the jaltcalljournal

ISSN 1832-4215
Vol. 10, No.1 Pages 21–47

Automatic speech recognition technology as an effective means for teaching pronunciation

Amal Khalil Elimat
Al al-Bayt University, Jordan
amal.elimat@yahoo.com

Ali Farhan AbuSeileek
Al al-Bayt University, Jordan
alifarhan66@gmail.com

This study aimed to explore the effect of using automatic speech recognition technology (ASR) on the third grade EFL students' performance in pronunciation, whether teaching pronunciation through ASR is better than regular instruction, and the most effective teaching technique (individual work, pair work, or group work) in teaching pronunciation through ASR. Sixty-four 3rd grade male and female students in the second semester of the scholastic year 2012/2013 at Al-Abrar Basic Mixed School were selected as the study sample. They were randomly assigned into four groups, three experimental and one control. The three experimental groups were taught using ASR method. They used the Tell Me More Performance English *program to practice pronunciation. The control group was taught using regular instruction by the same teacher. The findings of the study showed that there were statistically significant differences between the mean scores of the control (regular instruction) and the experimental (ASR) groups in favor of the experimental group. Furthermore, the findings revealed that there was a statistically significant difference in the mean scores between individual work, pair-work, and group-work in favor of the individual work method. The findings also revealed that there was no significant correlation between the level (word, sentence, and real-life dialogue), and the experimental group students' performance on the pronunciation post-test. However, students performed better at the dialogue level than at the word, and sentence levels. Finally, a number of related recommendations are presented for teachers and researchers to consider.*

Regular Paper

Keywords: automatic speech recognition technology, individual work, pair-work, group-work, teaching pronunciation

Introduction

Kedrowicz and Watanabe (2006) state that the acronym CALL is used to refer to computer-assisted language learning. One aspect of CALL is computer-assisted pronunciation training (CAPT; AbuSeileek, 2007) which is based on the use of technology for learning and teaching the segmental and suprasegmental features of the sound system. It is described by Rostron and Kinsell (1995) as the use of digitized speech for improving language pronunciation. Pronunciation is a field of language teaching and learning that is sometimes ignored. In the 1960s, repetition and recitation were used to teach pronunciation. In the 1970s and 1980s, language teachers considered pronunciation as an unimportant feature of language learning (Brown & Yule, 1983). Accordingly, in many language classrooms, pronunciation stopped to be taught (Derwing & Rossiter, 2002). Teachers were unsure about the best method for teaching it, and research showed that there were large individual variations among learners about what method was most useful (MacDonald, Yule, & Powers, 1994). Zughoul, (1987) stated the reasons why teachers in Jordanian schools ignored teaching pronunciation. He included inadequate teaching strategies teachers use in teaching pronunciation, the learners' lack of motivation, lack of the target language environment, and lack of pronunciation exercises in the textbooks.

Most foreign language teachers attempt to integrate the necessary grammar, vocabulary, culture, and the four language skills practice into their classes without focusing on integrating pronunciation instruction as well. According to Lord (2008), many language teachers assume that students will acquire pronunciation on their own through exposure to more input in the second language; other language teachers wonder whether it is necessary to teach the segmental and supra-segmental features of the phonology of a foreign language. CALL brings to pronunciation instruction many techniques like corrective feedback and total immersion learning (Eskenazi, 1999), and has led to a movement that goes beyond the limits of the classroom and gives the learner independence and control to develop their language learning ability (Pennington, 1999).

The most advanced systems incorporating automatic speech recognition (ASR) technology can provide feedback at the sentence, word, or text level. Automatic feedback can vary from refusing poorly pronounced utterances and accepting good ones to determining specific errors either in phonemic quality or sentence accent (Bunnel, Yarrington, & Poliknoff, 2000; Eskenazi & Pelton, 2002). This feedback can make the learner aware of problems in his/her pronunciation, which is the most important step in solving these problems. Automatic feedback might also prevent learners from developing incorrect pronunciation habits (Eskenazi, 1999). Since teachers have little time to perform pronunciation evaluation and provide individual feedback in traditional language teaching contexts, the chance to perform these tasks automatically is considered one of the main benefits of ASR-based CAPT (Eshani & Knodt, 1998; Neri, Cucchiarini, Strik, & Boves, 2002).

Jonassen (1996), Salaberry (1999), and Rost (2002) indicate that current computer technology has many benefits for second/foreign language learning. Computers can offer second/foreign language learners more independence from classrooms and allow learners the choice to work on their learning material at any time of the day. The cost for computer technology is lower than face-to-face classroom teaching and when used in conjunction

with traditional second/foreign language classroom study. Lee (2000) also states that the reasons why we should apply computer technology in second/foreign language instruction include 1) computer and language learning can offer more motivation for students; 2) enhance student achievement; 3) increase authentic materials for study; 4) encourage greater interaction between students and peers: 5) and provide lesson repetition as often as necessary.

Abdal-Haqq (1995) argues that teachers are not integrating advanced technologies to their classrooms because teacher education in computers often focuses on older and simpler instructional applications of computer technology such as using PowerPoint, copying files, deleting files and typing word documents instead of multimedia, and problem-solving applications. In addition, the literature points to a number of factors which may prevent the use of technology in the classroom such as age, gender, attitudes toward technology, teaching experience, time pressures both outside and during class, lack of support for integrating computers (Strudler, McKinney, & Jones, 1999), and also the rate of technological modifications (Levy, 1997).

CAPT programs are designed to provide learners with private, individualized, and instant feedback on pronunciation, and discussion into CAPT applications has focused on pedagogy, technology, and the role of the teacher in the classroom (Neri, Cucchiarini, Strik, & Boves, 2002). A number of researchers (e.g. Butler & Wiburg, 2003; Neri, Cucchiarini, Strik, & Boves 2002;) have investigated the advantages of CAPT programs for enhancing English learners' pronunciation. CAPT programs help students in selecting what function to employ, how often to utilize it, and it also helps them study independently. However, language teachers also benefit from CAPT programs in their pronunciation classes since they can give students drilling practice, which language teachers view as monotonous and time-consuming. Finally, CAPT programs present an interactive learning context in a range of methods: whole class, small-group, or pair, and teacher to individual (Pennington, 1999). This study investigates the effect of using teaching technique (individual work, pair work, and group work) on students' performance in pronunciation.

In Jordan, *Action Pack 3* is used in public schools. It contains many activities about the four skills (listening, speaking, reading, and writing) and the three language components (vocabulary, grammar, and pronunciation). The pronunciation activities in *Action Pack 3* include only two types of activities: listen and say, and say the words. It does not include activities about the sentence and real-life dialogue levels. This indicates that the textbook does not focus on pronunciation. The present study is based on introducing another pronunciation online course, *Tell Me More Performance English* program. It consists of the home page, which presents an opening screen including three levels (beginners, intermediate, and advanced) and twelve lesson workshops. Each lesson workshop consists of exercises at the word, sentence, and real-life dialogue levels aiming at developing students' pronunciation. The student listens to the pronunciation of a word, sentence or dialogue and the program provides the student with automatic feedback to determine the quality of his/her pronunciation.

Having observed classes for teaching English language at some Jordanian schools, the researchers noticed that students at public schools often pronounce English sounds incorrectly. Moreover, the textbook at Jordanian schools (*Action Pack 3*) does not focus on pronunciation. Therefore, the researchers aim at using ASR to investigate its effect on students' performance in English language pronunciation. Finally, many researchers are interested in using computer as a medium for teaching and learning English skills and components,

including the use of computer-assisted programs for teaching English pronunciation. The present study may offer pedagogical benefits for teachers and students as well as for curricula designers. ASR may help teachers know their students' individual needs and level; it may help them decide students' progress and also encourage greater interaction between teachers and students. Moreover, ASR can help students study independently; it can provide students with automatic feedback and encourage students to listen to authentic models of speech. Curriculum designers may benefit from this study by integrating ASR in the textbooks.

Automatic speech recognition for teaching pronunciation

ASR offers many advantages for language learners. For example, this technology gives the teacher a chance to discover individual problems of the learners, which the learners can then practice independently. It offers a possibility to store student profiles in log-files, and both the students and the teachers can control the improvements and the problems recorded. ASR can also help students who are afraid from practicing speaking in public to improve their speaking skill (Neri, Cucchiarini, & Strik, 2001; Wachowicz & Scott, 1999).

Some teachers teach English pronunciation regularly through printed pronunciation material using the phonetic alphabet and activities such as transcription practice and developmental drills (minimal pair drills, reading passages or dialogues, listening to a cassette, and imitating). Celce-Murcia, Brinton, and Goodwin (1996) state that students depend on their teachers to learn each sound. On the other hand, other teachers prefer to use CAPT programs based on ASR because of a number of advantages these programs can offer. First, task-based speaking activities can be included like interactive speech-based games and role-plays with the computer. Such activities make learning pronunciation a more realistic, rewarding, and fun experience. Second, CAPT programs can reduce foreign language classroom anxiety. Third, students can also study and improve pronunciation independently (Purushotma, 2005; Wachowicz & Scott, 1999). The ideal automatic speech recognition based CAPT programs can be described as a sequence of five phases as Neri, Cucchiarini, and Strik (2003) state:

1. Speech recognition: The ASR engine translates the incoming speech signal into a sequence of words on the basis of internal phonetic and syntactic models. However, the main pedagogical advantage that ASR-based CAPT can offer for training oral skills in the EFL is the provision of an evaluation of pronunciation quality.
2. Scoring: This phase makes it possible to provide a global evaluation of pronunciation quality in the form of a score. The ASR system analyses the spoken utterance that has been previously known. The analysis can be done on the basis of a comparison between a student's utterance and a native's utterance. The benefit of automatic scoring for pronunciation training is that it gives the learner immediate information about the quality of his/her pronunciation.
3. Error detection: The system can locate the errors in the utterance and indicate to the learner where s/he makes mistakes. Referring to any problematic sound within a word can be useful to raise awareness in the learner of that problem and thus helpful for her/him to focus and practice more on that area.
4. Error diagnosis: The ASR technology identifies the specific type of error that was made by the student and suggests how to improve it.
5. Feedback presentation: This phase presents the overall score as a graded bar, or as a

> number on a given scale. This phase is fundamental because the learner will only be able to benefit from all the information obtained by means of ASR if this is presented in a meaningful way. (p.1165)

Cooperative work and language learning

Johnson, Johnson, and Smith (1991) define cooperative learning as an educational technique in which small groups of students work together to increase individual, as well as group member learning. Most researchers have found that group work improves language learning (Armstrong-Melser, 1999; Kewley, 1998; Slavin, 1996). Students claim that working in groups may develop their language learning (Singhanajok, & Hooper, 1998). Many studies have documented the social advantages of cooperative learning (e.g. Armstrong-Melser, 1999; Slavin, 1996). They point out that working in groups increases motivation, positive attitudes towards school, and an internal sense of control over one's learning. Furthermore, students often prefer to work in groups rather than independently.

There are many advantages for cooperative language learning in classroom instruction. Long (1990) lists five advantages of group tasks compared with collective whole class instruction. These are: increasing the quantity of language use, enhancing the quality of the language used by students, providing more opportunities to individualize instruction, offering less threatening environment for language use, and motivating language learning. It appears that students feel less vulnerable and are less nervous about practicing language forms in front of their peers when they find themselves in the sheltered, nurturing environment of a bonded cooperative group (Senior, 1997). Furthermore, Kim (1999) states that cooperative work is preferred because it gives learners a chance to participate in activities and to practice English sounds.

> Interaction around computers sets among learners is based on the use of cooperative-group or pair work-learning strategy where the computer stands for a tool of communication between concerned members. (AbuSeileek, 2007, p. 498).

Moreover, Phinney (1996) adds that the product of teamwork is usually greater than what a single learner can produce. AbuSeileek (2007) points out that teamwork skills in computerized instruction are necessary for learning and that group-work learning ought to be the most commonly used technique in the teaching/learning of EFL skills. Computer-mediated communication activities may manage learners to improve communication and interaction. According to Kitade (2008), computer-mediated communication's interactive dimension promotes a cooperative context for learning, which occurs in cooperative dialogues where learners can get their partners' cooperative assistance. Computer-mediated communication may provide a medium for oral discussions, which may be quite useful for EFL learners in getting instantaneous feedback.

Despite the advantages of cooperative learning, there are disadvantages of using group-work. Tateyama-Sniezek (1990) points out that working together in groups does not ensure greater academic achievement. Tingle and Good (1990) did not find a significant difference in problem solving ability when comparing those who worked in heterogeneous groups to students that worked alone. Moreover, there is evidence that some students may not contribute equally to the group. In addition, students report that they are aware of differences in ability within their cooperative group, and this affects how the learning team functions (Cohen, 1994; Onwuegbuzie & DaRos, 1999). Researchers recommend several strategies to

maximize learning in cooperative groups. Students with different skills should be grouped together (Persons, 1998; Slavin, 1991). Steps need to be taken to minimize inequalities within the group (Cohen, 1994; Joyce, 1999). In addition, assignment requirements and roles should be clear enough to promote focus and organization (Cohen, Lotan, & Abram, 2002).

In addition, AbuSeileek (2012) lists some disadvantages for the small cooperative language learning groups. Sometimes, it is not possible to avoid the parallel problems such as doing nothing by (a) certain group member(s), so the final group product does not represent the contribution of all members fairly, or doing everything by (a) certain group member(s) which may discourage others from participating. Small cooperative language learning groups may also promote an atmosphere of individualism and competition rather than cooperation. Some students may be reluctant to share when they speak or write because they are afraid of making errors. Johnson, Johnson, and Stanne (2000) also point out that successful collaboration is not easy because participants may tend to avoid arguments and conflicts that may cause misunderstandings and hurt feelings during their discussions.

Individual work is sometimes more effective than cooperative work. Individualistic efforts may be most appropriate when the following occur (Johnson & Johnson, 2005):

1. Cooperation is too costly or difficult because of the unavailability of skilled potential cooperators or the unavailability of the resources needed for cooperation to take place.
2. Participants expect to be successful in achieving their goals.
3. The directions for completing the tasks are clear and specific, so participants do not need further clarification on how to proceed and how to evaluate their work.

Finally, Kim (1999) points out that individual work is effective when students want to improve their English pronunciation. Therefore, teachers ought to organize their classes to include group-work, pair-work, or individual work according to the characteristics of the class activity. One of the goals of this study is to find the effect of using teaching technique (individual work, pair-work, and group-work) on students' pronunciation performance. It aims to investigate which of these three teaching techniques is the most effective in teaching pronunciation.

Contextual pronunciation

The most criticized aspect of pronunciation teaching materials is their widespread reliance on decontextualized language and lack of grounding in the realities of actual communication. Jones (1997) reports that language is best taught when it is being used to transmit messages, and this opinion has been echoed in relation to pronunciation teaching by researchers such as Pennington and Richards (1986) who point out that it is artificial to isolate pronunciation from communication and other aspects of language use. Contextualization appears to be effective although it may have some shortcomings. According to Hayati (2010) one way to affect an improvement would be to find means of better integrating pronunciation instruction with other parts of instruction. Using different situations related to the students' real life situations, the teacher can present a pronunciation problem through different techniques. One is to tell the students a story in which the teacher can insert difficult sounds in the form of minimal pairs. The advocates of the audio-lingual method may claim that minimal pairs could also be practical in isolated sentences. It ought to be noted that there are some criteria for contextualization of minimal pairs. They are as follows as

suggested by Hayati (2010): (1) meaningful, (2) pictureable, (3) balanced, and (4) if possible, relevant to the experience and/or interest of the students. Apparently, the concrete words can be taught without serious difficulty through pictures. There are, nevertheless, obstacles in the way of teaching certain sounds within abstract words. At this stage, the possible solutions are to define the word in English, or use the students' first language. Whenever the teacher encounters such complications, s/he can give the meaning of the word in the students' first language although there have been controversial ideas regarding the use of mother tongue in teaching English as a foreign language (Tang, 2002).

Levis (1999) also notes that the treatment of intonation in textbooks is usually devoid of context and lacked communicative value. He argues that though intonation had been touted as a purveyor of meaning in instructional materials, its full communicative value had not and would not be realized unless instructional activities went beyond their current focus on pattern practice and encouraged the communicative use of language. The challenge of integrating the targeted practice of a given feature of pronunciation with meaning in instructional materials and activities is not particular to intonation, nor to pronunciation. Finally, one of the goals of this study is to investigate the correlation between the level (word, sentence, and real-life dialogue) and the experimental group students' performance in pronunciation.

Review of related studies

Many studies have been conducted about the effectiveness of using ASR on students' performance in pronunciation. In this section, they are categorized under the following main subtitles: studies about the effectiveness of using ASR in teaching pronunciation for undergraduate students, studies about the effectiveness of using ASR in teaching pronunciation for school students, and studies about the effectiveness of using ASR at the level.

Studies related to the effectiveness of ASR in teaching pronunciation for undergraduate students

Many studies (e.g., Al-Qudah, 2012) investigated the effectiveness of ASR and reported that it is functional in developing learners' pronunciation. For example, Hincks (2005) studied the effectiveness of *Talk To Me – English* software based on ASR technology on a group of middle-aged immigrant professionals studying English in Sweden. He found that automatic feedback that students in the experimental group received on the quality of their pronunciation from *Talk To Me – English* software was more effective than feedback students in the control group received from their teacher. Similarly, Seferoglu (2005) studied the effect of CAPT system in improving segmental and supra-segmental pronunciation and the effect of visual-feedback software. The experimental group showed improved pronunciation. Results showed a statistically significant improvement in the pronunciation of the experimental group as compared with the control group, especially in situations where little native language exposure is available. Moreover, In Kim (2006) study, students used ASR software to listen to sentences spoken by native English speakers as many times as they wanted and to make recordings, and ASR was a valuable tool for teaching pronunciation to EFL students where native speaker instructors are not available.

Other studies focused on some pronunciation features. For instance, Verdugo (2006) tested the effect of ASR on learners' intonation patterns. The experimental group which

studied using ASR showed increased quality of intonation and higher levels of awareness of intonation. The control group indicated no change in intonation. In addition, Chiu, Liou and Yeha (2007) examined the effectiveness of a web-based conversation environment called *CandleTalk* in helping EFL learners receive explicit speech acts training that leads to better oral competence. The results of the study showed that the application of ASR was helpful for the college freshmen in the teaching of speech acts, especially for the non-English major students. Learners perceived positively toward the instruction supported with speech recognition. Another study, Saito (2007), attempted to show the efficacy of explicit phonetic instruction for Japanese learners of English. The study had two important implications: Explicit phonetic instruction led the four students in the experimental group who continued to struggle with their pronunciation of the English vowel /æ/, to improve their pronunciation, and the activity encouraged students to become more aware of their pronunciation than exposure to the natural speech production of English in a classroom. In the long run, the activity based on explicit phonetic instruction contributed to pronunciation pedagogies in EFL situations where English was not used on a daily basis and learners could not have regular access to real-life communication with native speakers of English.

Finally, another study, Lee (2008), investigated the effectiveness of two computer software programs (*My English Tutor,* and *Issues in English*) on helping Taiwanese students improving English pronunciation. The results showed that students preferred the two computer software programs with explicit correction feedback. In addition, the two computer software programs helped students improve their English pronunciation more effectively. Similarly, Chen (2011) investigated the effectiveness of the Microsoft Speech Application Software Development Kit (SASDK) in developing an oral skills training website for EFL students. The ASR-based website offers six different types of online exercises which allow students to practice their oral skills and obtain immediate feedback on their performance. The results showed that most teachers and students enjoyed using this website because it could help them improve their English oral skills. They also pointed out that the ASR-based learning system offers several different types of exercises which can encourage learners to produce more output in a low-anxiety environment. These findings can be useful for teachers who are interested in using ASR in teaching and for CALL researchers who aim to develop better ASR-based systems for language learning.

Studies related to the effectiveness of using ASR in teaching pronunciation for school students

Many studies such as Mitra, Tooley, Inamdar, and Dixond (2003) examined the role of the SR-based feedback in improving students' pronunciation of problematic phonemes. The study showed that the ASR can give reliable feedback on pronunciation improvement over time. Moreover, using computers for video and other English-exposure activities helped students improve their pronunciation without any explicit training. Another study, Graff (2006), investigated the role of speech recognition in improving students' English pronunciation. The results showed that subjects who practiced pronunciation with *Rosetta Stone* software did experience a statistically significant improvement in the quality of their pronunciation while those who practiced pronunciation with the traditional instruction did not. Some studies (Shams, 2006) focused on investigating the use of computerized pronunciation practice as a tool in the reduction of foreign language anxiety and to investigate the use of CAP in improving students' pronunciation. The statistical analyses indicated that

there was no relationship between method of practice and the reduction in anxiety. The results showed that subjects who practiced using the computer did experience a statistically significant improvement in the quality of their pronunciation while those who practiced with the cassettes did not.

Moreover, Neri, Cucchiarini, and Strik (2008) examined the effectiveness of ASR-based feedback for improving pronunciation. The results showed that the group receiving ASR-based feedback made the greatest improvement, but the groups' mean improvements did not differ significantly. However, the group receiving ASR-based feedback showed a significantly larger improvement than the no-feedback group in the segmental quality of the problematic phonemes targeted. Similarly, Hinks and Edlund (2009) examined the effect of SR based visual feedback in improving pitch. The experimental group showed a higher increase than the control group, indicating that the feedback was effective. These positive results imply that the feedback could be beneficially used in a system for practicing oral presentations. A study was conducted by Lai, Tsai, and Yu (2009) to investigate the effectiveness of using a multimedia English learning (MEL) system, based on ASR for teaching students to enhance their English phonetic awareness and pronunciation. The results showed that the students' pronunciation skill in the experimental group improved more than did their colleagues in the control group. Finally, Hismanoglu (2012) conducted a study to elicit problem causing word stress patterns for Turkish EFL learners and investigate whether Internet-based pronunciation lesson is superior to traditional pronunciation lesson in terms of enhancing Turkish EFL learners' accurate production of stressed syllables in English words. Findings showed that the experimental group outperformed the control group in the final test administered.

Studies related to the effectiveness of using ASR at different levels

Many studies (see Mohsin, 2012) focused on investigating the effect of ASR at the word, sentence and dialogue level. For example, Tomokiyo and Wang (2000) explored whether the CALL Application Fluency Pronunciation Trainer (pronunciation software) was useful in improving students' pronunciation of difficult English sounds. Results showed that both groups were similarly significant improvement over the three-week period of the study; the results of the experimental group indicated a large range of variability, and they perform better at the sentence level. Furthermore, Mohammed (2008) examined the effect of two approaches of teaching English silent consonant letters: one of which is based on using computer assisted language teaching and learning and the other is a traditional approach. The results of the study showed the importance of using the computerized programs and games containing script and sound in the teaching-learning process where modern media is used for this purpose. Similarly, Neri, Mich, Gerosa, and Giuliani (2008) reported that pronunciation quality of isolated words improved significantly for both groups of subjects and that both groups significantly improved in pronunciation quality of words that were considered, difficult to pronounce and that were likely to have been unknown to them before training. Training with a computer-assisted pronunciation training system incorporating a simple automatic speech recognition component can thus lead to improvements in pronunciation that are comparable to those achieved by means of traditional pronunciation training.

Moreover, Cincarek , Gruhn, Hacker, Noth, and Nakamura (2009) conducted a study about the effectiveness of automatic sentence level scoring using computer assisted

pronunciation training (CAPT). Sentences and words are considered as scoring units. Automatic error diagnosis based on an automatically derived phoneme mispronunciation statistic showed reasonable results for five non-native speaker groups. The statistics can be exploited to produce the non-native feedback on mispronounced phonemes. Franco, Bratt, Rossier, Rao Gadde, Shriberg, Abrash, and Precoda (2010) used *EduSpeak* software to estimate the grade that a human expert would assign to the pronunciation quality of a phrase or a paragraph. Results showed that classification error of the most effective system for the phones that can be reliably transcribed is simply slightly higher than the average pairwise disagreement between the human transcribers. Moreover, using *EduSpeak* software improved students' pronunciation. However, Hismanoglu and Hismanoglu (2011) focused on which English vowels cause articulation problems for Turkish EFL learners and examine whether students who taught via internet-based pronunciation materials are better at articulating problematic English vowels than those who taught via printed pronunciation materials. The results of the study showed that / æ /, / ɔʊ / and / ɛ / were three most problematic English vowels for Turkish EFL learners and that Turkish EFL learners can solve their articulation problems with three problematic English vowels by being exposed to internet-based pronunciation lessons.

Summary

Related studies have focused on investigating the effectiveness of ASR on improving students' pronunciation at the phone, word, and sentence levels. They have also focused on investigating effectiveness of ASR in teaching stress, and intonation. None of these studies has focused on investigating the effect of ASR on the technique of teaching pronunciation (individual work, pair work, and group work). However, the present study attempts to investigate the correlation between the level (word, sentence and real- life dialogue), and the experimental group students' performance in pronunciation. It also investigates which teaching technique is the most effective in using ASR in teaching pronunciation (individual work, pair work, or group work).

The study

The purpose of this study is to evaluate the pedagogical effectiveness of ASR on the third grade students' performance in pronunciation. The study focuses on investigating the effectiveness of using ASR on developing students' performance in pronunciation. It also aims to investigate whether teaching pronunciation through ASR is better than regular instruction. Moreover, this study examines the most effective technique (individual, pair work, or group work) in teaching pronunciation through ASR, and it investigates whether the level (word, sentence, and real-life dialogue) correlates with the experimental group students' performance on the pronunciation post-test. More specifically, this study aims to answer the following questions:

1. Are there any statistically significant differences between the mean scores of the experimental and control groups on students' performance in English pronunciation attributed to the method of teaching (ASR vs. regular instruction)?
2. Are there any statistically significant differences between the mean scores of the experimental group attributed to the teaching technique (individual work, pair work, and

group work) due to using ASR in teaching English pronunciation on students' performance in pronunciation? and

3. Does the level (word, sentence, and real-life dialogue) correlate with the experimental group students' performance on the pronunciation post-test?

Method and procedures

Participants and design of the study

The sample of the study consisted of 64 (28 males and 36 females) third grade students who were 9 years old in the second semester of the scholastic year 2012/2013 at Al-Abrar Basic Mixed School in the Directorate of Education at Qassabat AL-Mafraq. The participants study at this public school which is affiliated with Al al-Bayt University. The quasi-experimental design was used in this study. Al-Abrar Basic Mixed School was intentionally selected to conduct the study because one of the researchers works there as a teacher of English language. The third grade in the school was selected as a sample of the study because there were three sections, and the same teacher taught them. However, the participants in this study were assigned randomly into four groups, three experimental and one control. Participants of the experimental group were exposed to ASR method for eight weeks. However, the control group was exposed to regular instruction for teaching English pronunciation using cassette and printed material for the same period of time. All participants studied the same material, and they were taught by the same teacher. A pre-test was given before the application of the treatment to the four groups to make sure they were equivalent. The independent variables of this study which had two levels: teaching method (ASR vs. regular instruction), and teaching technique (individual work, pair work, and group work). The dependant variable of this study was students' performance in pronunciation on the post-test in general, and at the word, sentence and real-life dialogue levels.

The findings of the pre-test show that there were no statistically significant differences on the pre-test for any group on the pronunciation test, suggesting that groups in different treatment conditions were equivalent in pronunciation performance related to pronunciation before the experiment (individual work (16 students): SD 16.56, mean = 3.35; pair work (16 students): SD = 5.50, mean = 2.39; group work (16 students): SD = 16.47, mean 2.58; and regular instruction (16 students): SD = 16.16, mean = 4.06; $F = .37$ at the $p < .05$ level).

Instrument

A pronunciation test was developed by the researchers (Appendix A) to measure students' performance before and after applying the treatment. The pronunciation test consisted of three questions which were taken from *Tell Me More Performance English* program. The first question included four subquestions: 1) Say the words, 2) Circle the word you hear, 3) Say the minimal pairs, and 4) Circle the word you hear from the minimal pairs. The second question comprised of two questions: 1) Say the sentences, and 2) Circle the sentence you hear. Finally, the third question had two questions: 1) Read the dialogues, and 2) listen and complete the dialogues. The total score for the pronunciation performance test was 36. The marking scale by AbuSeileek (2007) was used in this study to evaluate the fourth question (dialogue). However, it was modified to suit this study: as follows: has no communicative

competence = 1 grade, has partial communicative competence = 2 grades, and has full communicative competence = 3 grades.

The test was given to four professors, two English language supervisors, and two language teachers to detect the accuracy, clarity, validity, and the appropriateness of the test. They provided several comments such as adding words, changing sentences, and clarifying the rubrics of the questions. The test was modified according to their recommendation. To establish the reliability of the instrument, the test-retest was used on a pilot study with a two-week period between the test and re-test. The test was administrated to 16 students who were not included in the study participants. The reliability Coefficient of the test was calculated. It was 0.89 which is statistically acceptable. Students' papers were assessed by two raters. The inter-rater reliability between them was 0.91 which is statistically acceptable for the purpose of this study.

Instructional software and material

The *Tell Me More Performance English* program was used in this study. The program was used because it suits the level of the third grade, and it is easy to be used by the third grade students. It consists of the home page which presents an opening screen including three levels (beginners, intermediate, and advanced) and twelve lesson workshops (Appendix B). Four lesson workshops were selected to be taught to the control and experimental groups according to the recommendations of the jury of judges of the English supervisors and English teachers. Each lesson workshop consists of exercises at the word, sentence, and dialogue levels aiming at giving the student a chance to develop his/her pronunciation. The student can click on any lesson workshop and practice pronunciation of words, sentences, or real-life dialogues. The student listens to the pronunciation of a word, sentence or dialogue. The program provides the student with automatic feedback to determine the quality of pronunciation. That is, the student records the word, sentence or dialogue, and compares his/her attempts to those of a native speaker.

The material that was used in the study is based on the *Tell Me More Performance English* program. It was about multiple topics including four lesson workshops. Each unit included exercises about pronunciation at the following levels: word, sentence, and real-life dialogue. They include the following exercises (Appendix C): Click on the word you want to practice, Select the sentence you want to practice, and Listen to the dialogue and pronounce it.The material was given to a group of English language supervisors and teachers. They were asked to give their opinions about the fitness of the material items for the third grade students. They were also asked to give their opinions about the appropriateness of the material items to the level of the third grade students. They recommended choosing the following lesson workshops to be taught to the control and experimental groups: 1) The Menu, 2) Desserts, 3) Organizing a Meal, and 4) Setting the Table. To ensure more validity, the exercises were read by a pilot study of 16 students and three raters. Two of the raters were English language supervisors and the third was a teacher who teaches the third grade. The majority of the students in the pilot study (4.53 on a five-point Likert scale) and the raters considered the exercises interesting and suitable for the students.

Instructional treatment

Before the experiment, the teacher explained the nature of the study and its goals for the students in all groups. They were given the chance to ask questions about the course techniques (individual work, pair work, and group work), and methods to be used in learning/teaching pronunciation. Then the teacher took the students in the experimental group to the computer laboratory. The teacher assigned students in the experimental group into three treatment conditions: individual work, pair work, and group work to practice pronunciation. Each group consisted of 16 male and female students. Participants in the first group were seated individually to do the activities. Students in the second group were seated in pairs to do the activities. Members of the third group were seated in groups to do the activities. After that, the teacher asked students to log in to the computer, click on *Tell Me More Performance English* program button which is on the desktop, put the headsets on their heads, and begin listening to the pronunciation of the words, sentences, and dialogues. Then they were asked to use their voices to record the pronunciation of the words, sentences, and dialogues in order to hear their recordings.

The teacher's role was observing students' practicing pronunciation, giving them advice on how to use the program, and solving any problem that occurred while using the program. In addition, the teacher answered all questions that the students had asked.

Students in the control group studied the same material. However, they were taught using regular instruction. That is, they were given a chance to listen to the words, sentences, and dialogues on the cassette. Then they were asked to repeat what they heard. The teacher was listening to the pronunciation of the students and correcting their mistakes.

Study procedures

This study was conducted during the second semester of the scholastic year 2012/2013. The following procedures were followed after the researchers got the approval of Al-Mafraq Directorate of Education to conduct the study. The participants were assigned randomly into four groups: three experimental and one control. A pre-test was administered to the third grade sections to make sure that there were no significant differences between the experimental and control groups on the test in pronunciation. The control group was taught by one of the researchers using regular instruction. The experimental group was divided into three groups (individual work, pair work, and group work). Each group consisted of sixteen male and female students. The first group members were seated individually which means that every student had a computer. The second group members were seated in pairs and shared a computer. The third group was seated in groups of four students per computer. The program was applied one period a day for two periods a week over a period of eight weeks. The program was password-protected to allow only the target groups to use it only at allocated times. The post-test was administered to the experimental group and the control group directly after the computer program finished. The test was scored by two raters. Statistical analyses were used to answer and accomplish the questions and the objectives of the study.

Statistical analysis

The Statistical Package for Social Sciences (SPSS) software was used to conduct the required statistical analysis of the data related to the objectives of the study. The means, standard deviations, and one-way ANOVA statistical analysis were conducted for all the variables of the study including method of teaching (ASR vs. regular instruction), level (word, sentence, and dialogue), and teaching technique (individual work, pair work, and group work) on the pre and post-test.

Findings related to the first question

To answer the question, statistics related to the method of teaching were calculated as shown in Table 1.

Table 1: Means and standard deviations of method (ASR vs. regular instruction) on the pronunciation post-test

Group	Method	N	Mean	Standard deviation	F	Sig
Experimental	ASR	48	25.30	2.56	30.30	.00*
Control	Regular instruction	16	20.09	2.38		

* The results are significant at the $p < .05$ level

According to Table 1, it is obvious that the mean scores of the experimental group on the post-test were more statistically significant than those of the control group. The difference in this finding may be attributed to the method of teaching, suggesting that students in the ASR group significantly outperformed their peers who used the regular method.

Findings related to the second question

To answer this question, statistics related to the teaching technique (individual work, pair-work, and group-work) were calculated as shown in Table 2.

Table 2: Means and standard deviations of students' performance on the post-test for technique

Technique	N	Mean	Standard deviation	Sig	F
Individual work	16	27.03	1.79	*.00	12.07
Pair work	16	25.50	1.79		
Group work	16	23.38	2.64		
Total	48	25.30	2.56		

* The results are significant at the $p < .05$ level

Based on the findings in Table 2, the group that studied pronunciation individually achieved statistically higher scores on the post-test than the groups that were taught using pair work and group work. Whenever an ANOVA is used to examine the differences among

more than 2 groups, the post-hoc procedure is used to compare the differences between all pairs of means. Scheffe test was used to conduct this comparison. In addition, the Scheffe post-hoc comparison showed that there were statistically significant differences between the experimental groups at the $p < .05$ level, as shown in Table 3.

Table 3: Results of Scheffe Test for the teaching technique on the post-test in pronunciation

Teaching technique		Mean difference (I-J)	Std error	Sig
Individual Work	Pair Work	1.53	.75	.13
	Group Work	3.66*	.75	.00
Pair Work	Group Work	2.13*	.75	.02

* The results are significant at the $p < .05$ level

As shown in Table 3, there were significant differences between individual work and pair work in favor of individual work. Moreover, the Scheffe test revealed significant differences between the mean scores of individual work and group work in favor of the individual work at the $p < .05$ level . Furthermore, pair work got more significant mean scores than the group work technique at the $p < .05$ level. According to these results, the most effective teaching technique in developing students' pronunciation was individual work. The high mean score may relate mainly to the fact that individual work is effective when students want to improve themselves in English pronunciation. It may be a good way to practice pronunciation.

Findings related to the third question

To answer this question, statistics related to the level (word, sentence, and dialogue) were calculated for the experimental group as stated in Table 4.

Table 4: Means and standard deviation of students' performance in level

Level	N	Mean	Standard deviation	F	Sig
Word	48	7.84	1.14		
Sentence	48	8.08	1.59	19.05	.06
Dialogue	48	9.38	1.21		

* The results are significant at the $p < .05$ level

Table 4 reveals that there were differences according to the level, but they were not significant. However, students performed better at the dialogue level than at the word and sentence levels.

Discussion

Results of the first question

The first question investigated if there are any statistically significant differences between the mean scores of the experimental and control groups due to the method of teaching (ASR vs. regular instruction) on EFL students' performance in English pronunciation post-test. According to the findings of this study, speech recognition is found to offer a great opportunity in teaching pronunciation. Students in the experimental group achieved better results on the pronunciation test than the other group which was taught pronunciation using regular instruction.

The ANOVA results revealed that there were statistically significant differences between the mean scores for the experimental group and control group in favor of the experimental group. The differences between the experimental and control groups may be attributed to the fact that each group was subjected to a different method of teaching; the experimental group was subjected to the ASR and the control group to regular instruction. The students in the experimental group seemed to have improved their pronunciation through the ASR. Therefore, the ASR may be regarded as an effective tool in facilitating the pronunciation learning process which led for increasing students' performance in pronunciation.

This finding may be attributed to the fact that students might use speech recognition to practice pronunciation more independently, and this can reduce foreign language classroom anxiety, which might help students who are afraid of practicing speaking in public to improve their pronunciation. These findings are similar to Mitra, Tooley, Inamdar, and Dixond (2003) that the ASR can give reliable feedback on pronunciation improvement over time. Moreover, participants who used ASR in the experimental group outperformed students in the control group. Graff (2006), Neri, Cucchiarini, and Strik (2008), Chiu, Liou, and Yeha (2007), and Kim (2006) lent support to these findings and reported that ASR was helpful for students in teaching pronunciation, especially for the non-native speakers, and there was statistically significant improvement in the pronunciation of the experimental group as compared with the control group, especially in situations where little native language exposure is available.

This result is also in harmony with what is reported by Lai, Tsai, and Yu (2009) that the experimental group which used a multimedia English learning (MEL) system based on ASR for teaching students to enhance their English phonetic awareness and pronunciation performed better when compared to the control group. The results showed that the students' pronunciation skill in the experimental group improved more than did their colleagues in the control group.

Results of the second question

The second question tested if there were any statistically significant differences between the mean scores of the experimental group due to the teaching technique (individual work, pair work, and group work) on EFL students' performance in pronunciation. The findings of the study revealed that the most effective technique in developing students' pronunciation was the individual work with a mean score of 27.03 (Table 7). The ANOVA post-test revealed that there were significant differences between the mean scores according to the

technique of teaching (individual work, pair work, and group work), in favor of the individual work technique.

Group work is preferable in language learning and this is referred to by many researchers such as Long (1990), Armstrong-Melser (1999), and Slavin (1996). They stated that cooperative work is recommended because it gives learners a chance to participate in activities, increases motivation, increases the quantity of language use, and offers less threatening environment for language use . However, in this study the situation is different. The findings revealed that Individual work is more effective than group work. Kim (1999) and Tateyama-Sniezek (1990) point out that working together in groups does not always ensure greater academic achievement, and that individual work is effective when students want to improve their pronunciation in English. Moreover, this might be a function of the age of the students. That is, the younger children may be more easily distracted by the other members of a group.

Results of the third question

The third question examined if there is any statistically significant correlation between the level (word, sentence, and real- life dialogue), and the experimental group students' performance on the pronunciation post-test. The findings revealed there was no statistically significant correlation between the level (word, sentence, and real- life dialogue), and the experimental group students' performance in pronunciation. They showed that students performed best at the dialogue level. This may be attributed to many factors. For example, it is artificial to isolate pronunciation from communication and other aspects of language use. Moreover, students can develop intonation, and stress in context not in isolated words.

These findings agree with Mohsin (2012) that after training through computer-assisted learning based on ASR the results showed significant improvement in pronunciation of students' and teachers' individual sounds, long and short vowel sounds, diphthongs, word stress and intonation in connected speech. Eskenazi, Tomokiyo, and Wang (2000) stated that the CALL Application Fluency Pronunciation Trainer (pronunciation software) was useful in improving students' pronunciation of difficult English sounds. The results of the experimental group indicated a large range of variability, and they performed better at the sentence level.

Conclusions, limitations, and recommendations

Results from the analysis suggest that ASR method is found to offer a great opportunity in teaching and learning pronunciation than regular instruction. In addition, individual work technique affects participants' performance more positively in teaching pronunciation than pair and group work techniques. Finally, the findings revealed there was no significant correlation between the level (word, sentence, and real-life dialogue), and the experimental group students' performance in pronunciation.

Learning through ASR is more useful in learning pronunciation than regular instruction. The educational environments in which ASR is used in the classroom are highly motivating environments for learning English pronunciation. Individual work is the most appropriate technique that students can use in practicing pronunciation. ASR enables the individual to advance according to his/her own learning speed by taking into consideration the characteristics of the learner. Attention should be paid to real-life dialogues when

teaching English pronunciation. Students often perform better at the dialogue level than at the word and sentence levels.

This study has some limitations to the generalization of the results. This study is limited to the third grade students who learn English at Qussabet AL-Mafraq Directorate schools in the second semester of the scholastic year 2012/2013 and similar samples. This study uses only a certain program, *Tell Me More Performance English*. The method of teaching is ASR vs. regular instruction. This study uses three teaching techniques (individual work, pair work, and group work) in teaching English pronunciation. This study is limited to the word, sentence, and real-life dialogue levels in teaching English pronunciation. The instructor is the researcher, which is not an ideal situation for experimental studies.

Based on the findings of the study, it is advised to use ASR in the curricula plans of the English language subject at schools. The speech recognition method can be utilized for other English language classes at different scholastic levels and stages. Also, English language teachers may be trained to be able to use ASR in teaching pronunciation. Attention should be paid to the integration of ASR into learning and teaching environments. When using the computer and the Internet, speech recognition should be set up and used as active tools in the educational process. More research is needed in the area of teaching pronunciation via ASR. Finally, researchers may also conduct similar studies for other classes, bigger samples, and different techniques and methods.

References

Abdal-Haqq, I. (1995). Infusing technology into preservice teacher education. ERIC Digest. Retrieved December 24, 2012 from http://www.ed.gov/databases/ERIC_Digests/ed389699.htm.

AbuSeileek, A. (2007). Cooperative vs. individual learning of oral skills in CALL environment. *Computer Assisted Language Learning, 20*(5), 493–514.

AbuSeileek, A. (2012). The effect of computer assisted cooperative learning method and group size on EFL learners' achievement in communication skills. *Computers and Education, 58*(1), 231–239.

AbuSeileek, A. (2007). Computer-based pronunciation instruction as an effective means for teaching stress. *The JALT CALL Journal. 3* (1–2) 3–14.

Al-Qudah, F. (2012). Improving English pronunciation through computer-assisted programs in Jordanian universities. *Journal of College Teaching & Learning, 9*(3), 201–207.

Armstrong-Melser, N. (1999). Gifted students and cooperative learning: A study of grouping strategies. *Roeper Review, 21*(4), 315–316.

Brown, G., & Yule, G. (1983). *Teaching the Spoken Language.* Cambridge: Cambridge University Press.

Bunnel, H.T., Yarrington, D.M., & Poliknoff, J.B. (2000). STAR: Articulation training for young children. Proceedings of ICSLP2000, 6th International Conference of Spoken Language Processing, Beijing, China, 2000. Vol. 4 (pp. 85–88) China: China Military Friendship Publ.

Butler, P., & Wiburg, K. (2003). *Technology and teaching English language learners.* Boston, MA: Allyn and Bacon, Pearson Education, Inc.

Celce-Murcia, M., Brinton, D.M., & Goodwin, J.M. (1996). *Teaching Pronunciation.* Cambridge: Cambridge University Press.

Chen, H. (2011). Developing and evaluating an oral skills training website supported by automatic speech recognition technology. *ReCALL Journal, 23*(1), 59–78.

Chiu, T. L., Liou, H. C., & Yeha, Y. (2007). A study of web-based oral activities enhanced by Automatic Speech Recognition for EFL college learning. *Computer Assisted Language Learning, 20*(3), 209–233.

Cincarek, T., Gruhn, R., Hacker, C., Noth E., & Nakamura, S. (2009). Automatic pronunciation scoring of words and sentences independent from the non-native's first language. *Computer Speech & Language, 23*(1), 65- 88.

Cohen, E. G. (1994). Restructuring the classroom: Conditions for productive small groups. *Review of Educational Research, 64*(1), 1–35.

Cohen, E. G., Lotan, R. A., & Abram, P. L. (2002). Can groups learn? *Teachers College Record, 104*(6), 1045–1068.

Derwing, T., & Rossiter, M. (2002). ESL Learners' perceptions of their pronunciation needs and strategies. *System Journal, 30*(2), 155–166.

Eshani, F., & Knodt, E. (1998). Speech technology in computer-aided language learning: Strengths and limitation of a new CALL paradigm. *Language Learning & Technology, 2*(1), 45–60. Retrieved December 27, 2012 from http://llt.msu.edu/vol2num1/article3/index.html.

Eskenazi, M. (1999). Using a computer in foreign language pronunciation training: What advantages? *CALICO Journal, 16*(3), 447–468.

Eskenazi, M., & Pelton, G. (2002). Pinpointing pronunciation errors in children's speech: Examining the role of the speech recognizer. Paper presented at Pronunciation Modeling and Lexicon Adaptation for Spoken Language Technology Workshop, Estes Park, Colorado (pp. 48–52).

Eskenazi, M., Tomokiyo, L., & Wang, L. (2000). An empirical study of the effectiveness of speech-recognition-based pronunciation training. Proceedings of ICSLP, Beijing. Retrieved December 25, 2012 from http://citeseer.ist.psu.edu/cache/papers/cs/16798/http:zSzzSzwww.cs.cmu.eduzSz-laurazSz Papers-PSzSzicslp-fluency.pdf/an-empirical-study-of.pdf.

Franco, H., Bratt, H., Rossier, R., Rao Gadde, V., Shriberg, E., Abrash, V., & Precoda, K. (2012). EduSpeak: A speech recognition and pronunciation scoring toolkit for computer-aided language learning applications. *Language Testing, 27*(3), 401–418.

Graff, M. (2006). A study of *Rosetta Stone*'s effectiveness on improving English pronunciation. Unpublished MA thesis. California State University Dominguez Hills.

Hayati, A. (2010). Notes on Teaching English Pronunciation to EFL Learners: A Case of Iranian High School Students. *English Language Teaching, 3*(4), 121–126.

Hincks, R.(2005). *Computer support for learners of spoken English.* Unpublished doctoral dissertation, KTH School of Computer Science and Communication, Stockholm, Sweden.

Hincks, R., & Edlund, J. (2009). Promoting increased pitch variation in oral presentations with transient visual feedback. *Language Learning & Technology, 13*(3), 32–50.

Hismanoglu, M., & Hismanoglu, S. (2011). Internet-based pronunciation teaching: An innovative route toward rehabilitating Turkish EFL learners' articulation problems. *European Journal of Educational Studies, 3*(1), 23–36.

Hismanoglu, M. (2012). Teaching word stress to Turkish EFL (English as a Foreign Language) learners through Internet-based video lessons. *US-China Education Review 1*, 26–40.

Johnson, D.W., & Johnson, R. (2005). New developments in social interdependence theory. *Psychology Monographs, 131*(4), 285–358.

Johnson, D.W., Johnson, R.T., & Smith, K.A. (1991). *Cooperative learning: Increasing college faculty instructional productivity.* Washington, DC: The George Washington University. (ASHE-ERIC Higher Education Report No.4).

Johnson, D., Johnson, R., & Stanne, M. (2000). *Cooperative learning methods: A metaanalysis.* Minneapolis, Minnesota: University of Minnesota.

Jonassen, D.H. (1996). *Computers in the classroom.* Englewood Cliffs, NJ: Merrill.

Jones, R. (1997). Beyond 'Listen and Repeat': Pronunciation teaching materials and theories of second language acquisition. *System Journal, 25*(1), 103–112.

Joyce, W.B. (1999). On the free-rider problem in cooperative learning. *Journal of Education for Business, 74*(5), 271–274.

Kedrowicz, A., & Watanabe, S. (2006). Infusing technical communication and teamwork within the ECE curriculum. *Turkish Journal of Electrical Engineering & Computer Sciences, 14*(1), 41–53.

Kewley, L. (1998). Peer collaboration versus teacher-directed instruction: How two methodologies engage students in the learning process. *Journal of Research in Childhood Education, 13*(1), 27–32.

Kim, K.H. (1999). A project work in English pronunciation. *Linguistics, 7*(3), 321–339.

Kim, I.-S. (2006). Automatic Speech Recognition: Reliability and pedagogical implications for teaching pronunciation. *Educational Technology & Society, 9*(1), 322–334.

Kitade, K. (2008). The role of offline metalanguage talk in asynchronous computer-mediated communication. *Language Learning & Technology, 12*(1), 64–84.

Lai, Y.-S., Tsai, H.-H., & Yu, P.-T. (2009). A multimedia English learning system using HMMs to improve phonemic awareness for English learning. *Educational Technology & Society, 12*(3), 266–281.

Lee, K.W. (2000). English teachers' barriers to the use of computer-assisted language learning, *The Internet TESL Journal.* Retrieved December 25, 2012 from http://www.4english.cn/englishstudy/xz/thesis/barrir

Lee, S. (2008). *Teaching pronunciation of English using computer-assisted learning software: An action research study in an Institute of Technology in Taiwan.* Unpublished doctoral dissertation. Australia: Australian Catholic University.

Levis, J. M. (1999). Intonation in theory and practice, revisited. *TESOL Quarterly, 33*(1), 37–63. http://dx.doi.org/l 0.2307/3588190.

Levy, M. (1997). *Computer-assisted language learning: Context and conceptualization.* London: Oxford University Press.

Long, M. (1990). Task, group, and task-group interactions in S. Anivan (Ed.) *Language Teaching Methodology for the Nineties.* Singapore: SEAMEO Regional Language Centre.

Lord, G. (2008). Podcasting communities and second language pronunciation. F*oreign Language Annals, 41*(2), 364–379.

Macdonald, D., Yule, G., & Powers, M. (1994) Attempts to improve English L2 pronunciation: the variable effects of different types of instruction. *Language Learning, 44*(1), 75–101.

Mitra, S., Tooley, J., Inamdar, P., & Dixond, P. (2003). Improving English pronunciation: An automated instructional approach. *Information Technologies International Development, 1*(1), 75–84.

Mohammed, A. (2008). The effect of CALTAL approach on Jordanian university students' pronunciation of English words with silent consonant letters. *International Journal of Learning, 15*(1), 159–167.

Mohsin, N. (2012). Improving pronunciation of secondary school teachers through computer-assisted learning: An Experience. Proceedings of the European Conference LINQ, Brussels, 134–142.

Neri, A., Cucchiarini, C. & Strik H.(2001). *Effective feedback on pronunciation in ASR-based CALL*. In Proc. of the workshop on Computer Assisted Language Learning, Artificial Intelligence in Education Conference, San Antonio, Texas, 40–48.

Neri, A., Cucchiarini, C., & Strik, H. (2003). Automatic speech recognition for second language learning: How and why it actually works. Proceedings of 15th International Conference of Phonetic Sciences, 1157–2260. Retrieved February 11, 2012 from http://lands.let.kun.nl/literature/neri.2003.1.pdf.

Neri, A., Cucchiarini, C., & Strik, H. (2008). The effectiveness of computer-based speech corrective feedback for improving segmental quality in L2 Dutch. *ReCALL Journal, 20*(2), 225–243.

Neri, A., Cucchiarini, C., Strik, H., & Boves, L. (2002). The pedagogy-technology interface in computer-assisted pronunciation training. *Computer Assisted Language Learning, 15*(5), 441–467.

Neri, A., Mich, O., Gerosa, M., & Giuliani, D. (2008). The effectiveness of computer-assisted pronunciation training for foreign language learning by children. *Computer Assisted Language Learning, 21*(5), 393–408.

Onwuegbuzie, A.J., & DaRos, D.A. (1999). *Should I cooperate with my classmates? The effects of cooperative learning on attitudes and achievement in graduate-level research methodology courses.* Paper presented in April at the annual conference of the American Educational Research Association, Montreal, Canada.

Pennington, M. (1999). Computer-aided pronunciation pedagogy: Promise, limitations, directions. *Computer Assisted Language Learning, 12*(5), 427–440.

Pennington, M., & Richards, J. (1986). Pronunciation revisited. *TESOL Quarterly, 20*(2), 207–225. http://dx.doi.org/10.2307/3586541

Persons, O.S. (1998). Factors influencing students' peer evaluation in cooperative learning. *Journal of Education for Business, 73*(4), 225–229.

Phinney, M. (1996). Exploring the virtual world: Computers in the second language writing classroom. In M. Pennington (Ed.), *The power of CALL*. Houston, TX: Athelstan.

Purushotma, R. (2005). Commentary: You're not studying, you're just . . . *Language Learning and Technology, 9*(1), 80–96. Retrieved February 27, 2012 from http://llt.msu.edu/vol9num1/ purushotma/default.html.

Rost, M. (2002). *New technologies in language education: Opportunities for professional growth*. Retrieved June 28, 2006, from http://www.longman.com/ae/multimedia/pdf/MikeRost_PDF.pdf.

Rostron, A., & Kinsell, P. (1995). Learning pronunciation using CALL: Some experimental evidence. *ReCALL Newsletter, 5*(1). Retrieved August 30, 2006 from http://www.fredriley.org.UK/CALL/pubs/newsletter/content95.htm.

Saito, K. (2007).The Influence of Explicit Phonetic Instruction on Pronunciation in EFL Settings: The Case of English Vowels and Japanese Learners of English. *Linguistics Journal, 3*(3), 16–40.

Salaberry, R. (1999). CALL in the year 2000: Still developing the research agenda. *Language Learning and Technology, 3* (1), 104–107.

Seferoglu, G. (2005). Improving students' pronunciation through accent reduction software. *British Journal of Educational Technology, 36*(2), 303–316.

Senior, R. (1997). Transforming language classes into bonded groups. *ELT Journal, 51*(1), 3–11.

Shams, N. (2006). *The use of computerized pronunciation practice in the reduction of foreign language classroom anxiety.* Doctoral Thesis in Modern Languages and Linguistics. The Florida State University. ProQuest Information and Learning Company.

Singhanayok, C., & Hooper, S. (1998). The effects of cooperative learning and learner control on students' achievement, option selections, and attitudes. *Educational Technology, Research and Development, 46*(2), 17–25.

Slavin, R. E. (1991). Synthesis of research on cooperative learning. *Educational Leadership, 48*(5), 71–82.

Slavin, R. E. (1996) Cooperative learning in middle and secondary schools. *The Clearing House, 69*(4), 200–210.

Strudler, N., McKinney, M., & Jones, W. (1999). First-year teachers' use of technology: Preparation, expectations and realities. *Journal of Technology and Teacher Education, 7*(2), 115–129.

Tang, J. (2002). Using L1 in English classroom. *English Teaching Forum, 40*(4), 136–172.

Tateyama-Sniezek, K. M. (1990). Cooperative learning: Does it improve the academic achievement of Students with handicaps? *Exceptional Children, 56*(5), 426–437.

Tingle, J. B., & Good, R. (1990). Effects of cooperative grouping on stoichemetric problem solving in high school chemistry. *Journal of Research in Science Training, 27*(5), 671–683.

Verdugo, D. (2006). A study of intonation awareness and learning in non-native speakers of English. *Language Awareness, 15*(3), 141–159.

Wachowicz, K. A., & Scott, B. (1999). Software that Listens: It's not a question of whether, It's a question of how. *CALICO Journal, 16*(3), 253–276.

Warschauer, M., & Healey, D. (1998). Computers and language learning: an overview. *Language teaching forum, 31*(1),57–71.

Zughoul, M. (1987). Restructuring the English department in the Third World universities: Alternative approach for the teaching of English literature. IRAL. XXV/3: 221–236.

Appendix A

The performance test

The HASHIMITE KINGDOM OF JORDAN
MINISTRY OF EDUCATION
Pronunciation Test
Qussabet Al Mafraq Directorate of Education
Al-Abrar School

Name: _____ Class : 3rd Grade
Subject: English Language Section: A+B+C
Time : 1:30

Answer the following questions
Q. 1

1) Say the following words. *(3 points)*

1. wrong 2. right 3. mouse 4. address 5. quick 6. somewhere

2) Circle the word you hear. *(3 points)*

1. a. thumb b. thum c. tomb
2. a. bite b. bit c. pet
3. a. bar b. bare c. bear
4. a. advance b. advice c. advertise
5. a. chick b. quick c. chicken
6. a. ability b. able c. abilities

3) Say the following minimal pairs. *(3 points)*

1. right light 2. long wrong 3. best vest 4. bin pen
5. ride write 6. ship sheep

4) Circle the word you hear from the following minimal pairs. *(3 points)*

1. sum come
2. mouse mouth
3. sick thick
4. leaf leave
5. hat hot
6. cap cup

Q. 2

1) Say the following sentences. *(6 points)*

1. I try to learn ten words every day.
2. Can I sit here?
3. I'll have the chicken.
4. My mother is a teacher.
5. I like spring.
6. She works in a school.

2) Circle the sentence you hear. *(6 points)*

1. a. I'd like a glass of ice tea.	b. I'd like a glass of iced tea.
2. a. Can we have the bill now?	b. Can we have the bell now?
3. a. He'll be back in quarter of an hour.	b. He will be back in quarter of an hour.
4. a. Put your pen in the bin.	b. Put your pin in the pin.
5. a. She's a doctor.	b. She is a doctor.
6. a. It isn't hot today.	b. It is not hot today.

Q. 3

1) Read the following dialogues. *(6 points)*

A *(3 points)*

Waiter: What would you like?
Student: I'd like lamb and rice, please.
Waiter: Here you are.
Student: Thank you.
Waiter: You're welcome.

B *(3 points)*

Teacher: What are you going to do next year?
Student: I'm going to go for a science degree.
Teacher: How long will that take?
Student: Four years

2) Listen and complete the dialogues. *(6 points)*

A *(3 points)*

Teacher: Two cheeseburgers, please.
Student: For _____ or to go?
Teacher: To go thanks.
Student: Do you want _____ with that?
Teacher: Yes, please.
Student: Anything to _____?

B *(3 points)*

Student A: It is very _____ here.
Student B: Yes, the _____ is wonderful. I'm thirsty.
Student A: Well, it is _____ today.

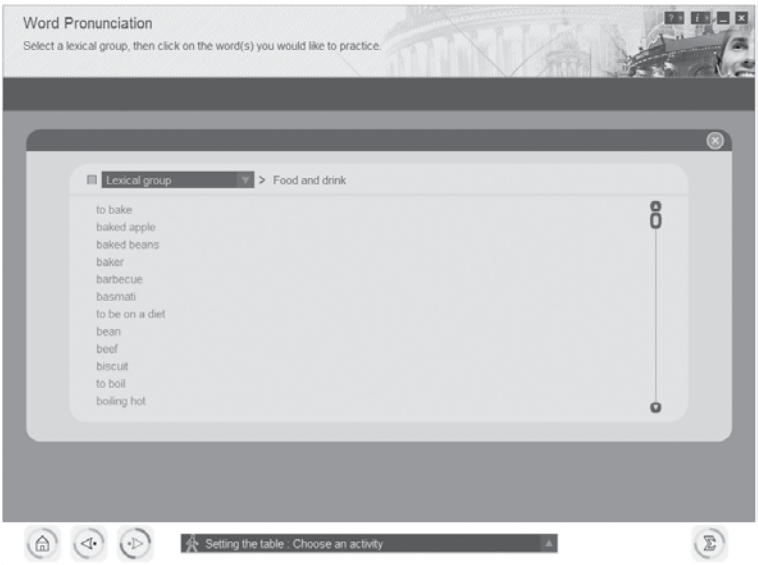
The End

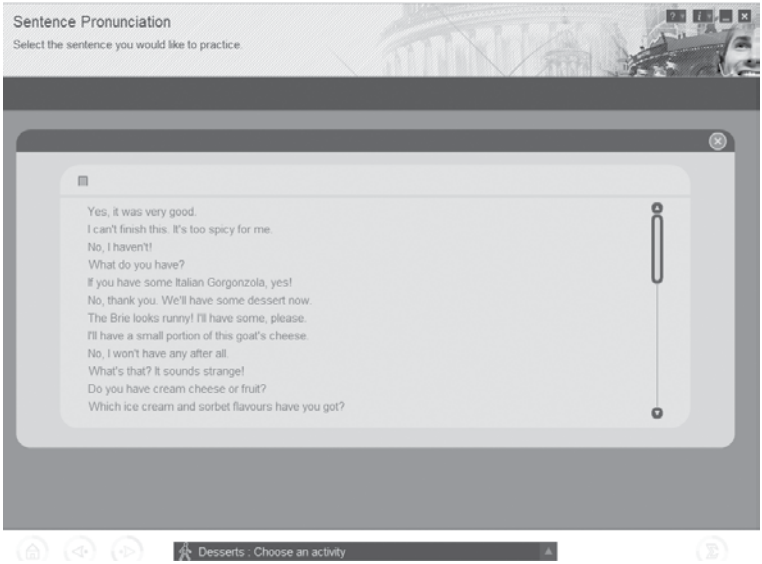
Appendix B

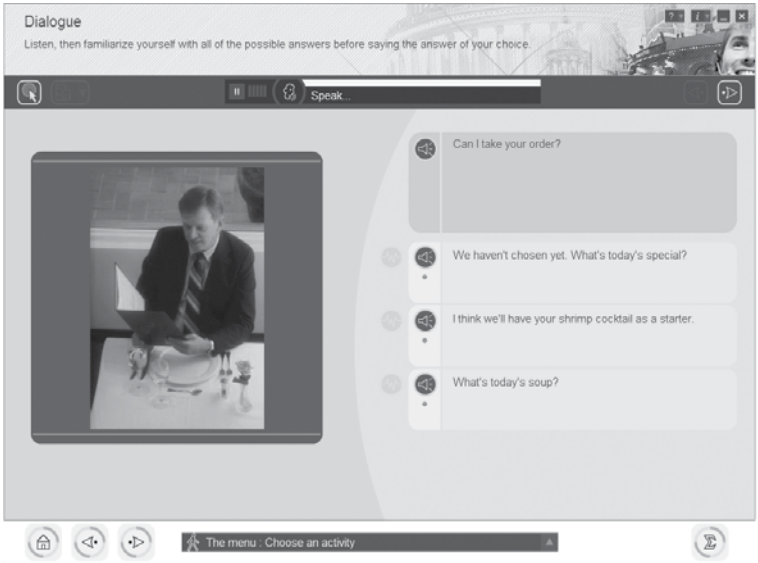
Screenshot of the home page of *Tell Me More Performance English* Program <www.tellme-more.com>

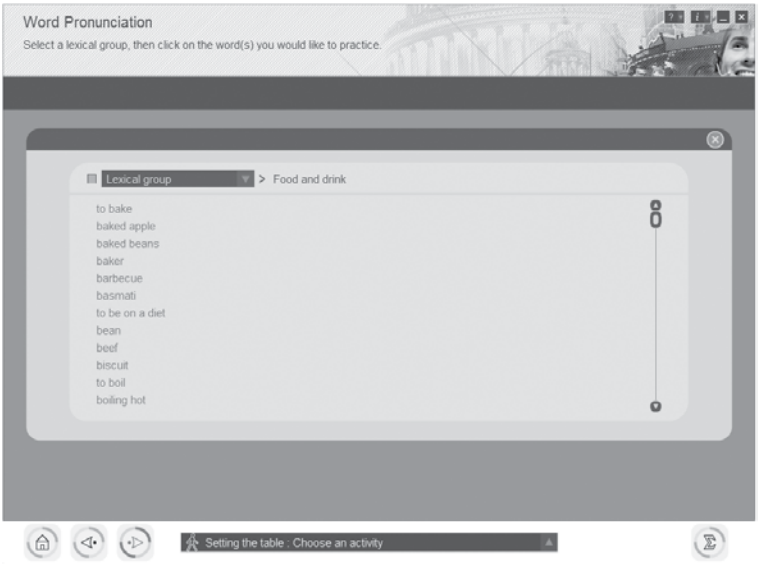
Appendix C

Sample of the exercises




Sentence Pronunciation
Select the sentence you would like to practice.
Yes, it was very good.
I can't finish this. It's too spicy for me.
No, I haven't!
What do you have?
If you have some Italian Gorgonzola, yes!
No, thank you. We'll have some dessert now.
The Brie looks runny! I'll have some, please.
I'll have a small portion of this goat's cheese.
No, I won't have any after all.
What's that? It sounds strange!
Do you have cream cheese or fruit?
Which ice cream and sorbet flavours have you got?
Desserts : Choose an activity


Dialogue
Listen, then familiarize yourself with all of the possible answers before saying the answer of your choice.
Speak...
Can I take your order?
We haven't chosen yet. What's today's special?
I think we'll have your shrimp cocktail as a starter.
What's today's soup?
The menu : Choose an activity


Word Pronunciation
Select a lexical group, then click on the word(s) you would like to practice.
Lexical group
> Food and drink
to bake
baked apple
baked beans
baker
barbecue
basmati
to be on a diet
bean
beef
biscuit
to boil
boiling hot
Setting the table : Choose an activity