

## Rehabilitating Fossilized Consonants through Computer-aided and Animated Material

### Fosilleşmiş Ünsüzlerin Bilgisayar Destekli ve Animasyonlu Malzemelerle Rehabilitasyonu

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**ABSTRACT:** Although pronunciation is considered critical in successful as well as effective communication, it only receives sporadic regard due to the prevailing factors in language education. Nevertheless, there is now far greater awareness and increasing need amongst language learners regarding the necessity of possessing a good working pronunciation for a successful communication and international intelligibility. In this respect the fossilized pronunciations in the consonants interfere with and severely disrupt the quality of speech. In an attempt to rehabilitate this situation, this research, unlike the traditional one, offers a model of computer-aided and animated material (tool) to provide important assistance on correcting fossilized consonants. This quasi-experimental study involves a pre-posttest design with both an experimental group and a control group composed of 19 and 18 undergraduate Erasmus students respectively. Following a five-week's treatment, the subjects were tested on general and fossilized consonants. The results indicate that there is a significant difference between the experimental and the control group, meaning that the treatment group which received the computer-aided and animated material far outperformed the control group which received only traditional method.

**Keywords:** Articulation, computer-aided, consonants, fossilized, pronunciation

**ÖZ:** Etkili ve verimli bir iletişim için çok önemli bir unsur olarak kabul edilmesine rağmen, yabancı dil eğitiminde hakim olan diğer unsurlardan dolayı telaffuz becerisi üzerinde çok fazla durulmamaktadır. Ancak, günümüzde başarılı bir iletişim ve uluslararası anlaşılabilirlik için doğru telaffuza sahip olmanın gerekliliği hususunda yabancı dil öğrencileri arasında giderek artan bir bilinç ve ihtiyaç olduğu görülmektedir. Bu bağlamda, ünsüz seslerdeki fosilleşmiş telaffuzlar, anlaşılabilirliğe engel olmakta ve konuşmanın kalitesini ciddi biçimde bozmaktadır. Benzer sorunlara çözüm olmak üzere yürütülen bu çalışma, geleneksel yöntemler kullanmak yerine fosilleşmiş ünsüzleri düzeltmek için önemli bir destek olarak bilgisayar destekli ve animasyon içerikli bir model sunmaktadır. Bu yarı-deneysel çalışma, lisans düzeyinde Erasmus öğrencilerini içeren deney (n=19) ve kontrol (n=18) grubunun yer aldığı ön test-son test araştırma desenine sahiptir. Toplam 5 haftalık bir uygulamanın sürecinin ardından, katılımcıların normal ve fosilleşmiş ünsüzleri kullanımları test edilmiştir. Araştırmanın sonuçlarına göre, deney ve kontrol grubu arasında anlamlı bir fark bulunmuştur; diğer bir deyişle, bilgisayar destekli ve animasyon içerikli modelin kullanıldığı deney grubu, yalnızca geleneksel yöntemin kullanıldığı kontrol grubundan çok daha fazla başarılı olmuştur.

**Anahtar Sözcükler:** Seslendirme, bilgisayar-destekli, ünsüzler, fosilleşmiş, telaffuz

## 1. INTRODUCTION

In formal instruction of English at university or high school level in Turkey, teaching pronunciation appears to receive scant regard as it is thought to be a peripheral component of English class and therefore, is rarely taught in any systematic way despite its apparent critical importance to spoken communication. This lack of interest among teachers and students can be explained: (1) by prevailing language teaching methods under the extreme influence of

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structural linguistics and behaviourist psychology and (2) perhaps more importantly by virtue of the almost total absence of opportunities and pressing needs for people to use the target language in genuine communication. However, in today's globalization and competitive environment, demands, aspirations and expectations of students, in terms of what they are going to get out of their language learning, are significantly different from fifteen or twenty years ago. Unlike the past, today English language positions itself not only as a tool of international communication but also a key to grasp opportunities and exploit possibilities for institutional plus personal fulfilment. Therefore, it is necessary to lay emphasis on pronunciation not necessarily to be native like, which is an unrealistic goal but for effective and intelligible communication. The target model is not British or American native speakers' pronunciation for L2 users but the international intelligibility is considered as a base for pronunciation (Çelik, 2008). Therefore, any kind of accent is regarded acceptable "as long as the accent does not jeopardize international intelligibility" (Jenkins, 2002: 85).

Although pronunciation is considered critical in successful as well as effective communication, it is less understood and emphasized by language teachers (Celce-Murcia, Brinton, Goodwin & Griner, 2010). However, as compared to the past, there is now a greater awareness and increasing need amongst language learners regarding the necessity of possessing a good working pronunciation for a successful communication and international intelligibility, without which communication seriously breaks down. Despite the increased interest in pronunciation, research into pronunciation instruction in the teaching of English as a foreign language (EFL) continues to be limited (Baker & Murphy, 2011). To date, there have been some studies regarding pronunciation instruction; some of them are merely theoretical (Hismanoglu 2006; Jones 1997; Milovanov, Pietila, Tervaniemi & Esquef 2010; Munro & Derwing 2006; Tominaga 2009); some focus on specific techniques (Kendrick 1997; Trofimovich & Gatbonton 2006; Varasarin 2007), some deal with the use of technology (Levis 2007; Lord 2008; Pennington 1999; Pujolà 2001; Saran & Seferoglu 2010) in pronunciation instruction. Common activities suggested for teaching pronunciation in all studies involve listen and imitate, minimal pairs, visual aids, tongue twisters, developmental approximation drills, reading aloud/recitation, and recordings of learners' production. There are however serious attempts, though at embryonic stage, to include computer-animated pronunciation tools to correct pronunciation errors such as voicing, intonation, insertions or deletions of segments (Engwall & Bälter, 2008; Luo, 2016; Thomson 2011; Tsai, 2006). In a rare but a quite significant experimental study Engwall (2012) used computer-animated pronunciation teachers to correct phonemic pronunciation errors though providing audiovisual feedback on the correct position, shape of the tongue and parts of the face.

Pronunciation problems, which cause communication breakdown, mostly occur in consonant sounds, vowel length and stress, where contextual clues do not work appropriately (Jenkins, 2002: 85). For Turkish L2 users, inter-dental fricatives /θ/ and /ð/, /ŋ/, /æ/, schwa /ə/, /ɔ:/ and /əɔ/ are considered as problematic and generally stem from the dichotomy of native and target language (Çelik, 2008; Demirezen, 2004; 2005; 2007a; 2007b; 2008; 2010a; 2010b; Hismanoglu, 2009). Apart from segmental pronunciation problems, Turkish learners have difficulties at supra-segmental level, such as stress and tone in words and sentences (Hismanoglu, 2009).

Today, two approaches govern the pronunciation teaching; Intuitive-Imitative and Analytic-Linguistic Approaches. In the Intuitive-Imitative Approaches, pronunciation teaching revolves around listening and imitating the sounds and rhythms of the target language but without any "explicit information", which requires authentic listening materials. Analytic-Linguistic Approaches take advantage of phonetic alphabets, charts picturing articulatory information and aim explicitly to inform the learners about the sounds and rhythms of the target

language. Both approaches are considered complementary (Celce-Murcia et al., 2010) and used together quite well combined with computer assisted pronunciation instruction.

Although much attention has been paid to computer assisted language teaching and education in general (Akbulut, 2007; Gömleksiz 2004) pronunciation teaching with technology has gained the least share (Witt & Young, 1997) and Turkish language teachers tend to avoid using computer-based pronunciation teaching methods (Hismanoglu & Hismanoglu, 2010). However, computer assisted pronunciation teaching methods provide learners with “stress free” (Hismanoglu, 2006:108) “individualized environments where learners learn at their own pace making autonomous decisions on the order of study topics” and help teachers to surmount the “traditional language classroom constraints” (Busa, 2008:165) which can be used in detecting learner errors and frequent patterns (Rau, Chang & Tarone, 2009; Witt & Young, 2000). Computerized instruction is also preferred and appreciated by students, and considered pleasurable (AbuSeileek, 2007). The autonomous learning environment creates comfortable learning atmosphere for learners where they can receive constant and immediate feedback, and the feedback given by a machine is considered “not only authoritative but also highly salient” by the learners (Pennington, 1999: 429). Unlike human-teachers, computers never give up or worn out by teaching or repeating. Computer assisted pronunciation teaching applications are free from “limitations of hearing, judgment or patience” (Pennington, 1999: 429).

In relation to the use of computer-aided pronunciation training, Carruther (2007) considers facial gestures critical to sound perception and improving pronunciation, proposing the webcam pronunciation mirror to develop articulation for L2 users. Carruther conducted his study on four groups; control group, training group which receives no visual feedback, training group with mirror feedback and training group with webcam pronunciation mirror feedback. Participants were required to articulate one syllable words after watching 20 video clips in which a native speaker pronounces the target words 3 times. Participants’ productions were recorded and rated during the training sessions. The results indicate that both methods of self-monitoring proved effective which emphasizes the importance of visual feedback in pronunciation teaching.

Besides software programmers, online tools are also favored in pronunciation instruction such as chat rooms, wikis, blogs and podcasts (Lord, 2008). Lord’s (2008) study is a podcasting project in which 19 undergraduate students create their own podcasting community and sustain their own podcast channel during one semester. Students upload their recordings which can be tongue twisters, short readings or personal reflections, as well as giving feedback to their peers. Despite the need for further supporting studies, the podcasting project is perceived useful and practical by the students, and provide them with phonological awareness and motivation.

Computer assisted pronunciation teaching applications begun to be used in error detection and assessment of pronunciation with the development of automatic speech recognition systems, some of which provide information at phoneme level that guide learners to the problematic sounds (Strick, Truong, Wet & Cucchiari, 2009). Strick et al. (2009)’s study develops a pronunciation training programme which detects pronunciation specified errors, aims to help correct salient pronunciation problems Dutch L2 learners have difficulty in maintaining successful communication. The pronunciation errors were selected on some basis such as, the ones that are frequent and persistent, plus common across speakers of various mother tongues’, as well as salient and potentially hampering communication, lastly the ones suitable for robust automatic detection. The pronunciation errors selected were tested based on two methods which are models that are trained incorporating artificial errors in native speech and have different classifications of pronunciation errors. The results show no significant difference between the performances of the two methods.

With the speech visualization technology, learners are provided with visual feedback, by which they can compare their and native speaker pronunciation. Levis and Pickering's study (2004) develops a speech visualizer programme which allows for discourse-level practice with intonation. Hincks and Edlund (2009) study develops a similar software with the aim of offering feedback to L2 learners. The common limitation to computer assisted applications for pronunciation teaching is that they suffer from a strong base in terms of curriculum and objective (Levis, 2007). Software programmes developed for pronunciation teaching need to be integrated into some sort of training programmes and fed by objectives so that they can serve more effectively and meaningfully. Therefore, this paper is an attempt to propose a model to specifically rehabilitate the fossilized problem-causing segmental phonemes of the target language /θ, ð, ŋ, w/ through the use of computer-aided and animated materials.

### 1.1. Rationale for the Choice of Fossilized Consonants /θ, ð, ŋ, w/

This study specifically focuses on rehabilitating fossilized (core) consonants (θ, ð, ŋ, w) rather than improving students 'pronunciation in general. "Core sounds of a target language are specific segmental sounds in forms of consonants and vowels, creating articulation and pronunciation difficulties for the non-native learners of that target language" (Demirezen, 2010b, p.130). /θ, ð, ŋ, w/ are among the core consonants of the English language and identified as "problem-causing consonants that give hard times in articulation" for Turkish learners (p.130).

As Kenworthy (1987) indicates, θ /thick/ and ð /that/ do not exist in Turkish language. Therefore, Turkish learners "will tend to substitute either /s/ or /t/ for /θ/, so 'thick' may sound like 'sick' or /tick/. /z/ or /d/ will be substituted for /ð/ so "that" will sound like 'zat' or 'dat' (p. 157). In support of Kenworthy, Demirezen (2010c) states "/θ/ and /ð/, too, happen to be serious fossilization problem for Turks" (p.379). It is also difficult for Turkish people to produce /ŋ/ as "learners tend to insert either a /g/ or a /k/ (Kenworthy 1987:157). /w/ is also confused with /v/ perceptually and also in production, giving hard times in recognition and articulation for Turkish learners.

Demirezen (2010b) criticizes the two predominantly used approaches (a) intuitive-imitative approach and (b) analytical-linguistic approaches for not being effective and compressive enough to handle the fossilized pronunciation errors in particular core sounds. All these methods appear to be characterized by (a) imitating the sound of the target language (b) following good models (native speakers, audiocassettes and compact discs) to be imitated (c) using extensive contrastive pairs drills (d) using phonetic alphabet, articulatory descriptions (e) using minimal pair drills and substitution drills extensively (d) relying on too much the teacher initiation and monitoring. Pointing out the lack of appropriate method, Demirezen (2010b:129) indicates "there is a greater necessity of designing a method that can cure the fossilized pronunciation mistakes". In an effort to cure the fossilized consonants, this research attempts to provide a more effective, compressive and viable option to the traditional methods, not necessarily ignoring the potential benefit of the traditional techniques, most of which have been built in the newly developed CAPT (Computer Aided Pronunciation Tool) not only linguistically but also pedagogically. Unlike the traditional approaches, Computer Aided Pronunciation Tool (CAPT) is expected to liberate the students from parrot-like (imitation) teaching by involving the students in self-evaluation and self-monitoring through ALPI 3B Head and Articulation Organs Model.

## 2. METHOD

This is a quasi-experimental study which aims to determine whether the use of computer-aided and animated pronunciation material would have an impact on Turkish students' fossilized consonants (/θ//ð//w/ /ŋ/) in English. The sample for this pre-post test design with a

control group is a non-probability purposive sample of undergraduate students enrolled in a 6-week Erasmus Language Orientation program that offers language courses for the candidates to continue their academic studies in European countries. A total of 37 undergraduate students were involved in the study. Their ages ranged from 19 to 23 years.

## 2.1. Instrument

Basically the instrument used for the study was the Computer Aided and animated Pronunciation Tool (CAPT), which was specifically designed and developed by Şimşek (2008) in Department of Computer Education and Instructional Technologies in Trabzon at Karadeniz Technical University. The tool was developed through five stages: (1) Analysis (diagnosing and analyzing the problem in detail in relation to the pronunciation through the use of questionnaire and interview with teachers and students and data from the field work) (2) Design (all information from the stage 1 served to provide strategies and ways in which the tool was planned), (3) Development (in accordance with the needs, analysis and plans, the functions and ingredients of the CAPT including animation, sound and interface were made), (4) Application (students and teachers of English were allowed to use the tool), (5) Evaluation (diagnosing the problems that occurred during the application stage). Şimşek (2008) reports that Autodesk Maya 3B, (3D animation software for, modeling, visual effects,) Macromedia Flash 8.0, Dreamweaver, and Adobe Photoshop were used to make the CAPT user friendly. The CAPT focused on a the “ALPI 3B Head and Articulation Organs Model that allows us to monitor the movement of teeth, tongue, palate, chin and lips in complex combinations with each other when a word is enunciated. “ALPI” 3B head model, which is one of major parts of the CAPT, was very much resembled the human anatomy including oral cavity, facial muscles, cheeks, bones and joints. Forty-three English sounds were modeled with animation techniques of Autodesk Maya in 3B.

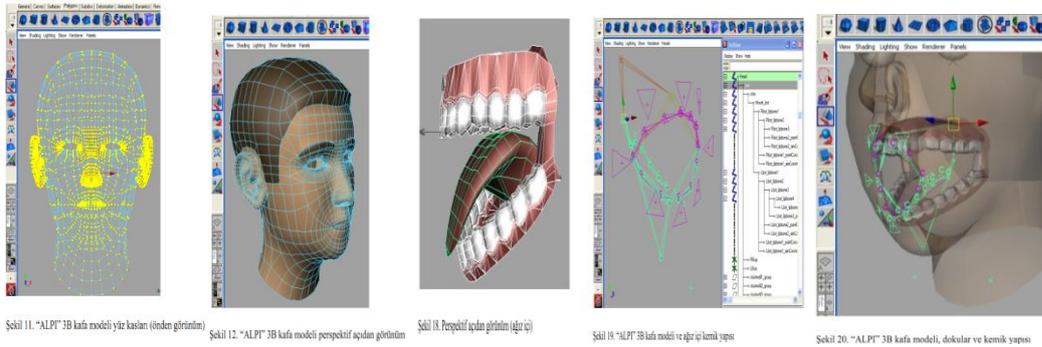


Figure 1. Views of 3B Head Model (face bones, oral cavity and bones structures) by Şimşek (2008)

## 2.2. Procedure

This quasi-experimental research was designed to answer the question “Does CAPT – “ALPI 3B Head and Articulation Organs Model have any effect on rehabilitating students’ fossilized consonants in English. Nineteen of the students were in the treatment group and 18 in the control group. The students’ language proficiency in English was identified as pre-intermediate by the Erasmus Proficiency Exam run by the School of Foreign Languages at KTU. To ensure greater reliability, both experimental and control groups were taught by the same experienced instructor, and classes were randomly assigned to either experimental or control groups. Both experimental and control groups were given the pre-test on pronunciation to ensure that the groups were very similar in their proficiency in pronunciation. The experimental group was instructed in the language lab through the use of the CAPT which served as pronunciation tutor for the course for five weeks. The students in the control group continued their classes with the traditional common practices as displayed in Table 1, without

being given the CAPT. In order to avoid Hawthorne effect, the instruction of fossilized consonant ( $\theta$ ,  $\delta$ ,  $\eta$ ,  $w$ ) was integrated into the pronunciation.

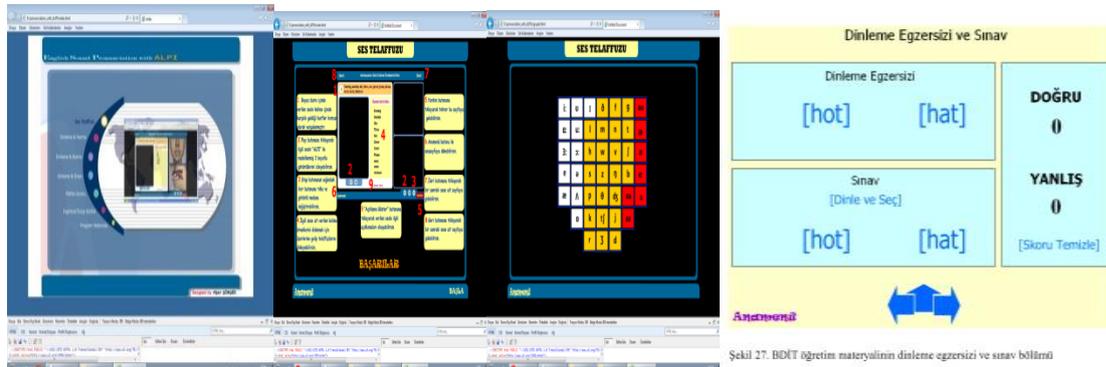


Figure 2. Views of the CAPT (Main menu phonemes, articulation-simulation-activities)

Table 1: Pronunciation course description

Week	Hour	Course Subject
1	6	IPA (International Phonetic Alphabet) Place of Articulation Plosives, Fricatives, affricates
2	6	Nasal, lateral and approximants
3	6	Vowels
4	6	Diphthongues
5	4	Extra focus on “fossilized” sounds
6	4	Extra focus on “fossilized sounds
Major Materials used for the control group:		
1	Baker, A. (1986). <i>Introducing English pronunciation: Tree or Three</i> . Cambridge: CUP.	
2	O'Connor, J.D. (1977). <i>Phonetic Drill Reader</i> . Cambridge English language Learning. Cambridge: CUP.	
Materials used for the experimental group:		
1	Computer Aided and animated Pronunciation Tool (CAPT) developed by Şimşek (2008)	
2	Webcam (for the students to record their pronunciation at Computer Lab)	

**Table 2: Modes of pronunciation instruction for the control and experimental groups**

The mode of Traditional Pronunciation instruction	The mode of Computer Aided Pronunciation Instruction
sound imitation	imitation of sounds along with the facial movements and articulatory gestures associated with the sounds given by ALPI head animation organs model of the CAPT
minimal pair drills and substitution drills	minimal pair drills through the CAPT
reading passages aloud studying phonetic transcription	recording via webcam at computer lab -
describing sounds (giving information about articulation of sounds)	viewing how each sound is produced in the vocal organs interacting with each other in producing each specific sound through the CAPT
listening to model passages where the intended sound occurs frequently	-
focusing on more fossilized consonants through repetitive drill and practice	focusing on more fossilized consonants through the ALPI head animation of the CAPT
self-study (with common practices in classroom)	self-study in Lang. Lab

The pre-test which consisted of two parts were administered to the control and experimental groups at the beginning of the treatment to see whether their level was similar in terms of pronunciation. In order to obtain greater reliability the first pretest was geared specifically to measure the students' ability to recognize the sounds which involved the sounds discrimination, discrepancies, sound recognition, matching, same and different sound. To this end, special permission was obtained from the USBEM company (2012) for the use of USBEM Academic Master Pronunciation for the study. The test consisted of randomly selected forty questions, including vowels, consonant, diphthongs, weak-strong forms. Four students (2 from the control, 2 from the experimental group) obtained higher than 50 out of a hundred in all tests and therefore were excluded from the analysis to ensure homogeneity.

The next step was to see how both groups would perform at sound production stage. For this purpose, students were given four passages to read loud and taped each individually. The passages were taken from Baker's (1986) "Ship or Sheep" (An intermediate pronunciation course, CUP. Cambridge). Two experienced raters with six and ten years of pronunciation teaching experience at university level respectively were asked independently to score the students' taped reading on the basis of 20 words marked in the master passages. These words included plosives, fricatives, affricates, nasal, lateral and approximants, vowels, diphthongs. The students were also asked to read aloud 20 sentences in which the fossilized sounds occur. The fossilized-occurring sentences were taken from Hancock's (2003) English Pronunciation in Use, and Mortimer's (1987) book Elements of Pronunciation.

### 3. FINDINGS

Test scores were analyzed through the use of SPSS version 16.0. T-test results in Table 3 below indicate that there was no significant difference between the control and the experimental group in the Pre-test on general pronunciation (the sounds recognition). Given the mean scores, the control group performed slightly better. However, what is more remarkable to note that both

groups performed very poorly, signaling the degree to which the issue of pronunciation is neglected in language teaching.

**Table 3: Pre-test on general pronunciation (sound recognition)**

	N	Mean	Sig. (2-tailed)	Mean Difference	Df
Control	18	33,6111	,910	,1901	32
Experimental	19	30,0000			

The t-test in Table 4 below indicates that there is no significant difference between the two groups in the pre-test on general pronunciation (the sounds production).

**Table 4: Pre-test on general pronunciation (sound production)**

	N	Mean	Sig. (2-tailed)	Mean Difference	Df
Control	18	30,5556	,275	-1,8129	31
Experimental	19	32,3684			

Once a clearer picture was obtained in relation to the students' pronunciation awareness and performance in general, a very similar test was used to identify students' awareness and performance on fossilized consonants as this was primary concern of this study. The t-test shows that both groups have very similar mean scores as illustrated in Table 5.

**Table 5: Pre- test on fossilized consonants (recognition and production)**

	N	Mean	Sig. (2-tailed)	Mean Difference	Df
Control	18	27,2222	,326	1,1696	32
Experimental	19	26,0526			

Following a six-week experiment using traditional and computer-aided pronunciation instruction with the control and experimental groups as shown in Table 1 and Table 2, the students were given post-tests on fossilized consonants for the sound recognition and production separately.

**Table 6: Post-test on fossilized consonant (sound recognition)**

	N	Mean	Sig. (2-tailed)	Mean Difference	Df
Control	18	51,1111	,000	19,4152	32
Experimental	19	70,5263			

**Table 7: Post-test on fossilized consonant (sound production)**

	N	Mean	Sig. (2-tailed)	Mean Difference	Df
Control	18	41,9444	,000	32,2661	32
Experimental	19	74,2105			

The pre-post test design allowed us to measure the potential effects of the computer aided pronunciation material by examining the difference in the pre-test and post-test results. The t-test results in Table 6 and 7 clearly indicate that there was a statistically significant difference at 0.01 level between the experimental and the control group in posttest on fossilized consonants for the sound recognition and production, meaning that the experimental group far outperformed the control group. While the experimental group was found to have corrected their fossilized consonants far better in comparison with the control group, the paired samples t-test also reveals

that experimental group also made very remarkable improvement on the fossilized sound production test from  $x=26,0526$  of pre-test to  $x=74,2105$  of the post-test respectively (paired  $t$  ( $df=18$ ) =  $t=22.192$ ,  $p=,000$   $p < 0.01$ ). A very great improvement was also observed in the experimental group's fossilized sound recognition as (paired  $t$  ( $df=18$ ) =  $t=38.46$ ,  $p=,000$   $p < 0.01$ ) as displayed in Table 8.

**Table 8: Paired samples differences for sound recognition and performance (Experimental)**

		Mean	Paired Differences Mean	N	Std. Deviation	t	df	Sig. (2-tailed)
Pair 3	PTFRPRE	25,2632	-45,263	19	3,1063	-38,46	18	,000
	PTFRPOST	70,5263		19	6,43228			
Pair 4	PTFPPRE	26,0526	-48,158	19	3,15302	-22,192	18	,000
	PTFPPOST	74,2105		19	9,16866			

TPFRPRE: Pronunciation Recognition pre-test on Fossilized sounds

TPFRPOST: Pronunciation Recognition post-test on Fossilized sounds

PTFPPRE: Pronunciation Production pre-test on Fossilized sounds

PTFPPOST: Pronunciation Production post-test on Fossilized sounds

It is interesting to note that the control group also improved their fossilized consonants for production and recognition to some degree as compared to their own pretest results (the pretest  $x = 33.6$  and the post test  $x = 41.9$ ). Yet, out of a hundred, the change in the mean ( $x$ ), though significant in itself, is still relatively poor.

#### 4. DISCUSSION AND CONCLUSION

Learners hear and perceive the sounds of any foreign language in relation to the sounds of their native language unless they specifically build the sound system of the target language into their heads. If the sounds do not exist in their language, learners tend to pick up the nearest available sounds. This misperception, if continued, is likely to result in fossilized errors in pronunciation as learners are dominated by the sound units of their own language to the extent that it is very difficult to break the habits of their native language. A solution to this problem is to build a new set of sound units corresponding to the sound of the target language "by establishing new ways of hearing, new ways of using our speech organs, new speech habits" (O'Connor, 1981, p.3). To this end, the Computer Aided and animated Pronunciation Tool (CAPT), with 3B head model designed and developed to integrate speech technology for Turkish learners of English proved to be very effective to the extent that most of the students in the experimental group appeared to rehabilitate their fossilized core consonants sounds. On the basis of the findings, the experimental group that primarily received articulatory training through the use of the CAPT performed far better on discrimination and production tests than those who, only received traditional training described in Table 8.

The Computer Aided and animated Pronunciation Tool (CAPT) in this study not only offered what was available in traditional pronunciation teaching but also served as the virtual teacher to allow the students to monitor the movement of teeth, tongue, palate, chin and lips in head animation model as a significant source of segmental information for speech perception. This is perhaps where traditional methods such as imitation, phonetic description and minimal pairs fail to produce expected results. This is not an act to substitute for traditionally used materials but highlight the role of articulatory system involving facial and vocal movements which are critical to sound recognition, production and intelligibility, focusing on the most problematic fossilized enunciation errors as a viable mode of pronunciation instruction. The success of the Computer Aided and Animated Pronunciation Tool can be attributed to the fact that the students in the experimental group heavily relied on visual cues to predict the place of

articulation, discern and produce phones when facial movements incorporated into articulation mechanisms within the mouth in the head animation. Therefore, “English language learners (ELL) do need to be concerned with facial movements” (Carruthers, 2007:5).

In addition to rehabilitating fossilized consonant sounds, phonological awareness as a by-product result of the articulatory training appears to have positive effects on the learners’ sound recognition, perception and production. Students were found to be receptive to the acquisition of the fossilized consonants as the scores were positively correlated with the use of the CAPT during the experiment. Nevertheless, the kind of data we have does not allow us to state whether students are able to maintain their newly acquired phonetic behavior in the long term. The use of CAPT deals with a very limited part of pronunciation issues. Therefore, the use of computer-aided and animated materials should be considered as a complementary tool.

In summary, from classroom instruction perspective, fast moving technology such as animations and computer-based interactive tools offers potential advantages to both the teachers and the students, facilitating learning process. Since this kind of computerized tool provides students with multi-sensory channels, it enables students to more focus on the words. Students can be more autonomous and self-directed in listening, seeing, reflecting and articulating the sounds, lowering affective filters and anxiety levels. It is, however, important to note that technology is nothing but an aid to an end. Once it is adjusted to educational needs and integrated into classroom instruction, it can be very powerful and supplementary tool in the hands of teachers who are receptive and open to the new technology

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## Geniş Özet

Türkiye'de yüksek öğretim düzeyinde İngilizce eğitimi verilirken, verimli bir iletişim kurmak için ciddi öneme sahip olmasına rağmen, telaffuz öğretimine çok fazla ağırlık verilmediği ve sistematik şekilde öğretilmediği görülmektedir. Öğretmenler ve öğrencilerin bu ilgisizliği iki husus ile açıklanabilir: (1) yapısal dilbilimi ve davranışçı psikolojinin aşırı derecede hakim olduğu dil öğretim metodlarının yaygın kullanımı ve (2) belki de daha da önemlisi, hakiki bir iletişim için İngilizce'yi kullanmak üzere bir ihtiyacın ya da fırsatın neredeyse hiç olmaması. Ancak, günümüzün globalleşen ve rekabetçi dünyasında, öğrencilerin talep, arzu ya da İngilizce ile ilgili beklentileri yıllar öncesinden çok daha farklıdır. Geçmişin aksine, İngilizce bugün sadece uluslararası iletişim aracı olmaktan ziyade kurumsal ve kişisel fırsatların elde edilmesinde bir anahtar görevi görmektedir. Dolayısıyla, etkili ve anlaşılabilir bir iletişim için telaffuz üzerinde daha fazla durulması gerektiği açıktır.

Geçmişe nazaran, başarılı bir iletişim ve uluslararası anlaşılabilirlik için, doğru bir telaffuza sahip olma konusunda yabancı dil öğrencileri giderek bilinçlenmektedir. Telaffuz konusunda artan bu ilgiye rağmen, ilgili alan yazında yabancı dil olarak öğretilen İngilizce dersleri sırasında verilen telaffuz eğitimi ile ilgili çalışmalar halen sınır sayıdadır (Baker & Murphy, 2011). Günümüze kadar yürütülmüş telaffuz odaklı ilgili araştırmalardan bazıları sadece teorik düzeyde kalmış (Jones 1997; Hismanoglu 2006; Munro & Derwing 2006; Tominaga 2009; Milovanov, Pietila, Tervaniemi & Esquef 2010); bazıları belli başlı teknikler üzerinde yürütülmüş (Kendrick 1997; Trofimovich & Gatbonton 2006; Varasarin 2007), bazıları teknoloji kullanımına yer vermiştir (Pennington 1999; Pujolà 2001; Levis 2007; Lord 2008; Saran & Seferoglu 2010). Telaffuz öğretiminde araştırmalarda yaygın şekilde kullanılan aktiviteler şunlardır; dinleme ve taklit etme, minimal çiftler [minimal pairs], görsel araçlar, tekerlemeler, gelişimsel yaklaşım tekrarları [developmental approximation drills], sesli okuma ve ezberden okuma, ve öğrencilerin telaffuzunu kaydetmek. Henüz embriyonik aşamada olmasına rağmen, bilgisayar destekli telaffuz araçlarının kullanıldığı çalışmalar da yer almaktadır (Tsai, 2006, Engwall & Bälter, 2008 Thomson 2011, Luo, 2016). Nadiren deneysel araştırmalarda da bilgisayar destekli telaffuz çalışmalarına da rastlanmaktadır (Engwall, 2012).

Bu yarı-deneysel çalışmanın amacı, bilgisayar-destekli ve animasyonlu telaffuz öğretiminin Türk öğrencilerin İngilizce öğrenimi sırasında fosilleşmiş ünsüzleri (/θ//ð//w/ /ŋ/) üzerindeki etkisini araştırmaktır. Ön-test ve son-test araştırma desenine sahip araştırmanın örneklemini, 6 haftalık iletişim becerileri odaklı Erasmus dil oryantasyon programına katılan ara-orta seviye İngilizce düzeyine sahip 19-23 yaşları arasındaki toplam 37 lisans öğrencisi oluşturmaktadır. Toplamda 19 öğrenci deney grubunda ve

18 öğrenci de kontrol grubunda yer almıştır. Güvenirliğin sağlanması için, her iki gruptaki öğrenciler de aynı dil okutmanından ders almış ve rastlantısal olarak gruplara ayrılmıştır.

Öğrencilere öncelikle telaffuz konusundaki seviyelerini belirlemek üzere ön-test uygulanmış. Bu testte, USBEM firmasına ait Akademik Uzman Telaffuz adlı 40 soru içeren bir test özel izin alınarak kullanılmıştır. Örneklemedeki homojenliği sağlamak, amacıyla her iki grupta da testlerden 50 üzerinde alan ikiye öğrenci çıkarılmıştır. Bir sonraki adımda ise, sesletim aşamasında grupların performanslarına bakılmıştır. Bunun için öğrencilere 4 okuma metni verilmiş ve yüksek sesle okuyarak bireysel olarak kayıt edilmiştir. Bu metinler Baker'ın (1986) Cambridge yayını olan "Ship or Sheep" adlı eserinden alınmıştır. Kayıtlar, belirlenen 20 kelime üzerinden iki ayrı uzman tarafından ayrı ayrı değerlendirilmiş ve puanlandırılmıştır. Ayrıca öğrenciler fosilleşmiş sesleri içeren 20 cümleyi sesli bir şekilde okumuştur. Bu cümleler ise Hancock'un (2003) "English pronunciation in Use", ve Mortimer'ın (1987) "Elements of Pronunciation" eserlerinden alınmıştır.

Bu araştırmada, Trabzon Karadeniz Teknik Üniversitesi Bilgisayar Eğitimi ve Öğretim Teknolojileri bölümünde Şimşek (2008) tarafından tasarlanan ve geliştirilen "Bilgisayar-destekli ve animasyonlu İngilizce telaffuz aracı (BDİT)" kullanılmıştır. Bu aracın tasarımında, öğrencilerin rahatça kullanabilmeleri için Autodesk Maya 3B, (modelleme ve görsel efektler için 3D animasyon yazılımı) Macromedia Flash 8.0, Dreamweaver, ve Adobe Photoshop yazılımları kullanılmıştır. Geliştirilen BDİT öğretim materyali için öncelikle İngilizce seslerin modelleneyeceği "ALPI" 3B kafa modeli geliştirilmiş ve modellemeler yapılmıştır.

SPSS 16.0 versiyonu ile elde edilen T-Test sonuçlarına göre, kontrol ve deney grubu arasında ön-testteki ses tanıma ve seslendirmeye ilişkin herhangi bir istatistik fark oluşmazken, 6 haftalık bilgisayar destekli uygulamanın ardından deney grubunun lehine önemli bir istatistiksel fark oluşmuştur. Buna göre, kontrol grubu ile karşılaştırıldığında deney grubunun fosilleşmiş sesler üzerinde hem ses tanıma hem seslendirme hususunda kendilerini oldukça geliştirdiği görülmüştür. Ayrıca, kontrol grubunun da kendi içinde çok anlamlı bir istatistik değere tekabül etmese de ön-test ile karşılaştırıldığında, fosilleşmiş ünsüzler konusunda ses tanıma ve seslendirme açısından bir geliştirme kaydettiği de gözlemlenmiştir.

Bu çalışmada kullanılan bilgisayar-destekli animasyonlu telaffuz aracı geleneksel telaffuz öğretiminin yanı sıra öğrenciler sesleri algılamak veya seslendirme sırasında dişlerini, dillerini, damaklarını, çenelerini ya da dudaklarını nasıl hareket ettirdiklerini kafa animasyon modeli sayesinde izleme fırsatı bulmuştur. Bu şekilde yürütülen çalışma, elverişli uygulanabilir bir yol olarak telaffuz öğretiminde ön plana çıkabilir. Böylece, aksan ya da telaffuz ile ilgili fosilleşmiş problemler alanların üzerinde durularak, ses tanıma, seslendirme ve anlaşılabilirlik açısından önemli bir paya sahip olan yüze ve sese ilişkin hareketleri içeren seslendirme sistemi yakından gözlemlenebilir. Bu çalışmada, fosilleşmiş ünsüz seslerin iyileştirilmesi yanı sıra, seslendirme uygulamaları sonucunda oluşan fonolojik duyarlılık ayrıca öğrencilerin ses tanıma, algılama ve üretiminde olumlu etkiler göstermiştir.