CAPT and its Effect on English Language Pronunciation Enhancement: Evidence from Bilinguals and Monolinguals

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Abstract

Nowadays there are several challenges for English teachers as well as researchers regarding how to teach foreign language pronunciation more effectively. The current study aimed to explore the effect of computer-assisted pronunciation teaching (CAPT) on Persian monolinguals and Turkmen- Persian and also Baloch- Persian bilinguals' pronunciation considering production and perception. A sample of 48 female mono and bilingual 7th-grade students participated in this study and made the experimental and comparison groups. All the participants took the Oxford Placement Test and accordingly were in the beginner level of English language proficiency (95.83% of the participants' scores ranged from 0 to 15). The experimental group experienced a technology-based instruction while the comparison group benefited from traditional listen and repeat method of pronunciation teaching. Two Two-way between-group ANOVAs were used to define the influence of CAPT on pronunciation production and perception of the mono and bilingual participants. The results of the study indicated that CAPT had a significant effect on pronunciation production while pronunciation perception was comparatively more enhanced through the traditional method. Regarding

mono and bilingualism, it was also found that bilinguals significantly outperformed monolinguals in pronunciation production in both groups while there was no significant difference between them in pronunciation perception. There were also no interaction effects for pronunciation perception or production scores. The results generally showed that CAPT can be beneficial specifically when it is used along with traditional methods at schools in beginner levels.

According to Liu (2008), pronunciation is critical for having a comprehensible speaking in oral communication, listener perception, and also speaker identity. Speaking and pronunciation are interconnected, but it is sometimes necessary to view them separately. Fraser (2000) explains that being able to speak English includes a number of sub-skills of which pronunciation is the most important one (the other ones are vocabulary, grammar, and pragmatics); Fraser (2000) argues that "with a good pronunciation, the speaker is intelligible despite errors in other subskills" (p. 7). Derwing and Munro (2005, p. 385) define and use two key terms concerning pronunciation; one is intelligibility which means "the extent to which a listener actually understands an utterance", the other one is comprehensibility which is tied to "the degree of effort a listener finds he/she must expend to understand a speaker".

There have been many methods offered for teaching pronunciation such as listen and repeat (Kenworthy, 1987), teaching vowels and consonants in isolation (Lane & Critchfield, 1998; Wylie & Durrell, 1970), teaching segmental and supra-segmental features separately (Brown, Brown, Brown, Gillian, & Yule, 1983; Rogerson & Gilbert, 1990), and "top-down" approaches to pronunciation teaching (Pennington, 1989). Therefore, because of the growing body of demands and needs of learners, a new approach to

teaching and learning foreign language pronunciation, computer-assisted pronunciation training (CAPT), has recently emerged. Despite the positive consequence of such a new approach in enhancing pronunciation (e.g. Butler-Pascoe & Wiburg, 2003; Kim, 2006; Neri, Cucchiarini, Strik, & Boves, 2002), as stated by Pirasteh (2014), it is rarely used in language learning classes in Iran.

Despite the previous beliefs about bilingualism as a negative factor causing a delay in linguistic development and academic learning and cognition (Appel & Muysken, 1987), recent researches on bilingual communities have highlighted the advantages of bilingualism such as better working memory and executive control (del Pilar Agustín-Llach, 2017) for acquiring an additional language. Despite the presence of various researches related to bilingualism along with different results compared to monolingualism in remembering and retrieving vocabulary, reading comprehension, and using meta-cognitive strategies (Afsharrad & Sadeghi Benis, 2017; Keshavarz & Ghamoushi, 2014; Seifi & Abdolmanafi Rokni, 2013), based on the researchers' investigation, there are not particular studies on pronunciation enhancement in bilinguals compared to monolinguals in acquiring their third and second language respectively. The crux of the matter is the effect of CAPT on very young English learners in Iranian schools particularly bilinguals' vs. monolinguals' perception and production of the English language.

Literature Review
Language Learning and the Pronunciation Component

As Kelly (1969) states pronunciation, more than any other component within the broad construct of second language speaking ability, has been subject to the fantasy of the time and fashions of the day and was dubbed as

the Cinderella of second language teaching. According to Derwing and Munro (2009), pronunciation aspects that are ascribed pedagogical value in the mind of researchers and teachers have shifted over time. On the other hand, vocabulary and grammar are much better understood by teachers because they are more studied. According to Breitkreutz, Derwing, and Rossiter (2001), by the development of the communicative approach, in the mid-1980s, pronunciation has received more attention by teachers, and English language teaching specialists have been generating more effective and more innovating pronunciation teaching materials, resources and instructional strategies because it was believed that the primary purpose of language is communication, and it should be central in all language classrooms. Along with the direct use of spoken language in classrooms, the legacy of 19th-century innovators suggested a style of pronunciation teaching characterized by exposure, imitation, and mimicry. From the 20th century, a growing number of researchers have been expanding a reliable research base to support pronunciation teaching (Derwing & Munro, 2015). Nowadays there is much interest in teaching pronunciation, especially in ESL/EFL classes, since poor pronunciation can lead to serious problems for learners, such as communicative breakdowns, anxiety, and discrimination (Florez, 1998).

Some researchers in Iran, Gooniband Shooshtari, Mehrabi, and Mousavinia (2013), found that there are some misunderstandings about teaching pronunciation among teachers; one of them is that teachers do not prioritize pronunciation instruction in their classrooms and they believe that pronunciation is a talent and cannot be taught or even they do not have time and also it might be because they do not have knowledge about teaching pronunciation. Alghazo (2015) reported that one of the reasons some students struggle with pronunciation could be because of the low priority given to explicit pronunciation teaching in many ESL courses. Based on Grim and

Sturm's (2015) survey of ESL teachers and students, the strongest view of why teachers did not prioritize pronunciation in their courses was because they felt pronunciation was not a basic component of language teaching. In some other researches about teaching pronunciation, (e.g. Baker, 2014; Breitkreutz et al., 2001; Derwing, Diepenbroek, & Foote, 2012), teachers have argued that they do not feel qualified to teach pronunciation because of their own lack of formal pronunciation training.

In some recent studies related to the importance of pronunciation teaching, Saito (2011) examined the efficacy of explicit phonetic instruction on Japanese adult learners of English. He found that explicit instruction had a significant effect on the comprehensibility of the learners, especially in the sentence reading task. A study by Busà and Stella (2014) investigated the production of yes/no question intonation patterns for 4 Italian native speakers and 3 English native speakers. The results demonstrated that the phonetic dimension of L2 intonation may be more difficult to learn than the phonological one. Korkut and Çelik (2018) found that using creative drama strategy via a read-aloud task made students have better pronunciation production, particularly in suprasegmental level. Li and Somlak (2019) in a more recent study investigated the articulatory gestures' effects on university learners' pronunciation in a read-aloud task. They concluded that the students who were exposed to audio-visual recordings along with the images of the speaker's face outperformed the students who were in just audio-visual recording class.

Bilinguals vs. Monolinguals in Language Learning

Kalantari (2015) states that Iran is a multicultural society and the home to a number of speech communities, Turkish, Kurdish, and Arabic languages

among others. Many bilingual children learn and speak their first language at home and study all of their courses in Persian throughout their education.

In a study, Zare and Mobarakeh (2013) examined the Arab-Persian bilinguals and Persian monolinguals in their recognition and production of new vocabulary in L3; they found out that bilinguals outperformed monolinguals in general and in L3 production vocabulary learning, however, there was no significant difference between monolinguals and bilinguals in L3 recognition vocabulary learning. Seifi and Abdolmanafi Rokni (2013) in a study on strategy use, revealed through a questionnaire that bilingual learners had an advantage in both cognitive and metacognitive strategy use than monolinguals. They argued that this advantage may be due to bilinguals' experience and success in mastering two languages. Keshavarz and Ghamoushi (2014) studied one hundred Turkish-Persian bilinguals and one hundred Persian monolinguals in terms of their reading strategy awareness and use. They reported that bilinguals were more aware of metacognitive and global strategies and they also used more strategies than monolinguals in some cases. The research by Schroeder and Marian (2014) which investigated bilingualism effects on memory concluded that bilinguals show enhanced memory for non-linguistic aspects of events and poorer memory for linguistic aspects compared to monolinguals.

As more instances, A study by Schmidt and Post (2015) which aimed to analyze the effects of bilingualism on the prosodic feature acquisition and speech rhythm indicated that bilinguals had an advantage in their pronunciation development in comparison to monolinguals. Yamchi and Kumar (2016) in their study found out that monolinguals outperformed bilinguals in immediate linguistic comprehension of the movie, and the authors claimed that this result might be because Persian is the first language of monolinguals and the second language of Azeri bilinguals. Finally, In a

more recent study by Izadi and Yarahmadzehi (2018) on Baluch- Persian bilinguals and Persian monolinguals, the metalinguistic awareness of participants was explored while learning English as their second or third language; the authors reported that Baluch participants corrected a higher proportion of grammatical errors compared to Persian participants, and they were also more grammar-oriented than their Persian counterparts.

Technology and Language Teaching

There have been different methods for teachers to teach pronunciation such as teaching segmental or suprasegmental features, focusing on vowels and consonants separately, and implicit or explicit instruction. A valuable meta-analysis study by Norris and Ortega (2000) demonstrated that explicit and implicit types of instruction, both in highly controlled and less controlled situations are equally effective. However, most of the related studies have focused on intelligible pronunciation production and almost none of them has noticed the comprehensible pronunciation and the extent to which instruction can influence the students' comprehensibility in pronunciation. What makes it worse as stated by Olson (2014), is that pronunciation skill is particularly absent from lower-level language instruction. Technology has recently further proved its pivotal role in language teaching and in fact, in many contexts they are inseparable. According to Kessler (2018), teachers should get familiar and attain the ability to comfortably use the new, intelligent and also sophisticated technologies as teaching resources because these opportunities are possible to form the new landscape of world language teaching and learning.

One main issue regarding technology and education is learning through multimedia. Multimedia in its broad definition is a combination of web, text, audio, graphics, animation and video which are displayed by the help of computers or other electronic media devices (R. E. Clark, 2001). Due to the

importance of technology and its facilitative effects on different areas of life, education has also not been an exception, and many respective researchers and practitioners have tried to incorporate technology into education in general and language teaching in specific.

According to Mayer's Cognitive Theory of Multimedia Learning, (R. E. Mayer, 1997), students who receive a verbal explanation coordinated with a visual explanation perform better on problem-solving transfer than students who receive only a verbal explanation. According to "multimedia principle" by R. Mayer and Mayer (2005), "people learn more deeply from words and pictures than from words alone". In a similar vein to visual and verbal explanation, another well-known related theory is the Dual Coding Theory by J. M. Clark and Paivio (1991) which states that cognition relates to two subsystems, a verbal system which deals with language and a nonverbal system (imagery) which deals with nonlinguistic objects and events. Based on this theory, both systems are involved even in language phenomenon. Another theory related to visual and verbal processing which is worth mentioning is Cognitive Load Theory proposed by Sweller (1988). It claims that meaningful learning occurs when connections are made between information in the visual and the verbal-processing channels of working memory, which leads to schema connections and enhances the long term memory utilization. Confirming the important role that technology can play in language learning, Wang (2018) has also argued that by the help of multimedia teaching, it is possible for teachers to mobilize students' eyes, mouth, ears and hands, which can help them maximize their amount of English learning with a vivid environment in classrooms.

Computer-assisted pronunciation training as a rather new advancement in language teaching through incorporating technology has several advantages over traditional teaching methods; unlimited input is available for students,

Journal of Teaching Language Skills **(JTLS)**	**129**
39(2), Summer 2020, pp. 121-167	**Mozhgan Parsiani**

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feedback can be provided for them automatically, pre-recorded materials can be used through using computers, stress-free environment can be provided for students at which they can practice at their own pace for unlimited time (Gilakjani & Rahimy, 2019; Neri, Cucchiarini, & Strik, 2001; Zhang, 2018). Levy and Stockwell (2013) believe that while early computer-assisted language learning (CALL) intervention often targeted very specific tasks or functions, recently the use of social and new media in contexts has become very popular, which in turn will lead to authentic language production. One aspect of CALL is computer-assisted pronunciation teaching (CAPT) which is based on the use of technology for teaching and learning the segmental and suprasegmental features of a language (Gilakjani & Rahimy, 2019). There have been also different efforts recently to make CAPT more user-friendly through different games, songs, pictures or videos to promote pronunciation. Young and Wang (2014) claim that these facilities motivate the learners and help them have fun in a low-stress situation and perform better.

One of the recent studies related to technology-based pronunciation teaching is Inceoglu's (2014) study which relates to the effects of audio-visual and audio-only technology on the enhancement of pronunciation. He concluded that both training groups (audio-visual and audio-only) outperformed the control group which was equipped with no technological facilities, and among the two experimental groups audio-visual group learners outperformed the audio-only group in pronunciation production. A study by Luo (2016), oral reading and peer review applying voice recording indicated that the integration of the CAPT technique through computer software as a self-study project was superior in reducing students' problems in pronunciation production compared to only in-class instruction. Xodabande (2017) investigated the effectiveness of Telegram as a social network on learners' pronunciation. After the treatments, there appeared a significant

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improvement for the experimental group. He mentioned that this success might be because the technology was available every time they needed. Yan, Lin, and Liu (2018) designed a web-based platform for computer-assisted peer review to investigate its influence on learner's pronunciation enhancement and concluded that web-based platform was beneficial and could overcome some problems related to pronunciation teaching. In a very recent study on technology-based pronunciation instruction, Fouz-González (2019) investigated the podcast-based pronunciation training effects on the students' pronunciation of English consonants and some English stops; the results of the study showed that the technology-based instruction had a positive impact on participants' perception and production of the target sounds.

To the knowledge of the authors, despite the presence of some studies on CAPT and language learning, they suffer from some limitations. First, pronunciation perception and production are not emphasized or discussed as aspects of pronunciation instruction. Second, most of the mentioned studies focus on adult language learners not young language learners at schools. Next, few if any of them focus on monolingualism and bilingualism as the core issue under investigation.

CAPT has recently led to the emergence of many pronunciation practices and techniques which in turn have shown the usefulness of technology in adapting or adopting more effective ways of teaching pronunciation (Foote & McDonough, 2017; Pennington, 1999). Various recent studies argue for the importance and effectiveness of CAPT (Gilakjani & Rahimy, 2019; Xodabande, 2017; Young & Wang, 2014). Regarding the bilingualism and monolingualism differences and their effects on various aspects of language learning, there have been some controversial results. Some studies found no significant differences between them (e.g. Sa'di, Sa'di, & Shoja, 2013; Zare & Mobarakeh, 2013) and some have concluded the outperformance of one group

over the other (e.g. Keshavarz & Ghamoushi, 2014; Seifi & Abdolmanafi Rokni, 2013; Yamchi & Kumar, 2016). The studies linking bilingualism, monolingualism and pronunciation learning have not also led to definite results and are full of contradiction. Besides, just a few have focused on young language learners. This study tries to experimentally investigate if CAPT would lead to significant enhancement of pronunciation perception and production compared to the traditional method in both bilingual and monolingual female school students. It is hoped that the results of the study would shed further light on the effect of technology on language enhancement and help teachers and language practitioners to make more substantiated and accurate decisions while selecting their teaching methods and techniques. Therefore, the administration of this study addresses the following research questions:

Q1: Is there a significant difference in enhancing the productive ability in pronunciation between the comparison group and the CAPT group?

Q2: Is there a significant difference in enhancing the productive ability in pronunciation among the subgroups of the comparison and CAPT groups?

Q3: Is there a significant difference in enhancing the perceptive ability in pronunciation between the comparison group and the CAPT group?

Q4: Is there a significant difference in enhancing the perceptive ability in pronunciation among the subgroups of the comparison and CAPT groups?

Method

Participants

The sample of the current study included 48 females, seventh-grade high school students from a village in Golestan province of Iran. Convenience sampling was used to choose the participants. There were 24 students in one class and 24 in the other one. In each class 14 students were bilinguals. A

mixture of Turkmen-Persian and Baloch-Persian bilinguals. All of the students were 12 or 13 years old. It was their first year of having English as one of their courses at school. One class was randomly selected to be taught with the help of technology as the experimental group and the other was selected for the traditional teaching of pronunciation, which made the comparison group.

Instruments

a) *Oxford Placement Test (OPT):*

To make sure about the students' linguistic homogeneity. Oxford placement test version 2 (2001), published by Oxford University Press was administered.

b) *A Vocabulary Familiarity Questionnaire:*

A questionnaire designed by the researcher to know about the students' familiarity with the words selected out of the students' textbooks through consulting experienced teachers (see Procedure & Appendix A).

c) *The School English Textbooks of Seventh and Eighth Grades:*

These English books were used as the main sources for word selection.

d) *PowerPoint Presentation:*

PowerPoint slides embedded with a written form of the words, pictures, or videos and the mp3 file of the pronounced words by a native speaker made the other instrument used in this study.

e) *A Pamphlet:*

A 10-page pamphlet designed for the comparison group by the researchers including the written word and the Persian translation of it accompanied by the respective picture whenever possible.

f) *A Production and Perception Pronunciation Post-test:*

A pronunciation test from the words taught to students was also used which was designed by the help of three experienced teachers to investigate the students' pronunciation enhancement. The number of questions for each part of the test was as follows: 10 true-false (10 words were used) and 10 multiple-choice questions (20 words were used) for the perception part; and also 20 items for the production part of the test to be read aloud. To make sure about the reliability of the comprehension and production pronunciation test, a test-retest reliability technique was employed in another school with the students who had the same proficiency level according to OPT results. The gap between test administrations was one week to prevent practice effect bias or additional learning. The results showed an almost high reliability of the test (r= 0.86). The content validity of the test was also approved by designing a table of specification and by consulting three experts, who were experienced English teachers at different schools. Note that all the words and items in the test were from the content covered in the treatment sessions in both classes. (see appendix C & D).

g) *An Audio Recorder:*

A voice recorder was used to record the pronunciation of students for later analysis.

Procedure

The following procedure was used to conduct the present study:

Placement Test

To begin the study, two classes in a school in a village that included both bilingual and monolingual seventh-grade female students in Golestan province were randomly selected. As the first stage, all the 50 participants took the Oxford Placement Test version 2 (2001) to make sure they were

linguistically homogeneous. The results indicated that 46 out of 48 (95.83%) students scored within the range of 0 to 15 which is titled beginner level based on Oxford Placement Test instruction. Thus two linguistically homogeneous groups, each containing 24 subjects was used in the current study.

Vocabulary Familiarity Questionnaire

A long list of seemingly difficult-to-pronounce words was selected by the researcher from the seventh and eighth grade English textbooks. In the next step, the long list was curtailed to 45 items by consulting three experienced school teachers.

A vocabulary familiarity questionnaire including 45 selected words was then given to students to know about their degree of familiarity with those words. The questionnaire asked them how many times they had already seen those words, 0 time or not familiar at all, 1 time or just seen one time, 2 times or it looks like familiar, 3 times or more or a really familiar word. The purpose behind the questionnaire was to make sure the students were almost unfamiliar to the words selected. In case a word proved familiar to many, it was replaced with another one, though in the extreme case, the high familiarity did not reach nine percent. For analyzing the data, at first, the general familiarity of students to the items of the questionnaire was assessed. Table 1 shows that the most frequent choice of answer was "0 times", which is more than 88 percent while only 0.78 percent chose the last choice, or "a really familiar word" (see appendix B for more information).

Table 1.

General Index of Familiarity to the Words in the List

Questionnaire items	0 time= Not familiar at all	1 time= Just seen once	2 times= Looks like familiar	3 or more times= A really familiar word
Percentage of selected items by 48 participants	88.84%	8.70%	1.7%	0.78%

CAPT Instruction

The main stage was the treatment period including 10 sessions held in 40 days. For this purpose, the experimental group received the CAPT method through PowerPoint slides prepared by the researchers, which were embedded with pre-recorded voices of native speakers, multiple target pictures, related video-clips and also song-videos of the specified hard-to-pronounce words. The PowerPoint slides for experimental group were prepared by the help of pre-recorded voices of American native speakers available in reliable and worldwide dictionary websites such as Merriam-Webster (http://www.merriam-webster.com) and Oxford Learner's Dictionary (https://www.oxfordlearnersdictionaries.com). The colored picture related to each word was inserted in the slide above the written word and the audio icon (the native speaker pronunciation). Most pictures were downloaded from the American well-known worldwide picture web, Pinterest (https://www.pinterest.com) and also the British Council Learn English Kids (https://learnenglishkids.britishcouncil.org). The next slide for each word included a short video-clip containing the target word mainly taken from the British Council Learn English website, (https://learnenglishkids.britishcouncil.org). The CAPT class sessions were held in the school laboratory which was equipped with a projector, computers

and speakers which were suitable and useful for computer-based teaching. (see Appendix E).

In treatment sessions, both groups (CAPT and traditional) shared different types of activities such as repeating the already heard words. As another class activity, the researcher asked one student to read the words (in the pamphlet or on the screen) aloud, and if other students could find a mispronunciation, they just raised their hands and after getting permission, corrected the mistake. In the other activity, the researcher divided the students into groups and gave them time to pronounce all the words together, and then randomly chose one of the members of each group to read the words aloud and if most of the words were pronounced correctly, all the group members were given a positive point.

Traditional Instruction

The comparison group received the traditional listen and repeat method (Kenworthy, 1987) through the help of a pamphlet including the words and their Persian equivalent. The decision was based on an informal interview with seven experienced teachers, six of whom appreciated the use of L1 equivalents as a means to focus the students' attention to the pronunciation of the new word instead of guessing its meaning. Whenever necessary, the researcher explained the phonological rules such as: how to pronounce "th" in "toothache", or "ch" sounds like "k" in ache, to both groups. The classroom exercises were the same as those in the CAPT class. There were ten sessions in about one month and 10 days for both classes. Each session lasted about 30 to 40 minutes.

Pronunciation Perception and Production Test

At the end, a perception/production pronunciation test based on the covered materials was taken from the students to analyze their progress and answer the research questions. In the perception part of the test, the test items were scored on the basis of zero and one (zero for false choice and one for correct choice). For the production part of the test, to come to a rather fair judgment, the recorded voices of students were rated by three experienced teachers separately. For gaining the final score of production for each student, the judgment of the majority was taken into account. To make sure about the reliability of the raters, a Cronbach Alpha test and an interclass rater correlation were administered which indicated high reliability for raters (r= 0.99).

Results

To answer the first and second research questions related to the pronunciation production results, a two-way between-groups ANOVA was conducted, the assumptions and the results of which are presented in Tables 2, 3, 4, 5, and 6 respectively. In Table 2, as the result of Levene's test indicates the homogeneity of production scores is supported. Therefore, the assumption of homogeneity is not violated. To make sure about normality through Kolmogorov-Smirnov's test as Table 3 shows, the sig. value for all independent variables is more than 0.05 for production scores which means the normality is accepted. Another test of normality was also employed, Table 4 shows Skewness and Kurtosis values are -.239 and -1.213 respectively. Therefore, the normal distribution can be assumed and parametric statistical tests can be used to analyze the data.

Table 2.

Levene's Test of Equality of Error Variances

	Levene Statistic	df 1	df 2	Sig.
Production score	1.992	3	44	.129

Table 3.

Kolmogorov-Smirnov Test of Normality for Production Scores

Production scores	Kolmogorov-Smirnov		
	Statistics	df	Sig.
Monolingual	.128	20	.200
Bilingual	.149	28	.114
Traditional class	.143	24	.200
CAPT class	.145	24	.200

Table 4.

Skewness and Kurtosis Normality test for Production Scores

Sample size	Skewness statistics	Std Error Skewness	Kurtosis statistics	Std Error Kurtosis
48	-.239	.343	-1.213	.674

As Table 6 shows, there was a statistically significant difference for group type $F (1, 44) = 4.875$, $p= .032$ with an approximately large effect size (partial eta squared= .100). Therefore, there is a significant difference in the performance of individuals in different classes. According to the descriptive statistics of production test which is shown in Table 5, the traditional class and the CAPT class mean scores are 9.33 and 13.37 respectively. This shows that individuals in the CAPT class (p= .032) outperformed the individuals in the traditional class in pronunciation production.

To answer the second question of the study, which is related to the pronunciation production differences in bilinguals and monolinguals as

subgroups according to Table 6, it is clear that in addition to the group type difference, there is also a main statistically significant difference for Language type variable in the study F (1, 44) = 7.184, p= .010; with a large effect size (partial eta squared= 0.14), stating the main large difference among monolinguals and bilinguals in pronunciation production scores. The interaction effect between group type and language type was not statistically significant F (1,44) = 2.547, p= .118. In fact, this means that bilinguals not only in the CAPT class performed better in pronunciation production they also outperformed monolinguals in the traditional group. In general, the CAPT class outperformed the traditional class in pronunciation production performance.

Table 5.

Descriptive Statistics of Pronunciation Production Scores

group type	language type	Mean	Std. Deviation	N
Traditional class	Monolingual	8.3000	6.51579	10
	Bilingual	10.0714	5.91562	14
	Total	9.3333	6.09823	24
CAPT class	Monolingual	9.3000	6.03784	10
	Bilingual	16.2857	3.96967	14
	Total	13.3750	5.96229	24
Total	Monolingual	8.8000	6.13532	20
	Bilingual	13.1786	5.86928	28
	Total	11.3542	6.30599	48

Table 6.

Test of two-way between Group ANOVA test for Pronunciation Production Scores

Dependent variable: production score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	498.993[a]	3	166.331	5.342	.003	.267
Intercept	5635.672	1	5635.672	181.002	.000	.804
Gptype	151.801	1	151.801	4.875	.032	.100
Langt	223.672	1	223.672	7.184	.010	.140
Gptype * Langt	79.301	1	79.301	2.547	.118	.055
Error	1369.986	44	31.136			
Total	8057.000	48				
Corrected Total	1868.979	47				

Note. Gptype= group type (traditional/CAPT) Langt= language type (monolingual/bilingual)

According to Table 5, it is obvious that bilinguals in both classes outperformed the monolinguals as subgroups in pronunciation production scores.
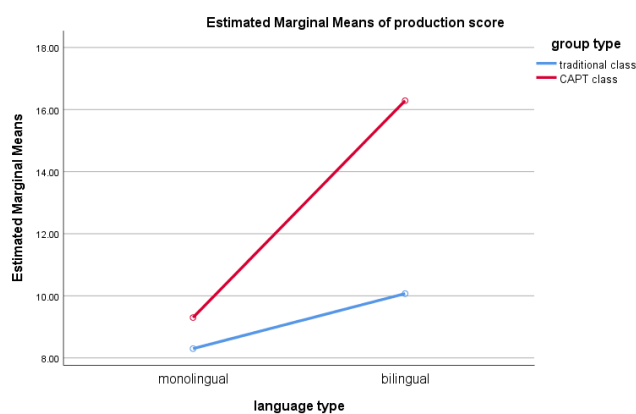
Figure 1. *Results of a two-way between-groups ANOVA for production score*

The plot in Figure 1 shows the relationship between the independent variables, group type and language type and their effects on the dependent variable which is production score.

To answer the research questions three and four related to pronunciation perception performance of participants and their differences in subgroups, another two-way between-groups ANOVA for the perception scores as the dependent variable was administered. The following tables are the assumptions and results of ANOVA test for perception scores. Table 7 of Levene's test shows that the homogeneity of perception scores is met, therefore the assumption is not violated.

Table 7.
Levene's test of Equality of Error Variances

		Levene Statistic	df1	df2	Sig.
Perception score	Based on Mean	1.357	3	44	.268

The result of Kolmogorov-Smirnov tests of normality is shown in Table 8. As another test of normality, the Skewness and Kurtosis results are shown in Table 9 accordingly. Regarding to normality tests results, normality assumptions are met and parametric statistical tests can be used to analyze the data.

Table 8.
Kolmogorov-Smirnov Tests of Normality for Perception Scores

	Kolmogorov-Smirnov		
Perception scores	Statistics	df	Sig.
Monolingual	.225	24	.003
Bilingual	.115	24	.200
Traditional class	.173	28	.031
CAPT class	.144	20	.200

Table 9.

Skewness and Kurtosis Normality test of Perception Scores

Sample size	Skewness statistics	Std error Skewness	Kutosis statistics	Std error Kurtosis
48	-.820	.343	-.177	.674

To answer the third research question related to pronunciation perception scores of individuals in different classes, Table 11 shows that there is a statistically significant difference for group type $F (1, 44) = 4.322$, $p= .0432$ however the effect size is medium (partial eta squared= .089). By considering the mean score in the descriptive statistics of the perception scores in Table 10, it is concluded that individuals in the traditional class with the mean score of 17.25 and standard deviation of 2.95 outperformed the CAPT class with 15.41 mean score and 3.14 standard deviation.

Table 10.

Descriptive Statistics of Perception Scores

language type	group type	Mean	Std. Deviation	N
monolingual	traditional class	16.6000	3.94968	10
	CAPT class	14.6000	3.56526	10
	Total	15.6000	3.80305	20
bilingual	traditional class	17.7143	2.01642	14
	CAPT class	16.0000	2.80110	14
	Total	16.8571	2.54899	28
Total	traditional class	17.2500	2.95252	24
	CAPT class	15.4167	3.14735	24
	Total	16.3333	3.15779	48

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Table 11.
Two-way between-groups ANOVA for the Perception Scores

Dependent variable: perception scores

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	59.010ᵃ	3	19.670	2.113	.112	.126
Intercept	12290.438	1	12290.438	1320.078	.000	.968
Langt	18.438	1	18.438	1.980	.166	.043
Gptype	40.238	1	40.238	4.322	.043	.089
Langt * Gptype	.238	1	.238	.026	.874	.001
Error	409.657	44	9.310			
Total	13274.000	48				
Corrected Total	468.667	47				

Note. Gptype= group type (traditional/CAPT) Langt= language type (monolingual/bilingual)

To answer the fourth and last question about the difference between bilinguals and monolinguals as subgroups comparison regarding pronunciation perception scores, there is no statistically significant difference among bilingual and monolingual individuals in relation to pronunciation perception test $F(1, 44) = 1.980$, $p= .166$, and also there is no interaction effect for group type and language type in this case $F(1, 44) = .026$, $p= .874$. Although, the descriptive statistics of Table 10 of mean scores shows better performance of bilinguals in both the traditional and the CAPT class compared to monolinguals, this difference is not considered statistically significant.
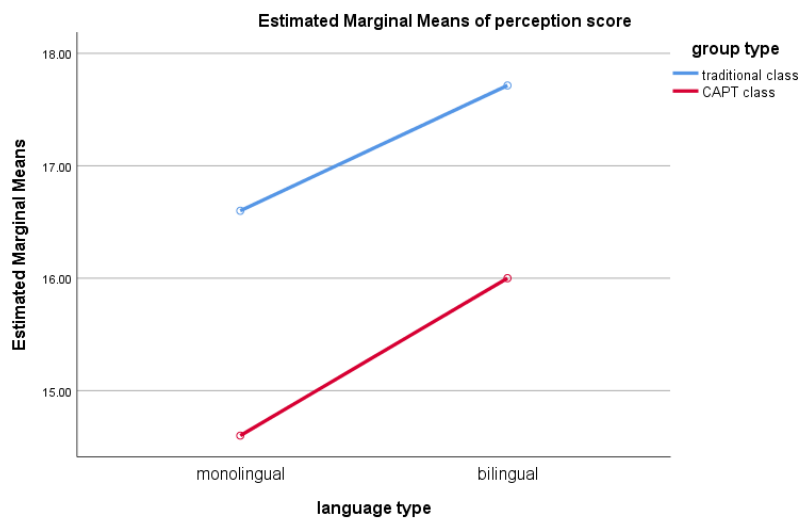
Figure 2. *Results of a two-way between-groups ANOVA for Perception Scores*

The plot in Figure 2 shows the relationship between the independent variables, group type, language type, and their effects on the dependent variable which is perception score.

Discussion

This study aimed at exploring the CAPT effect on pronunciation production and perception of young bilingual and monolingual individuals in comparison with the traditional approach to pronunciation teaching. The statistical analysis of two-way between-groups ANOVA showed the significant difference between the CAPT and the traditional groups in pronunciation production and based on the mean scores the CAPT class students outperformed the traditional ones in production. In addition, bilinguals performed better than monolinguals not only in the CAPT class but

also in the traditional class in pronunciation production with a large effect size. The results related to the pronunciation perception also indicated a significant difference between the two groups in a way that the traditional class outperformed the CAPT class according to the mean score and the difference between bilingual and monolingual learners demonstrated no significant differences in pronunciation perception.

To answer the first research question, the CAPT class participants, i.e. the experimental group, outperformed the comparison group, in pronunciation production scores. In general, this finding is in agreement with other recent studies (e.g. Fouz-González, 2019; Korkut & Çelik, 2018; Luo, 2016; Xodabande, 2017; Yan et al., 2018). In all these experimental studies the pronunciation of participants improved in some way compared to a traditional approach through different technological approaches for teaching pronunciation as explained in the review of the literature. This result of the present study can be explained in the light of Mayer's Cognitive Theory of Multimedia Learning by R. E. Mayer (1997) which argues that both verbal (text) and visual (image, video) explanation are needed for meaningful learning, which were prepared in slides. This result might also be explained by the theory of Dual Coding Theory by J. M. Clark and Paivio (1991) which in the same vein states that verbal (linguistic) and nonverbal (nonlinguistic) systems are interconnected for better cognition in language phenomenon. Considering the results of the present study and these mentioned related theories and studies, the undeniable effects of CAPT and multimedia on different aspects of language learning becomes more obvious.

As a response to the second research question based on the findings of the study, it is possible to claim that bilinguals outperformed monolinguals. The difference between the performance of monolinguals and bilinguals as subgroups of each of the two groups proved statistically significant. There was

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no interaction effect in the type of treatment and bilingualism or monolingualism which entails that bilinguals in both groups performed better than their monolingual competitors in production score. In general, the CAPT class outperformed the traditional class. One of the other reasons for outperformance of the CAPT class as mentioned above is supported by Cognitive Load Theory by Sweller (1988) that states both working memory channels (verbal and visual) have more effective delivery modes when the instruction employs animation and narration. There might be different reasons for the results of bilingual advantages over monolinguals but according to what is expressed in Izadi and Yarahmadzehi (2018) article related to Structural Sensitivity Theory posed by Kuo and Anderson (2010), bilinguals, simultaneous exposure to two languages leads them to better realize and understand similarities and also dissimilarities between the two languages and therefore have better skill in processing these features, which makes the advantage of bilinguals beyond a simple cross-linguistic transfer of similar patterns as well as metalinguistic awareness. In other comparative studies in the area of foreign language learning, the frequent superiority of bilinguals supports the present results of pronunciation production of bilinguals (Afsharrad & Sadeghi Benis, 2017; Keshavarz & Ghamoushi, 2014; Schroeder & Marian, 2014; Seifi & Abdolmanafi Rokni, 2013; Yamchi & Kumar, 2016). The superior performance of bilinguals in the present study makes it close to Schmidt and Post's (2015) report. In their study, they claim that bilinguals have an advantage over monolinguals in prosodic features of acquisition and production and also speech rhythms. They also make a hypothesis that this result might be because of the advanced motor control and more stable mental representation of phonological features to keep the two languages apart in bilinguals which can help them have an advantage in dual

language production over monolinguals. This study also demonstrates that bilinguals had early advantage at more complex languages.

To respond to the third research question related to pronunciation perception, according to the findings and comparing the mean scores of two classes, it is clear that the traditional class, i.e. the comparison group performed significantly better in pronunciation perception compared to the CAPT class, i.e. the experimental group. Moreover, the effect size of the difference shows a medium range. One possible reason for the superiority of the traditional class might be the students' direct exposure to the teacher's pronunciation while in the CAPT class the students were exposed to the pre-recorded voice of the native speakers which is not based on their previous experiences. Similar to this result is Inceoglu's (2014) study who compared the French nasal vowel perceptions in American- English learners through audiovisual and audio-only perceptual training. The results of that study revealed that audiovisual perception training was more efficient which means that the auditory-visual group benefited from visual information they received during training. The result of our study in relation to pronunciation perception and the outperformance of the comparison group under the traditional teaching of pronunciation might also be compatible with Hinton's (2013) study related to the effect of mimicry in second language pronunciation. In his article mimicry seems to be an efficient candidate for better performance in pronunciation in another language.

Concerning the last research question, we notice that there is no significant difference between the pronunciation perception scores of bilinguals and monolinguals in CAPT class instruction or traditional class, and also there was no interaction effect. This result might be because bilinguals have greater processing skills with patterns that are similar/dissimilar between two languages and some similar properties of one language can be transferred

to another language. This result is in agreement with the Sa'di et al. 's (2013) comparative study indicating no significant difference in strategy use among bilinguals versus monolinguals. The result of this section of the present study is also in agreement with Zare and Mobarakeh's (2013) study which showed that there was no significant difference between bilinguals and monolinguals in recognition of vocabulary in a second/third language. However, for the production of vocabulary, bilinguals outperformed the monolinguals. Another study that showed no significant difference among bilinguals and monolinguals is Keshavarz and Ghamoushi 's (2014) study on awareness and perception of strategies in reading comprehension. The results related to problem-solving and supportive metacognitive strategies showed that there was no significant difference between mono and bilinguals. However, in overall metacognitive strategy use, bilinguals outperformed monolinguals. To the knowledge of the authors, the relationship between perception and production is rarely addressed by the studies in this area. A more recent study focusing on this relationship is Fricke, Kroll, and Dussias (2016) who exploited phonetic variation in bilinguals to understand the processes occurring during speech articulation. As part of the results of their study, they also concluded that in phonetic variation, comprehension and production are no more modular processes and that they must be integrated to enable fluent communication.

Conclusion and Implications

This study was an attempt to further illuminate the process of pronunciation production and perception enhancement through CAPT and traditional method in Turkmen- Persian, Baloch- Persian bilinguals who were learning English as their third language and Persian monolinguals who were learning English as their second language in Golestan province. It can be

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concluded that mixing tradition and technology would probably create a more useful context for learning L2 pronunciation. In other words, technology has a great potential for pronunciation teaching in terms of maximizing opportunities for practice and exposure to the spoken language of native speakers and also in creating an exciting environment in classrooms, yet it cannot be recommended to be used as a stand-alone approach to language learning and teaching. At least based on the achieved results, to fulfill today's teachers' and learners' expectations it is better to resort to both tradition and technology.

Moreover, the results revealed that bilinguals had generally a better performance specifically in pronunciation production, and it might imply that bilinguals take advantage of their knowledge of two languages and also a more sophisticated processing skill compared to monolinguals. If pronunciation production is considered as a non-linguistic feature, in agreement with other previous studies such as Zare and Mobarakeh (2013), it can be concluded that bilinguals perform better than monolinguals in non-linguistic features of the language and they might have a positive cross-linguistic transfer from their two languages to their third language. A more recent study by Izadi and Yarahmadzehi (2018) claims that the presence of an additional language allows L3 learners to experience two different formal linguistic systems which might help them to understand linguistic forms better than L2 learners, and this might mean that bilinguals perform better in linguistic tasks as well as some other jobs like noting and correcting metalinguistic awareness tasks. In other words, it is implied that what distinguishes bilinguals and monolinguals in third language learning lies in the production section rather than perception or recognition. Therefore, the findings related to bilinguals of the present study support the proposition that when an individual has already managed the difficult process of learning two languages he/she has developed the

competence to deal with the new language learning more successfully than his/her monolingual peers.

The study also has theoretical implications for the field of applied linguistics. While emphasizing the importance of CAPT and multimedia learning, the study does not ignore the importance of traditional teaching of pronunciation. Therefore, Experts and applied linguists are also suggested not to overlook the importance of old methods while focusing on the modern ones in teaching pronunciation. The findings of the study have some implications for syllabus designers to develop materials based on today's technology but not at the price of ignoring traditional approaches.

Limitations and Suggestions for Further Studies

No study in SLA is free from methodological shortcomings and manageability trade-offs and the present research is no exception. Designing specific software based on the selected words for teaching at the school level might be noticeable for further studies. Considering the types of feedback during the treatments, the results might change in further studies if just one specific type of feedback is used. The time allocated to the treatment period of the present study was about one month and 10 days which could be extended in other studies. In addition, regarding the sampling, the researcher wasn't allowed to assign each participant randomly to an experimental or comparison group and also to include male students in the study. Involving male students in the next studies can lead to different results. Moreover, other studies can focus on specific aspects of pronunciation or sound types such as super-segmental features or just vowels or consonants. This study can be replicated in different contexts with bilinguals speaking other languages. Other studies can be done employing larger samples to get to more reliable results.

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Appendix A
Word Familiarity Questionnaire

Name: …………………………………………………

How many times have you faced each of these words?

	0 time	**1** time	**2** times	**3 or more** times
1- Carrot				
2- Onion				
3- Orange				
4- Quince				
5- Pineapple				
6- Coconut				
7- Yoghurt				
8- Email-address				
9- Study				
10- Watch				
11- Comb				
12- Mirror				
13- Stairs				
14- Kitchen				
15- Garage				
16- Tower				
17- Bathroom				
18- Bookcase				
19- Asia				
20- Europe				
21- Mountain				
22- Draw				
23- Swim				
24- Patient				
25- Headache				
26- Backache				
27- Toothache				
28- Stomachache				
29- Temperature				
30- Sore throat				
31- Hospital				

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	0 time	**1** time	**2** times	**3 or more** times
32- **Church**				
33- **Restaurant**				
34- **Shrine**				
35- **Building**				
36- **Museum**				
37- **Train station**				
38- **Bus station**				
39- **Air port**				
40- **Thermometer**				
41- **Field**				
42- **Snowy**				
43- **Spring**				
44- **Tractor**				
45- **plow**				

Appendix B
The Percentage of Familiarity of Each Word in Word Familiarity Questionnaire

Items in questionnaire / Words	0 times= Not familiar at all	1 time= just seen once	2 times= Looks like familiar	3 or more times= A really familiar word
1. Carrot	79.2%	14.6%	6.3%	0%
2. Onion	79.2%	18.8%	2.1%	0%
3. Orange	79.2%	8.3%	4.2%	8.3%
4. Quince	75%	16.7%	4.2%	4.2%
5. Pineapple	77.1%	18.8%	2.1%	2.1%
6. Coconut	89.6%	8.3%	2.1%	0%
7. Yoghurt	91.7%	6.3%	0%	2.1%
8. Email-address	68.8%	22.9%	8.3%	0%
9. Study	75%	18.8%	4.2%	2.1%

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Items in questionnaire / Words	0 times= Not familiar at all	1 time= just seen once	2 times= Looks like familiar	3 or more times= A really familiar word
10. Watch	81.3%	14.6%	4.2%	0%
11. Comb	83.3%	12.5%	4.2%	0%
12. Mirror	87.5%	10.4%	2.1%	0%
13. Stairs	87.5%	10.4%	2.1%	0%
14. Kitchen	83.3%	10.4%	2.1%	4.2%
15. Garage	89.6%	8.3%	2.1%	0%
16. Tower	89.6%	10.4%	0%	0%
17. Bathroom	62.5%	29.2%	6.3%	2.1%
18. Bookcase	85.4%	8.3%	4.2%	2.1%
19. Asia	87.5%	8.3%	2.1%	2.1%
20. Europe	93.8%	6.3%	0%	0%
21. Mountain	85.4%	14.6%	0%	0%
22. Draw	77.1%	18.8%	2.1%	2.1%
23. Swim	91.7%	4.2%	4.2%	0%
24. Patient	95.8%	4.2%	0%	0%
25. Headache	97.9%	2.1%	0%	0%
26. Backache	89.6%	8.3%	2.1%	0%
27. Toothache	95.8%	4.2%	0%	0%
28. Stomachache	97.9%	2.1%	0%	0%
29. Temperature	97.9%	2.1%	0%	0%
30. Sore throat	95.8%	4.2%	0%	0%
31. Hospital	93.8%	2.1%	2.1%	2.1%
32. Church	97.9%	0%	2.1%	0%
33. Restaurant	93.8%	2.1%	2.1%	2.1%
34. Shrine	93.8%	6.3%	0%	0%

Items in questionnaire / Words	0 times= Not familiar at all	1 time= just seen once	2 times= Looks like familiar	3 or more times= A really familiar word
35. Building	93.8%	6.3%	0%	0%
36. Museum	97.9%	2.1%	0%	0%
37. Train station	97.9%	2.1%	0%	0%
38. Bus station	95.8%	4.2%	0%	0%
39. Air port	97.9%	2.1%	0%	0%
40. Thermometer	91.7%	8.3%	0%	0%
41. Field	91.7%	8.3%	0%	0%
42. Snowy	95.8%	4.2%	0%	0%
43. Spring	91.7%	8.3%	0%	0%
44. Tractor	97.9%	2.1%	0%	0%
45. Plow	95.8%	4.2%	0%	0%

Appendix C

Pronunciation Perception and Production Test

Perception and production pronunciation test

Name: …………

1- Listen to each word and check if it is pronounced correctly (yes) or not (no)?

1-	Coconut	Yes	No
2-	Hospital	Yes	No
3-	Study	Yes	No
4-	Tower	Yes	No
5-	Asia	Yes	No
6-	Shrine	Yes	No
7-	Headache	Yes	No
8-	Mountain	Yes	No
9-	Swim	Yes	No
10-	Garage	Yes	No

2- Listen to each sentence and choose the word you hear.

    1- A) kitchen   B) garage

    2- A) tower   B) mountain

    3- A) apple   B) pineapple

    4- A) field   B) flat

    5- A) bedrooms   B) bookcase

    6- A) blanket   B) building

    7- A) patient   B) painter

    8- A) washing   B) watching

    9- A) bus station   B) train station

    10- A) date   B) draw

3- Read these words aloud.

4-

1- Onion	11- Stomachache
2- Mirror	12- Temperature
3- Church	13- Air port
4- Restaurant	14- Train station
5- Museum	15- Spring
6- Europe	16- Tractor
7- Stairs	17- Orange
8- Comb	18- Yoghurt
9- Toothache	19- Carrot
10- Snowy	20- Plow

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Appendix D
Table of Specification for Researcher Made Test

Days	Instructional objectives	Time spent on topic	Percent of class time on topic	Number of test items	Mark of each item	Type of test items
Day 1	OPT test					
Day 2	Word familiarity questionnaire					
Day 3	*listen and comprehend (carrot, onion, orange, quince, pineapple) traditional/CAPT method.	15'	4.10%	1 word for comprehension	1	*True-false *Multiple choice items
	*repeat/produce heard voices plus exercises	15'	4.10%	3 words for production	1	Read aloud
Day 4	Review	5'	1.36%			
	*listen and comprehend (coconut, yoghurt, study, watch) in a traditional/CAPT method.	15'	4.10%	3 words for comprehension	1	*True-false *Multiple choice items
	*repeat/produce heard voices	15'	4.10%	1 words for production	1	Read aloud
Day 5	*listen and comprehend (comb, mirror, stairs, Asia) in a traditional/CAPT method.	15'	4.10%	1 words for comprehension	1	*True-false *Multiple choice items
	*repeat/produce heard voices	15'	4.10%	3 word for production	1	Read aloud

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Days	**Instructional objectives**	**Time spent on topic**	**Percent of class time on topic**	**Number of test items**	**Mark of each item**	**Type of test items**
Day 6	*listen and comprehend (garage, tractor, bathroom, bookcase) in a traditional/CAPT method.	15'	4.10%%	3 words for comprehension	1	*True-false *Multiple choice items
	*repeat/produce heard voices	20'	5.47%	1 word for production	1	Read aloud
Day 7	*listen and comprehend (kitchen, Europe, mountain, draw, swim) in a traditional/CAPT method.	20'	5.47%	4 words for comprehension	1	*True-false *Multiple choice items
	*repeat/produce voices heard	20'	5.47%	1 words for production	1	Read aloud
Day 8	*listen and comprehend (patient, headache, backache, toothache) in a traditional/CAPT method.	15'	4.10%	2 words for comprehension	1	*True-false *Multiple choice items
	*repeat/produce heard voices	20'	5.47%	1 words for production	1	Read aloud
Day 9	*listen and comprehend (stomachache, sore throat, hospital,	20'	5.47%	1 words for comprehension	1	*True-false

Days	Instructional objectives	Time spent on topic	Percent of class time on topic	Number of test items	Mark of each item	Type of test items
	temperature, church) in a traditional/CAPT method+ review					*Multiple choice items
	*repeat/produce heard voices	20'	5.47%	3 words for production	1	Read aloud
Day 10	*listen and comprehend (restaurant, shrine, building, museum) in a traditional/CAPT method+ overall review	20'	5.47%	2 word for comprehension	1	*True-false *Multiple choice items
	*repeat/produce heard voices	20'	5.47%	2 words for production	1	Read aloud
Day 11	*listen and comprehend (train station, bus station, airport, thermometer, field) in a traditional/CAPT method+ overall review	20'	5.47%	1 word for comprehension	1	*True-false *Multiple choice items
	*repeat/produce heard voices	20'	5.47%	2 words for production	1	Read aloud
Day 12	*listen and comprehend (snowy, spring, tower, plow, email-address) in a	20'	5.47%	2 word for comprehension	1	*True-false *Multiple choice items

Days	Instructional objectives	Time spent on topic	Percent of class time on topic	Number of test items	Mark of each item	Type of test items
	traditional/CAPT method+ overall review					
	*repeat/produce heard voices	20'	5.47%	3 words for production	1	Read aloud
Total		365'	100%	40	40	10 true/false 10 multiple choice 20 read aloud

Appendix E
Screenshots as Examples of PowerPoint Slides