviewer: would you like to use it in the future? Yes, because I'm still a student and I have to improve my pronounce when I see this software is very useful for us. I have to use it in the future.	Software improve pronunciation. Recommend to use video



Universiti Utara Malaysia



Students' Interview responses

Name: Ayman
Age: 20
Group A (Experiment group)
Test marks: pretest 43 - posttest 84 (out of 100)
Level: 1st year student

Question	Response	Keyword
Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?	6 out of 10	Average
Q2- What do you think is your biggest problem in English pronunciation, if any?	I don't have big problem in pronunciation but I have to use many programs to improve my pronunciation.	No problem in pronunciation
Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.	No People /pi:pl/ , seven /sevən/ Pleasure /pleʒə/, king /kɪŋ/ Hat /hæt/, chips /tʃɪps/ Garbage /gɹɑ:b..dʒ/ , victim /vɪktɪm/ Paper /peɪpə/ , church /tʃɜ:tʃ/ Ink /ɪŋk/, measurable /meʒərəbl/ Hash /hæʃ/, image /.. meɪʒ/ Sing /sɪŋk/ , lava /lɑ:və/ Oppress /əpres/	Few mispronounce words with this sound: /ŋ/
Q4- What do you do to help your pronunciation outside the class?	Uhh I have to improve my pronunciation I have a location his name "Voice Of America" that's improve my pronunciation.	Listen to native speaker sources
Q5- Have you used language learning software or speech recognition software before?	No, just this software EyeSpeak is my first time	Haven't used software before

Q6- Do you usually feel comfortable using computer or new software?	Yeah, because that help me in improve pronunciation.	Comfortable using new software, helpful & improve pronunciation
Q7- What do you think about using EyeSpeak software in pronunciation class?	That was good and I'm interesting with my friends.	Good & interesting using it in class.
Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?	Uhh..I was comfortable because if I want to improve my pronunciation I should be comfortable.	Comfortable
Q9-Do you think EyeSpeak software is helpful for your pronunciation and why?	I didn't choose that program but I think is help me to know there are many words the same pronunciation. Interviewer: do you think in this way help you more? When I use it that program is help me to recognized the difference and the similarities . Yeah uhh I didn't see like that program before, that program is special.	Special and Helpful in recongizing the sounds differences and similarities
Q10- What kind of Eyespeak activities you have practice did help you the most?	Similar sounds	Similar sounds activity
Q11- How does the feedback of this program help you to learn English pronunciation?	When I'm using this program i...i...i... Sometimes when I'm using that choose between the two words that the same of the pronunciation when I make a mistake he is correct my pronunciation that's help me.	'Sound similairites' correct his mistakes
Q12- Do you like the ways in which the program give you correction and feedback?	Yeah, I like it Interviewer: which one you prefer the correction in the traditional teaching class or with the software? No..No.. ofcourse..ofcourse with the software . I hope to continue using it.	Like the software's correction & feedback.
Q13- Which feature in EyeSpeak software would you consider to be the most effective in improving your	Similar sounds and word practice	Effective features in 'sound similarities' & 'word practice'

pronunciation?		
Q14- Do you have any suggestion or recommendation you would like to say about EyeSpeak software as a tool for pronunciation learning?	I have a suggestion, I think that program to add like videos of conversation that will be not traditional. When we want to learn we don't want to learn in the traditional method.	He like it because learning in modern way not traditional method





Students' Interview responses

Name: Basel

Age: 20

Group A (Experiment group)

Test marks: pretest 44 - posttest 82 (out of 100)

Level: First year student

Question	Response	Keyword
Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?	9	Very good
Q2- What do you think is your biggest problem in English pronunciation, if any?	Yes, my problem I can't pronounce long words.	Long word problem
Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.	No. People /pi: b l/ , seven /sevən/ Pleasure / b lezə/, king / k ɪŋ/ Hat /hæt/, chips /tʃi: p s/ Garbage /gɑ: b ɪdʒ/, victim /vɪktɪm/ Paper /peɪ b ə/ , church /tʃə: tʃ / Ink /ɪŋ k /, measurable /me r ɛʒ.. ə bl/ Hash /hæʃ/, image /ɪmɪdʒ/ Sing /sɪ n k/, lava /lə:və/ Oppress /əpres/	Mispronounce many words with these sounds: /p/ /ŋ/
Q4- What do you do to help your pronunciation outside the class?	Listen to music	Exposure to english language through Music
Q5- Have you used language learning software or speech recognition software before?	Actually, No I haven't use any software	Haven't use software before
Q6- Do you usually feel	I feel comfortable using computer,	Comfortable

comfortable using computer or new software?	yeah.. I don't have any problem with it.	using new software.
Q7- What do you think about using EyeSpeak software in pronunciation class?	mmm..., it's good	Good to have it in class
Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?	Good feeling. It's not helpful	Feeling good but it's not helpful
Q9-Do you think EyeSpeak software is helpful for your pronunciation and why?	Yes, it help me uh.uh.. in sound prononuce some words. Before that I did not know how to pronounce it correctly but now I can.	Help me in improve pronounce certain words
Q10- What kind of Eyespeak activities you have practice did help you the most?	Similar sound	'Similar sounds' is the most helpful
Q11- How does the feedback of this program help you to learn English pronunciation?	Yes, it help me.	The feedback is helpful
Q12- Do you like the ways in which the program give you correction and feedback?	Yes..[mmm].. I think this is the most helpful thing about this software which give me the correction in easy way.	Like the way that give me the feedback
Q13- Which feature in EyeSpeak software would you consider to be the most effective in improving your pronunciation?	Similar sound	Best feature is similar sounds
Q14- Do you have any suggestion or recommendation you would like to say about EyeSpeak software as a tool for pronunciation learning?	No it's perfect	Perfect tool



Students' Interview responses

Name: Fatin
Age: 22
Group A (Experiment group)
Test marks: pretest 38- posttest 78 (out of 100)
Level: first year student

Question	Response	Keyword
Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?	Maybe 7* or 9	Above average to very good
Q2- What do you think is your biggest problem in English pronunciation, if any?	Uh.. my problem in English pronunciation uh..uh.. I don't think I have a problem because uh when aaa.. I try to use the this program I feel myself is very good in it.	Don't have problem in pronunciation
Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.	Uhh.. there is uh..uh.. just a little problem it can't uh.. it maybe stop sometimes. Sometimes it stop just this. People /pi:pl/ , seven /sevən/ Pleasure /pleʒə/, king /kɪŋ/ Hat /hæt/, chips /tʃɪps/ Garbage /gɹɑ:bɪk/, victim /vɪktɪm/ Paper /peɪpə/, church /tʃɹɑ:dʒ/ Ink /ɪŋk/, measurable /meʒərəbl/ Hash /hæʃ/, image /ɪmɪdʒ/ Sing /sɪŋ/, lava /lɑ:və/ Oppress /əpres/	Mispronounce some words with these sounds: /tʃ/ /ŋ/
Q4- What do you do to help your pronunciation outside the class?	I just uhh know the letters uh.. I sometime speak with my friends and listen on the google the sounds of the pronunciation to know uhh.. when I listen to it, it keep on my mind and be a good with that.	Communciate with friends and use google to improve her pronunciation

Q5- Have you used language learning software or speech recognition software before?	Just once only the EyeSpeak.	Haven't use software before
Q6- Do you usually feel comfortable using computer or new software?	Yes.	Comfortable using new software.
Q7- What do you think about using EyeSpeak software in pronunciation class?	It very easy and I wish it become a knowledge programme because it very useful.	Very easy and useful to use.
Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?	Yes, uh in the beginning when we see the letter of pronunciation and the teacher teach us how to use it after that when we use the program it become more easy.	Easy to use after teacher instruction of use
Q9-Do you think EyeSpeak software is helpful for your pronunciation and why?	Yes, it is very helpful.	Very helpful tool
Q10- What kind of Eyespeak activities you have practice did help you the most?	Uhh, the first one we learn it Interviewer: you mean similar sounds activities? Yes it is very beautiful and very useful.	'similar sounds' Very good & useful
Q11- How does the feedback of this program help you to learn English pronunciation?	It actually very good.	Very good feedback
Q12- Do you like the ways in which the program give you correction and feedback?	Yes, it very comfortable.	Comfortable with its way of giving the feedback
Q13- Which feature in EyeSpeak software would you consider to be the most effective in improving your pronunciation?	The listening and the speaking everything with that ..uhh.. they are complete each other.	Listening & speaking feature are effective. It complete each other
Q14- Do you have any suggestion or recommendation you would like to say about EyeSpeak software as a	Yes, I will use it because it is very useful like I said before but sometimes it stopped when it reach to some levels, sometimes it stop so referesh the program.	Useful and effective. Software limitation is get frozen screen

tool for pronunciation learning?	Interviewer: do you recommmed to use it maybe next year? I wish that, first miss fatimah we take lesson in her lessons that help or complete the program it will be..uhh... Interviewer: effective! Do you mean? Yes, it will be very useful.	in some levels.
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Students' Interview responses

Name: Mays

Age: 17

Group A (Experiment group)

Test marks: pretest 37 - posttest 81 (out of 100)

Level: First year student

Question	Response	Keyword
Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?	7	Above average
Q2- What do you think is your biggest problem in English pronunciation, if any?	Don't have any problems.	No problem in pronunciation
Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.	Some uh like /p/ People /pi:pl/ , seven /sevən/ Pleasure /pleʒə/, king /kɪŋ/ Hat /hæt/, chips /tʃɪps/ Garbage /grɑ:bɪg/, victim /vɪktɪm/ Paper /peɪpə/, church /tʃɜ:tʃ/ Ink /ɪŋk/, measurable /mi:sərəbl/ Hash /hæʃ/, image /ɪmedʒ/ Sing /sɪŋ/, lava /lə:və/ Oppress /əpres/	Mispronounce few words with this sound: /ʒ/
Q4- What do you do to help your pronunciation outside the class?	Listen to music and watching film and read the short story.	Exposure to native speaker resources like music and movies
Q5- Have you used language learning software or speech recognition software before?	No, this is my first time. Interviewer: what is your first impression about the software? It is a pleasant experience, I think.	Haven't use software before
Q6- Do you usually feel comfortable using	Yes, I feel comfortable when I use new software.	Comfortable using new

computer or new software?		software.
Q7- What do you think about using EyeSpeak software in pronunciation class?	Yes, I think is good in class.	Good to have it in class
Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?	Is easy to use and really helpful.	Easy and very helpful
Q9-Do you think EyeSpeak software is helpful for your pronunciation and why?	Yes, when I hear the sound of the teacher in the program, it's make me understand the words more.	Clarify how to pronounce correctly
Q10- What kind of Eyespeak activities you have practice did help you the most?	Similar sounds. It is easy.	Easy to practice the similar sounds
Q11- How does the feedback of this program help you to learn English pronunciation?	I told you when I hear the sound is very clear.	Clear pronuncciation
Q12- Do you like the ways in which the program give you correction and feedback?	Yes. Interviewer: please tell me why you like it? I can see and hear where I did make a mistakes and that is make a huge different in understanding my mistakes.	Likes the correction & feedback
Q13- Which feature in EyeSpeak software would you consider to be the most effective in improving your pronunciation?	Similar sound it really help me and the other student.	The similar sounds feature is very helpful
Q14- Do you have any suggestion or recommendation you would like to say about EyeSpeak software as a tool for pronunciation learning?	I don't think so, because there is very uhuh.. Everything I need in the program.	The program fit his needs



Students' Interview responses

Name: Mazen

Age: 18

Group A (Experiment group)

Test marks: pretest 30 – posttest 41 (out of 100)

Level: first year student.

Question	Response	Keyword
Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?	It is 9	Very good
Q2- What do you think is your biggest problem in English pronunciation, if any?	No, I don't have problem.	No pronunciation problem
Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.	The long words. People /pi:pl/ , seven /sevən/ Pleasure /pli:ʒə/, king /kɪŋ/ Hat /hæt/, chips /tʃɪps/ Garbage /gɑ:bæg/ , victim /vɪktɪm/ Paper /peɪpə/ , church /tʃɜ:tʃ/ Ink /ɪŋk/, measurable /meʒərəbl/ Hash /hæʃ/, image /ɪmɪdʒ/ Sing /sɪŋ/, lava /lɑ:v../ Oppress /əpreʃ/	He pronounce all the tested sounds correctly, but mispronounce some other sounds
Q4- What do you do to help your pronunciation outside the class?	Read magazine and short stories.	Improve pronunciation through reading
Q5- Have you used language learning software or speech recognition software before?	No.	Haven't use software before
Q6- Do you usually feel comfortable using computer or new software?	Yes, ofcourse. I like technology in general.	Comfortable in use it

Q7- What do you think about using EyeSpeak software in pronunciation class?	Learn the new pronunciation better.	Learn better pronunciation with the use of the software.
Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?	It is very interesting and uhh.. because have new words and pronunciation.	Very interesting program
Q9-Do you think EyeSpeak software is helpful for your pronunciation and why?	Yes, because have new words and have ..uhh.	Learn new words
Q10- What kind of Eyespeak activities you have practice did help you the most?	The similar sounds activities.	Best effect is similar sounds
Q11- How does the feedback of this program help you to learn English pronunciation?	Correcting in front of Eyespeak is better than in class. Interviewer: why do you think that? In the class I can't practice like I do with the software also I don't feel worry at all with the software what I feel is the opposite I feel excited.	Correction with software is much better than in front of the class
Q12- Do you like the ways in which the program give you correction and feedback?	Yes, ofcourse.	Like the way that the programe gives feedback
Q13- Which feature in EyeSpeak software would you consider to be the most effective in improving your pronunciation?	similar sounds activities.	Effective feature is related with similar sounds
Q14- Do you have any suggestion or recommendation you would like to say about EyeSpeak software as a tool for pronunciation learning?	To upgrade of this software and have good speaking recommend and like give new lessons with this software.	Recommend to have new lessons with this software



Students' Interview responses

Name: Malik

Age: 20

Group A (Experiment group)

Test marks: pretest 37 – posttest 69 (out of 100)

Level: first year student

Question	Response	Keyword
Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?	Very good	Very good
Q2- What do you think is your biggest problem in English pronunciation, if any?	I can't understand words because it hard to pronounce.	Hard to pronounce words
Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.	All the sounds. People / bi:bl / , seven /sevən/ Pleasure /pleʒə/, king /kɪŋ/ Hat / ðæt /, chips /tʃɪps/ Garbage /g ræb / , victim / fæt .. Paper / berbə /, church /tʃɜ:tʃ/ Ink /ɪŋk/, measurable /meʒərəbl/ Hash /.. æf /, image /.. mAɪt / Sing /sɪŋ/, lava / li:v .. Oppress / bæbət /	Problem with all the sounds Mispronounce these sound: /p/ /v/
Q4- What do you do to help your pronunciation outside the class?	Watching movies.	Exposure to english language through movies
Q5- Have you used language learning software or speech recognition software before?	No.	Haven't use software before

Q6- Do you usually feel comfortable using computer or new software?	Yes.	Comfortable in use
Q7- What do you think about using EyeSpeak software in pronunciation class?	Interviewer: do you like using Eyespeak in pronunciation class? Yes. I do so much. I loved it.	Like to have it in class
Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?	Good using the program.	Feeling good with this program
Q9-Do you think EyeSpeak software is helpful for your pronunciation and why?	Yes, ofcourse good program. Interviewer: why do you think that? Because with the software I know ..i mean I noticed different in [pause] my speaking and become more accurate.	Helpful for learning pronunciation, good program
Q10- What kind of Eyespeak activities you have practice did help you the most?	Similar sound.	Best activity is similar sounds
Q11- How does the feedback of this program help you to learn English pronunciation?	Through listening to native speaker.	Good feedback because it is native speaker
Q12- Do you like the ways in which the program give you correction and feedback?	Yes.	Like the way of giving feedback
Q13- Which feature in EyeSpeak software would you consider to be the most effective in improving your pronunciation?	Reading words by comparing two words.	Best feature is comapring two words
Q14- Do you have any suggestion or recommendation you would like to say about EyeSpeak software as a tool for pronunciation learning?	No, Interviewer: Are you going to use it in the future? Yes.	Good tool and willing to use it in the future



Students' Interview responses

Name: Munir

Age: 20

Group A (Experiment group)

Test marks: pretest 47- posttest 97 (out of 100)

Level: first year student

Question	Response	Keyword
Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?	I think is like 9 or 8 because my accent is kind of different like I speak English in an American accent so it kind of different so I have some different pronunciation between words.	Very good or good
Q2- What do you think is your biggest problem in English pronunciation, if any?	I think is like the same the different between the accent now is like kind of problem for me, with the English all of it I don't think so, I have no problems.	No problem
Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.	No, I don't have any problem. People /pi:pl/ , seven /sevən/ Pleasure /pleʒə/, king /kɪŋ/ Hat /hæt/, chips /tʃɪps/ Garbage /gɑ:bdʒ/, victim /fɪktɪm/ Paper /peɪpə/, church /tʃɜ:tʃ/ Ink /aɪnk/, measurable /meʒərəbl/ Hash /hæʃ/, image /emɪdʒ/ Sing /sɪŋk/, lava /lə:və/ Oppress /əpresəs/	He mispronounce certain sounds /v/ /ŋ/
Q4- What do you do to help your pronunciation outside the class?	First of all, I choose which accent I want so, after that I going to watch some movies like if I'm choosing the American accent I watching American movies and music. Sometimes I write songs because I'm song writer and I trying to not looking to the translation of the moive so I'm just hear what they saying and after that I recorded myself of this part to see myself I'm right or wrong and repeat it again.	Exposure to sources from native speaker of English (music and movies)

Q5- Have you used language learning software or speech recognition software before?	No, I'm always trying to talk with American people to practice with my pronunciation my language, learn more about... this is my first time with this kind of program. I'm watching some classes on the internet but after that when I look at myself like I have great accent I have great language and see myself like I'm good with pronunciation . I say that's enough I don't have to practice with that so I change it to movies.	Communicate with native speaker and watch movies
Q6- Do you usually feel comfortable using computer or new software?	Uh, Yeah I think so.	Comfortable using new software.
Q7- What do you think about using EyeSpeak software in pronunciation class?	This is really excellent because you know it something like mixed it between the studying and fun and I don't feel bored when I use it in that program.	Excellent Learning with fun & never feel bored using it.
Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?	I think ahh..ahh.. its really great because I learn more if there is something wasn't understand it but now I think I'm good with it.	Clarify the misunderstood items.
Q9-Do you think EyeSpeak software is helpful for your pronunciation and why?	Ofcourse it's helpful because sometimes like I know my lecturer it's kind of bad with pronunciation, I don't hear his voice but with this program I was putting the headphone and hear like a real pronunciation like I understand it what they saying so I know there is nothing wrong with it, so I think it's really helpful for me.	Helpful with clear pronunciation.
Q10- What kind of Eyespeak activities you have practice did help you the most?	I think that exam of the pronunciation between the different sounds the /v/ and /p/ was different like 'fine' and 'wine'	Differentiate the differences between sounds like: /v/ /p/
Q11- How does the feedback of this program help you to learn English pronunciation?	I think it cool to help me in many thing. I think like with fun idea and make me learn a good pronunciation.	Learn good pronunciation with fun
Q12- Do you like the ways in which the program give you correction and feedback?	I think it is the same the different between the sound help me because I was uhh.. we all have that's problem with voices like sometimes I say 'vine'	Eyespeak correct his pronunciation

	and 'fine' if I don't pronounce it like /v/ the person next me will don't understand what I'm saying so that really helpful.	
Q13- Which feature in EyeSpeak software would you consider to be the most effective in improving your pronunciation?	I think that game to give you the different between sounds and when you hear it from the teacher then I have to recorded and see where is my wrong with it. It's really helpful.	Showing their pronunciation mistakes in 'similar sounds'
Q14- Do you have any suggestion or recommendation you would like to say about EyeSpeak software as a tool for pronunciation learning?	I think it all cool it doesn't need anything and I don't have any opinion of that because the greator of the program was really genius with this, he found like a great way to make us learn the pronunciation and the language.	Excellent tool for learning pronunciation with fun.



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Students' Interview responses

Name: Anwar

Age: 21

Group A (Experiment group)

Test marks: pretest 41- posttest 90 (out of 100)

Level: first year student

Question	Response	Keyword
Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?	I rated maybe 8	good
Q2- What do you think is your biggest problem in English pronunciation, if any?	Maybe some words like /p/ and /b/ sometimes I feel when I pronounce it, but sometimes I pronounce it like /p/. this is the only problem in pronunciation.	Problems with /p/ and /b/
Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.	Sometimes but I can read, People /pi:pl/ , seven /sevən/ Pleasure /pleʒə/, king /kɪŋ/ Hat /hæt/, chips /tʃɪps/ Garbage /gɑːbɪdʒ/ , victim /fɪktɪm/ Paper /peɪpə/ , church /tʃɜːtʃ/ Ink /ɪŋk/, measurable /mɪʒrəbl/ Hash /hæʃ/, image /ɪmɪdʒ/ Sing /sɪŋ/, lava /lɑːvə/ Oppress /əpres/	Some pronunciation mistakes with these sounds: /v/ /ʒ/
Q4- What do you do to help your pronunciation outside the class?	Maybe, I speak with native speaker like with some people from USA or another who know English, I make practice with him, always speaking with him make me help me with English also in grammar. Interviewer : so you communicate with them through the internet? Yeah through the internet or if there is someone I will practice with him in Al-Turath University or another place.	Communicate and exposure to native speaker of English sources

Q5- Have you used language learning software or speech recognition software before?	Yes, I have tried maybe one time before how to learn software like 'Deebly' but I didn't get it too much but I get some information about computer and this is my second time EyeSpeak.	Use another software before
Q6- Do you usually feel comfortable using computer or new software?	Really, I hate computer but I use EyeSpeak with other students I feel comfortable.	Hate computer but with Eyespeak feel comfortable.
Q7- What do you think about using EyeSpeak software in pronunciation class?	It is so interesting. It make me inspiring and motivate to learn new pronunciation in English.	Interesting, motivating and inspiring tool
Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?	It is very nice, like I used to pronounce some words wrong but when I used this programe it make me pronounce very nice also the practice of sounds also make me very nice, it is very interesting.	Ineresting and improve pronunciation
Q9-Do you think EyeSpeak software is helpful for your pronunciation and why?	Yeah, it is helpful because it make me pronounce some sounds right like not for example there is practice in sounds and how to uhhh there is two words and make one of them that how you get the pronounce from other and how you do it.	Helpful activities because practicing sounds & words
Q10- What kind of Eyespeak activities you have practice did help you the most?	The sound one like the sound I hear after I say because also give my pronunciation and how can I pronounce the word correctly.	Showing the correct way to pronounce sounds in 'word practice'
Q11- How does the feedback of this program help you to learn English pronunciation?	It also give me some experience, new experience how to learn new words and how to make concentration between the words.	Learn new words
Q12- Do you like the ways in which the program give you correction and feedback?	Yeah, too much because it help me like there some one jumping and after that it go to the word is like a game it make me very nice. Interviewer: so you enjoy while you are practicing? Yes, I enjoy it too much.	Helpful and joyful tool
Q13- Which feature in EyeSpeak software would you consider to be the most effective in	Maybe the words, because the words the one with 'bear' the middle one, because also if someone don't know English when he see it just press the	Using words is the effective feature in 'similar

improving your pronunciation?	word and go directly to the word as I said it's like a game and you will learn easily.	sounds' make learning easier.
Q14- Do you have any suggestion or recommendation you would like to say about EyeSpeak software as a tool for pronunciation learning?	I very really interesting to enter this software in the class. I recommend to develop it and make it more better to other students because it is very interesting program to other and it give us the motivation to be better, to improve our English . Interviewer: Do you think after this experience using EyeSpeak software are you going to use it in the future? Yeah, inshallah I will try to use it because it is very interesting even if it finish I will pay to use it because it is like a program, I use interchange real until level 4 but I find this program is more easy and practice more than books.	Interesting, motivating and so eager to use it in the future. Practicing is more useful than books



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Students' Interview responses

Name: Saber

Age: 22

Group A (Experiment group)

Test marks: pretest 50 – posttest 90 (out of 100)

Level: First year student

Question	Response	Keyword
Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?	I think maybe 7 or 8	Above average or good
Q2- What do you think is your biggest problem in English pronunciation, if any?	Maybe it's transcribe is my only problem.	Transcribing problem
Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.	No, People /pi:pl/ , seven /sevən/ Pleasure /pleʒə/, king /kɪŋ/ Hat /hæt/, chips /ʃɪps/ Garbage /gɑ:bɪdʒ/, victim /vɪktɪm/ Paper /peɪpə/, church /tʃɑ:dʒ/ Ink /ɪŋk/, measurable /mɪzrəbl/ Hash /hæʃ/, image /ɪmɪdʒ/ Sing /sɪŋ/, lava /lɑv/ Oppress /ɔ:pres/	Mispronounce some sounds: /tʃ/ /ʒ/
Q4- What do you do to help your pronunciation outside the class?	I speak with my friend just English to improve my English skills and my accent.	Communicate with friends
Q5- Have you used language learning software or speech recognition software before?	No.	
Q6- Do you usually feel	Yes, ofcourse	Comfortable

comfortable using computer or new software?		using new software.
Q7- What do you think about using EyeSpeak software in pronunciation class?	It's amazing program. I enjoy to use it	Amazing and enjoyable program
Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?	Ofcourse it is amazing program it improve my pronunciation skill my listening skill. Okey.	Improve pronunciation and listening skill
Q9-Do you think EyeSpeak software is helpful for your pronunciation and why?	Ofcourse is very helpful, is improve my listen skill my pronounce skill. Ofcourse is big helpful.	Very helpful and improve pronunciation
Q10- What kind of Eyespeak activities you have practice did help you the most?	Uhh..... listening ...uh... listening.	Most helpful in listening
Q11- How does the feedback of this program help you to learn English pronunciation?	Ofocurse it's help me to ..uhh.. because aaa.. the program improve my listen skill my pronunciation skill...okey.	Improve listening skill
Q12- Do you like the ways in which the program give you correction and feedback?	Ofcourse, of course it's uhh.. The program give me my mistake..okey. how I try to uhh improve my pronunciation how I to try improve my listen skill.. okey.	Like the way that showing correction & feedback.
Q13- Which feature in EyeSpeak software would you consider to be the most effective in improving your pronunciation?	Maybe the listening.	
Q14- Do you have any suggestion or recommendation you would like to say about EyeSpeak software as a tool for pronunciation learning?	It's great program but I think ..uhh.. it should be more accent you know the British Like Irish, American, Okey. Interviewer: So you recommend to have more than one accent? Yeah, ofcourse... ofcourse.	Great, amazing activities. Recommend more accent. Willing to use it in the future.

	Interviewer: what about the features and the activities? No..No.. the features and the activities is amazing...okey. Is great program. Interviewer : Are you going to use it in the future? Ofcourse ..ofcourse. I have my own account I use it, if I have chance. Okey.	
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Students' Interview responses

Name: Sami

Age: 22

Group A (Experiment group)

Test marks: pretest 36 – posttest 41 (out of 100)

Level: first year student

Question	Response	Keyword
Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?	I will give it 5.	Below average
Q2- What do you think is your biggest problem in English pronunciation, if any?	The long word I can't read it.	Problem in pronouncing long words
Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.	Yes, the consonant. People /bi:bl/ , seven /sevən/ Pleasure /pleʒə/, king /kɪŋ/ Hat /hʌt/, chips /tʃɪps/ Garbage /gɑ:bɪk/, victim /vækteɪm/ Paper /beɪbə/, church /tʃɑ:dʒ/ Ink /ɪŋk/, measurable /meʒərəbl/ Hash /hæʃ/, image /ɪmeɪdʒ/ Sing /sɪŋk/, lava /lə:və/ Oppress /əpresəs/	Problem with consonant sounds Mispronounce these sounds: /p/ /ŋ/ /tʃ/
Q4- What do you do to help your pronunciation outside the class?	Uhh.. the programs of English, listen to music which is British.	Exposure to English language through listening to British Music

Q5- Have you used language learning software or speech recognition software before?	No, because dictionaries can pronounce the sound.	Haven't use software before
Q6- Do you usually feel comfortable using computer or new software?	Yes. no problem.	Comfortable using new software.
Q7- What do you think about using EyeSpeak software in pronunciation class?	EyeSpeak software is very good in pronunciation. Interviewer: why? First it is English native pronunciation and [mmm] second I love the way it show me my mistakes.	Very good tool
Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?	The program EyeSpeak help people in the pronunciation. Sometimes easy sometimes no.	Helpful and sometimes it easy
Q9-Do you think EyeSpeak software is helpful for your pronunciation and why?	Yes, the pronunciation for long words.	Helpful in pronouncing the long words
Q10- What kind of Eyespeak activities you have practice did help you the most?	The listen words. Interviewer: do you mean 'word practice'? Yes	Best activity is listening to words.
Q11- How does the feedback of this program help you to learn English pronunciation?	Yes, it is good, kind of.	Good feedback
Q12- Do you like the ways in which the program give you correction and feedback?	Yes, in the pronunciation.	Like the way it correct his pronunciation
Q13- Which feature in EyeSpeak software would you consider to be the most effective in improving your pronunciation?	Pronouncing the sounds.	Best feature listeing how it pronounce the sounds

Q14- Do you have any suggestion or recommendation you would like to say about EyeSpeak software as a tool for pronunciation learning?	I suggest to listen to EyeSpeak program Yes.	Suggest to other to use EyeSpeak program.
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Students' Interview responses

Name: Zainab

Age: 20

Group A (Experiment group)

Test marks: pretest 43 - posttest 88 (out of 100)

Level: first year student

Question	Response	Keyword
Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?	Well, I give myself 5 out of 10	Below average
Q2- What do you think is your biggest problem in English pronunciation, if any?	Well, I have problem in pronunciation the word syllable of the words.	Problem with word syllable
Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.	Yes a lot of People /pi:bl/, seven /sevən/ Pleasure /pleɪdʒə/, king /kɪŋ/ Hat /hæt/, chips /tʃɪps/ Garbage /kɑ:big/, victim /fɪktɪm/ Paper /peɪpə/, church /tʃɜ:tʃ/ Ink /ɪŋk/, measurable /mɪzəbl/ Hash /hæʃ/, image /ɪmɪdʒ/ Sing /sɪŋ/, lava /lɑ:v../ Oppress /əbres/	Mispronounce Some sounds: /p/ /ɜ/ /v/
Q4- What do you do to help your pronunciation outside the class?	Well, I practice the language with my friends with my family specially with my father, we talk a lot on the phone because he is in another country so I talk to him.	Practicing with friends and family
Q5- Have you used language learning software or speech recognition software before?	No, I haven't use it before.	Haven't use software before
Q6- Do you usually feel comfortable using computer and new	Yes, ofcourse.	Feel comfortable using new

software?		software.
Q7- What do you think about using EyeSpeak software in pronunciation class?	Well, is a very important program and help us to improve our pronunciation.	Important, helpful and improve her pronunciation
Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?	Well, I feel some of stress and anxiety at the same time.	Stress and anxiety
Q9-Do you think EyeSpeak software is helpful for your pronunciation and why?	Yes, ofcourse because it improve and help us improve our pronunciation and talk to another people.	Help her to improve her pronunciation
Q10- What kind of Eyespeak activities you have practice did help you the most?	The most practice help me that word practice and similar speech also.	Words practice and similar sounds
Q11- How does the feedback of this program help you to learn English pronunciation?	That I said I have problem with the syllable of the words so that correct the syllable to me that I understand it. Interviewer: so did the software help you in improving that? Yes yes	Correct her pronunciation in word syllable problem
Q12- Do you like the ways in which the program give you correction and feedback?	Yes, ofcourse.	Like Eyespeak correction & feedback
Q13- Which feature in EyeSpeak software would you consider to be the most effective in improving your pronunciation?	The word practice is very important to improve bacuase that pronunciation the word, so it help us.	Very important and helpful tool
Q14- Do you have any suggestion or recommendation you would like to say about EyeSpeak software as a tool for pronunciation learning?	Yes, I like we can add a teacher that we talk to him and if we face any problem that will help us.	Wish can talk with native speaker through this software.



Students' Interview responses

Name: Tamer

Age: 20

Group A (Experiment group)

Test marks: pretest 35 – posttest 49 (out of 100)

Level: First year student

Question	Response	Keyword
Q1-How do you rate your English pronunciation, on scale of 1 to 10, if 1 means very low and 10 means excellent?	Very low 5	Below average
Q2- What do you think is your biggest problem in English pronunciation, if any?	In some words I have difficulties.	Words pronunciation difficulties
Q3- Do you face any difficulties in pronouncing certain sounds? Could you please read these words : people, seven, pleasure, king, hat, chips, garbage, victim, paper, church, ink, measurable, hash, image, sing, lava, oppress.	No, People /pi:pl/ , seven /sevən/ Pleasure /pleʒə/, king /kɪŋ/ Hat /hæt/, chips /tʃɪps/ Garbage /gɑ:bdʒ/, victim /vɪktɪm/ Paper /peɪpə/, church /tʃɜ:tʃ/ Ink /ɪŋk/, measurable /meʒərəbl/ Hash /hæʃ/, image /ɪmɪdʒ/ Sing /sɪŋk/, lava /lə:və/ Oppress /əbreɪs/	Mispronounce only two sounds: /ŋ/ /p/
Q4- What do you do to help your pronunciation outside the class?	I read magazine and some stories.	Improve his own pronunciation through reading

Q5- Have you used language learning software or speech recognition software before?	No.	Haven't use software before
Q6- Do you usually feel comfortable using computer or new software?	Yes, I feel that.	Comfortable using new software.
Q7- What do you think about using EyeSpeak software in pronunciation class?	It is easy and good software. Interviewer: why do you think it is a good software? For me it is the best thing in learning English pronunciation from the practising to feedback. It is what I need to understand.	Easy and good tool
Q8- How would you describe your feelings about your experience with EyeSpeak software in the process of leaning English pronunciation?	I feel good and help me to say some words.	Good in helping pronounce the words correctly
Q9-Do you think EyeSpeak software is helpful for your pronunciation and why?	Yes, help me. Because some words difficult but with native speaker yeah it become easier.	Helpful because it's native speaker
Q10- What kind of Eyespeak activities you have practice did help you the most?	Sound similarity.	similar sounds activites
Q11- How does the feedback of this program help you to learn English pronunciation?	It is helpful.	Helpful feedback
Q12- Do you like the ways in which the program give you correction and feedback?	Yes, it is helpful. Yes, I like it.	Like & helpful in the way giving correction & feedback
Q13- Which feature in EyeSpeak software would you consider to be the most effective in improving your pronunciation?	Listening feature is the most effective.	Listening features is the most effective

Q14- Do you have any suggestion or recommendation you would like to say about EyeSpeak software as a tool for pronunciation learning?	No. Interviewer: Are you going to use it in the future? Yes, inshallah Interviewer: Would you like to use this software next yesr in the class? Yes.	willing to use it in the future & pleased in using it in the class
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Appendix K



PEJABAT PEMBANGUNAN PELAJAR DAN ALUMNI
Student Development & Alumni Office
College of Arts and Sciences

Universiti Utara Malaysia

Weekly Lesson Plan: Teaching Pronunciation/ March-April 2016

Week	Day	Hour	Stage aims	Activities & interaction	Class material/ aids	
					Experiment class	Control class
1	Sat 5 March	10:00 a.m Experiment group and control group	Testing	None	None	None
	Wed 9 March	10:00 a.m Experiment group	Introducing Eyespeak software	Showing the students how to use Eyespeak.	Eyespeak	
	Thu 10 March	10:00 a.m Control group.	General information about all the consonant sounds	Introducing the phonemes (sounds) of English (the consonant) and its symbols. Providing definition terms	Book	Book
		10:50 a.m Experiment group.				
2	Sat 12 March	10:00 a.m Control group.	Introducing the consonant sound /v/	Explain the details of place of articulation for this sound and place of manner	Book/ pictures of speech organs	Book/ pictures of speech organs
		10:50 a.m Experiment group.				
	Wed 16 March	10:00 a.m Experiment group	Revise the information that introduced in the previous classes	Providing drills and practising Exercise for the sound /v/ compared with the sound /f/	EyeSpeak	book
		10.50 a.m control group				

	Thu 17 March	10:00 a.m Control group.	Student assessment	practising the sounds by doing drills activities for the students.	Book	Book
		10:50 a.m Experiment group.				
3	Sat 19 March	10:00 a.m Control group.	Introducing the consonant sound /z/	Explain the details of place of articulation for this sound and place of manner	Book/ pictures of speech organs	Book/ pictures of speech organs
		10:50 a.m Experiment group.				
	Wed 23 March	10:00 a.m Experiment group	Revise the information that introduced in the previous classes	Providing drills and practising Exercise for the sound / z / compared with the sound /j/	EyeSpeak	book
		10:50 a.m control group				
	Thu 24 March	10:00 a.m Control group.	Student assessment	practising the sounds by doing drills activities for the students.	Book	Book
		10:50 a.m Experiment group.				
4	Sat 26 March	10:00 a.m Control group.	Introducing the consonant sound /p/	Explain the details of place of articulation for this sound and place of manner	Book/ pictures of speech organs	Book/ pictures of speech organs
		10:50 a.m Experiment group.				
	Wed 30 March	10:00 a.m Experiment group	Revise the information that introduced in the previous classes	Providing drills and practising Exercise for the sound /p/ compared with the sound /b/	EyeSpeak	book
		10:50 a.m control group				
	Thu 31 March	10:00 a.m Control group.	Student assessment	practising the sounds by doing drills activities for the students.	Book	Book
		10:50 a.m Experiment group.				
	Sat 2 April	10:00 a.m Control group.	Introducing the consonant sound /tʃ/	Explain the details of place of articulation for this sound and place of manner	Book/ pictures of speech organs	Book/ pictures of speech organs
		10:50 a.m Experiment				

5		group.				
	Wed 6 April	10:00 a.m Experiment group	Revise the information that introduced in the previous classes	Providing drills and practising Exercise for the sound /tʃ/ compared with the sound /dʒ/	EyeSpeak	book
		10:50 a.m control group				
	Thu 7 April	10:00 a.m Control group.	Student assessment	practising the sounds by doing drills activities for the students.	Book	Book
		10:50 a.m Experiment group.				
6	Sat 9 April	10:00 a.m Control group.	Introducing the consonant sound /ŋ/	Explain the details of place of articulation for this sound and place of manner	Book/ pictures of speech organs	Book/ pictures of speech organs
		10:50 a.m Experiment group.				
	Wed 13 April	10:00 a.m Experiment group	Revise the information that introduced in the previous classes	Providing drills and practising Exercise for the sound /ŋ/ compared with the sound /n/	EyeSpeak	book
		10:50 a.m control group				
	Thu 14 April	10:00 a.m Control group.	Student assessment	practising the sounds by doing drills activities for the students.	Book	Book
		10:50 a.m Experiment group.				
7	Sat 16 April	10:00 a.m Control group.	Introducing the consonant sound dark /l/	Explain the details of place of articulation for this sound and place of manner	Book/ pictures of speech organs	Book/ pictures of speech organs
		10:50 a.m Experiment group.				
	Wed 20 April	10:00 a.m Experiment group	Revise the information that introduced in the previous classes	Providing drills and practising Exercise for the sound dark /l/ compared with the sound light /l/	EyeSpeak	book
		10:50 a.m control group				
	Thu 21 April	10:00 a.m Control group.	Student assessment	practising the sounds by doing drills activities for the students.	Book	Book
		10:50				

		a.m Experiment group.				
8	Sat 23 April	10:00 a.m Control group.	Revision	General revision about the consonant sounds and practising all the sounds	Eyespeak	Book
		10:50 a.m Experiment group.				
	Wed 27 April	10:00 a.m Experiment group and control group	Testing	None	None	None



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Appendix L



PEJABAT PEMBANGUNAN PELAJAR DAN ALUMNI
Student Development & Alumni Office
College of Arts and Sciences

Universiti Utara Malaysia

Daily Lesson Plan Sample: Teaching Pronunciation/ March 2016

Daily Lesson Plan

Lesson name: Introducing the consonant sound /v/

Skill focus: Pronunciation

Teacher name: Fatimah Sabri

University name: Al-Turath University College

Students: Ages 17–22, 1st year level students

Materials used in class: Textbook *Better English Pronunciation* by J.D.Connor, computers, EyeSpeak software, headset.

Lesson plan day 3: Wed 16 March 2016

Lesson Objectives

- Ability to pronounce the targeted sound /v/.
- Ability to recognize targeted sound in words, word pairs, sentences and tongue twisters during activities.
- Ability to recognize the phonetic differences between /v/, /f/ and /w/ sounds in words during pair drills.

Behavioural Objectives

By the end of the lesson, students will be able to do the following:

1. Pronounce the targeted sounds correctly
2. Recognize the phonetic differences between /v/, /f/ and /w/ sounds via minimal pair examples and drills
4. Use this knowledge to articulate new words

Preparation Prior to the Lesson

- Three minutes prior to the start of the lesson, the teacher will prepare the lab by turning on the lights and the computers.

Warm Up and Motivation

The teacher greets the class and asks, 'How are you today'? If there are no problems, the teacher begins the lesson. She shows students in the software the types of activities they will work on that day along with the purpose of doing these activities.

Identifying the Lesson Objectives

The teacher states the topic and the aim of the lesson to the students. 'Today, we are going to learn the differences and how to pronounce /v/, /f/ and /w/ sounds by using Similar Sounds and Word Practice activities'. First, the teacher tells the students that they need to

practice several times with similar sounds activities in the software by choosing the /v/ sound and comparing it with /f/ and /w/ sounds. Then, after practicing with Similar Sounds, students use the Word Practice activities based on the selection of the /v/ sound.

Preparation

Each student will need to log into his or her EyeSpeak account and wear the headset for the activities in the software.

Practice

During practice, the teacher will have students carefully listen to a native English speaker model in the EyeSpeak software. In all the software activities, the students need to use the headset to listen to a clear pronunciation from a native speaker model. First, the teacher instructs students to go to the 'Similar Sounds' activities in the speech section in the software and select the activities related to the /v/ sound. The 'Similar Sounds' category allows students to practise the selected /v/ sound in EyeSpeak using a variety of words. Two words with similar pronunciations are presented (/v/ as compared with /f/ and /v/ as compared with /w/), and the students have to select one pair. In the activity, EyeSpeak software presents two words and pronounces one of the words; students must select the word they hear. This type of drill is repeated five times and will display how the students scored.

Next, the teacher informs students that after they finish practising the similar sounds' activities, they should go to the 'Word Practice' category and practice selecting the /v/ sound. This category provides opportunities for students to practise each word under the selected /v/ sound. Students will first listen to a native speaker's pronunciation for the selected word and then record his/her pronunciation. Then, EyeSpeak presents students with a comparative overview of their pronunciation of the selected word compared with the same pronunciation from the native speaker. The software provides details of the comparison with the native speaker in respect to overall similarity percentage and animated sound wave similarity for pronunciation, pitch, timing, loudness and sound production. It does this by showing a cutaway side view diagram of the human speech organs. The teacher instructs students to practice these activities until they obtain a good result from the comparison percentage as compared of their pronunciation to the pronunciation of the native English speaker.

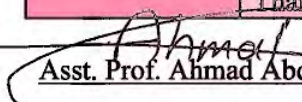
During these activities, the teacher observes students and offers assistance if needed. The teacher will also check the performance of the students. If students finish early and have high scores in these activities, the teacher will permit these students to use the 'Fun' section in the software. This section features games and rewards students who attain a higher level of the software activity scoring as a way of encouraging them to be even more motivated and interested in learning.

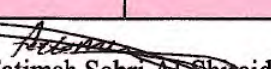
End of the Lesson

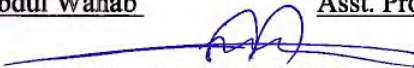
The teacher summarizes the lesson by saying the following: 'Today, we learned some new words and how to pronounce these words, and we did some activities together. Thank you very much'.

Stage	Instructions	Time	Objective
Warm up and Motivation	The teacher greets the class and asks, 'How are you today'? If there are no problems, the teacher begins the lesson.	5 minutes	To make the students feel relaxed and to prepare them for the class
Identifying Lesson Objectives	The teacher presents the students with the topic and the aim of the lesson. 'Today, we are going to learn how to pronounce /v/, /f/ and /w/ sounds by using Similar Sounds and Word Practice activities.	4 minutes	To show students the purpose of the lesson
Preparation	Students log into EyeSpeak and put on the headset in preparation for the activities in the software.	4 minutes	
Practice: 'Similar Sounds'	Students open the Similar Sounds category in the Speech section and select the activities under the /v/ sound. The software presents two words and pronounces one of the words; students must select the word they hear. This type of drill is repeated five times and shows students their scores. The word pair examples in the software include the following: Fine—vine Half—halve Leaf—leave Veil—vail Vest—west Vine—wine Vow—wow	15 minutes	These activities help students to recognize the /v/ sound compared to /f/ and /w/ sounds via minimal pair examples and drills.

Practice: 'Word Practice'	Students go to the Similar Sounds category in the Speech section and select the activities for the /v/ sound. The Word Practice category provides examples of words for the selected /v/ sound. Students first listen to a native speaker's pronunciation for the selected words and then record the student pronunciation. Next, EyeSpeak presents each student with an overview of his/her pronunciation compared to the native speaker's pronunciation. The software provides details of the comparison with the native speaker in respect to overall similarity percentage and animated sound wave similarity for pronunciation, pitch, timing, loudness and animated sound production. It does this by showing a cutaway side view diagram of the human speech organs. The teacher instructs students to practice these activities until they obtain a good result from the comparison percentage as compared of their pronunciation to the pronunciation of the native English speaker. The words featured in the software for the students to practice include the following: Above Alive Arrive Eleven Valley Value Victory Visit Voice Vowel	15 minutes	These activities help students to accurately pronounce the targeted /v/ sound.
End of the Lesson	The teacher summarizes the lesson. 'Today, we learned some new words and how to pronounce these words, and we did some activities together. Thank you very much'.	2 minutes	


Asst. Prof. Ahmad Abdul Wahab


Asst. Prof. Fatimah Sabri Al-Shuaib


Asst. Teacher Mustafa Mohamed Rasheed