



Hacettepe University Graduate School of Social Sciences
Department of Foreign Language Teaching
English Language Teaching

**TEACHING WORD STRESS TO ELT FRESHMAN STUDENTS THROUGH
COMPUTERS**

Hasan ÖZKAN

Master's Thesis

ANKARA, 2010

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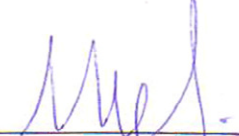
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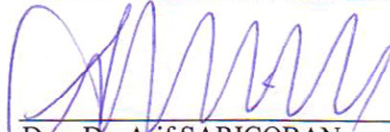
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KABUL VE ONAY

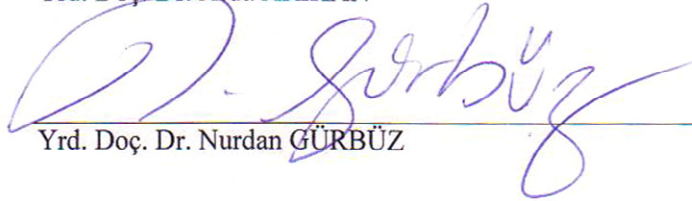
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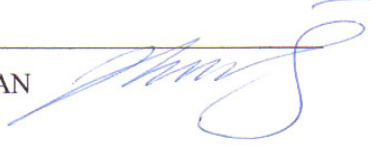
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ÖZET

ÖZKAN, Hasan. *İngiliz Dili Eğitimi Birinci Sınıf Öğrencilerine Bilgisayar Yoluyla Kelime Vurgusu Öğretimi*. Yüksek Lisans Tezi, Ankara, 2010.

Bu çalışma, İngilizcede bulunan kelime vurgusu sisteminin İngiliz Dili Eğitimi Bölümü birinci sınıf öğrencilerine bilgisayar aracılığıyla öğretimi üzerine araştırma ve yazılım geliştirmeyi amaçlamaktadır. Çalışma 2009-2010 akademik yılının ikinci döneminde Hacettepe Üniversitesi İngiliz Dili Eğitimi Bölümünden 25 katılımcı ile gerçekleştirilmiştir. Araştırma kapsamında sorulan sorulara cevap bulma amacı ile, ilk adım olarak “Kelime Vurgusu Alıştırma Seti” isimli bir yazılım paketi geliştirilmiş ve katılımcıların 5 haftalık süreçte bu yazılımı kullanmaları istenmiştir. Yazılımın katılımcılara sunumundan önce ve sonra yapılan testler aracılığıyla, 5 haftalık süreçte yazılım kullanımının öğrencilerin kelime vurgusu sistemi ve ölçüt olarak kabul edilen kelimelerin sesletimi üzerinde yaptığı etkilerin ortaya konulması amaçlanmıştır.

Çalışmada kullanılan yazılım tamamen bu araştırmaya özgün olup sadece kelime vurgusu öğretimine yönelik şekilde araştırmacı tarafından hazırlanmıştır. 60 adet kelimenin sesletiminin yapılması ve bunları bilgisayar ortamına kaydedilmesi şeklinde gerçekleştirilen bu testler araştırmacı ve bir bağımsız puanlayıcı tarafından değerlendirilerek puanmanın güvenilirliği artırılmış ve puanlamaların analizleri yapılarak güvenilirliği incelenmiştir. Elde edilen verilerin SPSS 16 yazılımıyla analizinden elde edilen sonuçlar çalışma öncesi yapılan testlerde alınan ortalama puanın 100 üzerinden 63 olduğunu, çalışma sonrası yapılan testlerde ise katılımcıların ortalama puanının 81’e yükseldiğini göstermektedir. Katılımcılardan alınan görüşler de çalışmada sunulmuş ve gelecekte yapılacak iyileştirme geliştirme çalışmalarına ve alanda yapılacak yeni araştırmalara yardımcı olabilecek öneriler sunulmuştur.

Anahtar Sözcükler: Bilgisayar Destekli Dil Öğrenimi, Bilgisayar Destekli Sesletim Eğitimi, Kelime Vurgusu

ABSTRACT

ÖZKAN, Hasan. *Teaching Word Stress to ELT Freshman Students through Computers*. Master's Thesis, Ankara, 2010.

This study aims to develop a software application and conduct research about its efficiency on teaching word stress of English language to ELT Freshman students through computers. The study was conducted in the academic year of 2009-2010 at Hacettepe University with 25 participants from the English Language Teaching Department. To find answers to the research questions, a software application named "Word Stress Practice Set" was developed and participants were asked to use this software application for a 5 week period. Two tests, prior and after this period, were done to gather data to analyze the efficiency of the software.

The pre and post tests were based on the recordings of the pronunciation of 60 words from each participant and analysis of these. The recordings were scored by the researcher and an independent rater in order to increase the reliability and objectivity of the scorings. The two sets of scores for each test were analyzed in terms of consistency and reliability with SPSS 16. The results of the pre and post tests and the analysis of their mean scores pointed out that while the mean score for the participants in the pre test was 63 over 100, the post test's mean score increased to 81. The suggestions and opinions of the participants regarding the use of the software application are also presented in this study to state suggestions that can be useful for the further improvements and developments and the future studies and research in the field.

Key Words

Computer Assisted Language Learning, Computer Aided Pronunciation, Word Stress

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CHAPTER 1

INTRODUCTION

1. INTRODUCTION

Word stress pattern of English is one of the most important, yet rarely emphasized, elements for correct pronunciation. Despite common indifference and mistaken conception, word stress pattern is not a feature only to consider while aiming developing accuracy in native like pronunciation, which may not be accepted as an achievable goal for non native learners of English, but it, is a trait of correct intelligible pronunciation, which also provides the correct the perception of verbal language. This research aims to develop a software application as an aid for teaching and learning the word stress pattern of English and evaluate its efficiency.

This chapter presents the background to the research, states the problem of the research and draws the framework for the purpose and the scope of the study which is in the field of vocabulary analysis. It also introduces the software developed for the study, highlights the hypothesis related to the study and discusses the limitations of the thesis topic.

1.1 BACKGROUND TO THE STUDY

Kenworthy (1987) highlights the place of word stress in language teaching and learning as "... the stress of pattern of a word is an important part of its identity for the native speaker. (p.18)" Teaching and learning English, as a stress-timed language, definitely needs a further emphasis on the stress both on segmental and suprasegmental levels. Such an importance has definitely shaped the approaches, aiming a better communication skill development and effort to realize such an improvement has taken place since communication was started to be accepted as an essential part of language learning and teaching process.

After the turning point the history of foreign language teaching methodology and philosophy in which communication gained importance as the vital element for the use of the second or foreign language, pronunciation instruction has been moved into the focus and given more emphasis. Communicative Language Teaching (CLT), which states the desired goal as the ability to use linguistic system effectively and appropriately (Richards & Rodgers, 2001), has considerably influenced pronunciation instruction. Despite the previous approaches to language teaching, CLT directly focused on the real use of language in meaningful context through effective use of communicative skills. Such use of these skills then created the term of communicative competence which is defined by Hymes, as cited in Richards & Rodgers (2001), as the skills making the language learner communicatively competent in a speech community, enhanced by efficient knowledge and ability for language use. Despite the effort to realize the objective of developing communicative competence, today learners and even some language teachers have insufficient speaking skills, lacking of confidence. However, difficulties in speaking in a foreign language has been studied by many researchers (Dewaele et.al, 2008; Woodrow, 2006) as communicative anxiety and foreign language anxiety in an interdisciplinary perspective, the lack of competence and knowledge about the dynamics of the oral language seems to be an effective factor in the creation of negative attitude towards speaking and insufficiency during the oral communication. The effects of these factors cannot be ignored when the communicative competence is to be focused on.

Considering the importance of stress pattern in English for the correct identification of the words for both native and non-native speakers, it is evident that more emphasis should be given to activities so as to develop awareness on the issue. Just like all other parts of learning and teaching pronunciation, stress pattern can be quite demanding and time consuming for both teachers and students. Although the instructional material can be easy to handle during class hours the practice session and effort to develop a constant awareness to the word stress pattern of English for language learners can be difficult to complete during classes.

Therefore, it is obvious that there is a need for extra curricular activities and practice outside the classroom. Although this need was to be fulfilled with paper based

homework, activities on books or pair work of learners who would not be competent on the issue, with the help of computer technology these practices were supported and even replaced with multimedia applications on computers beginning with the spread of desktop computers. However this change was not the end for educational software applications for language learning, with the Internet and introduction of high speed and easy access to it, such applications has gained a new environment and partially turned into an online content. Parallel with the broadband Internet access, learners started to have the opportunity to find pen friends via e-mails, chat via instant message software applications, and talk online via software applications which allows users to make voice calls over the Internet. Finally, video chat was introduced and it rapidly gained popularity among the users of the Internet. Today, all these activities are blended into each other with Web 2.0 applications and only opening a page in your browser is enough to do all which needed separate, complex software applications just a few years ago. So, as people call the present century in which we live as the era of communication, there is no limit for learners to interact in a real communication online without stepping out of their homes or schools. Recently, we have also experienced the mobile technology's immense development and computers can now be seen as stationary, heavy tools to enter the world of communication and information processing. Mobile phone is now not only popular to make phone calls but also to make video calls and access information at a global level.

As the technology changed our understanding of communication and access to information, it also helped us to develop better alternatives for language learning activities especially for listening and speaking aspect of the process. The commercial products for language teaching and learning have changed the media they are presented to the customers with the development of technology. Most of them are sold in forms of a series of CDs or DVDs but the number of downloadable software via online payment is increasing gradually. Although most of these applications have commercial aims and pedagogical or instructional downsides, the number of learners using these as basic learning tools or supplementary activities has been increasing. Table 1 displays three of the most popular software with their prices and the summary of their content.

Among the features shared by these products like high price and main focus on the development of communicative skills, they have another important similarity which is speech recognition that enables the user to see the feedback for his or her utterances' correctness. When the testimonies from users, although their correctness can be classified as suspicious, are read, one can see the popularity of the speech recognition application for the development of speaking skills.

Table 1- Samples of Commercial Software

Name	Price	Content
Tell Me More© 10 Levels	\$ 510	Vocabulary, grammar, reading, writing, listening comprehension and conversation practice lessons.
Rosetta Stone© American English Level 1 to 5	\$ 730	Largely based on vocabulary and interactive practice sessions. The real life use of language is emphasized.
Eye Speak© Premium Edition	\$ 153	Developed for speaking skills and accent perfection. Everyday English communication is in the focus.

However there is no direct focus on the word stress pattern of the target language in software mentioned above. Pedagogical concerns can be the reason why word stress is not overtly emphasized in the software aimed for common language learning and teaching market. Nevertheless, we need to consider the needs of EFL freshman students as prospective teachers of English language as not only to practice the word stress pattern correctly but also have the sufficient knowledge and experience to instruct and use it in their teaching practice.

1.2 STATEMENT OF THE PROBLEM

Word stress pattern of English bears great importance but its mobile nature makes is very problematic for the learners. Non native learners of English, especially those having the languages with fixed, or at least predictable, stress patterns like Turkish as native languages, experience difficulty in learning the stress pattern and developing awareness and command on the issue. Stemming from this difficulty and the complexity of the related rules, word stress pattern is rarely emphasized in English language teaching. Different approaches to the international use of English also make the

reference to word stress pattern as a difficult area but they support the learning and teaching of this important part of English pronunciation for the sake of the adequate communication skills.

As a demanding area of English pronunciation, word stress learning and teaching may utilize learning environments which have the abilities of being flexible, enabling learners to plan their own studying schedule in terms of time, having the ability to help the learners to compare their pronunciation with a sample from a native speaker to have feedback. Such a learning environment can be created in different ways of combining various learning tools. However with the help of computer and multimedia technology, using a computer based learning software seems to be an effective way.

Current products that can be found on the market and the Internet have a rather encompassing attitude regarding all key elements required for learning a foreign language. However many of them lack sufficient emphasis on the word stress pattern of English and those who have related sections on the topic generally choose the method of introducing them in an inductive and rather superficial approach.

Along with the problems of lacking emphasis on the teaching of word stress of the current software on the market, the cost of buying these software and having each student be able to access and use them seems very difficult considering the financial limitations. The most update information regarding Turkish students' educational expenditures was gathered by Turkish Statistical Institute in 2002. According to the report entitled "The amount of education expenditures per student by level of education, 2002" , 1.918.483 Vocational Training Schools, Undergraduate, Master and Doctorate students had the 6.573.911.000 Turkish Liras for education expenditures which means about 2254 US Dollars for per student for educational expenditures (TUIK, 2010). With such limited resources, expecting students to purchase the products on the market or school to use these products as teaching materials in the classroom seems impossible considering the price rates displayed in Table 1. Therefore designing and developing software that do not require financial resources is an option which can easily be put into practice with some effort and the use of open source and freeware software developing kits.

In sum, the rule governed yet notoriously difficult pattern of English word stress needs further emphasis in English Language Education Division of faculties of education at universities as an important element for the accuracy of the communication by English. Moreover, the current research is aimed to be conducted on freshman students of English Language Teaching and these prospective language teachers need to focus on this issue in order to prevent the fossilized mistakes that can be acquired by their students in the future, as the teacher still occupies the position of the role model in terms of pronunciation for the learners. Furthermore, the high prices and the approach of the software applications that can be found on the market to the topic of word stress pattern create the problem for which this research and related project seeks a solution as a product that can be used to support and enhance the word stress learning and teaching.

1.3 STATEMENT OF THE PURPOSE AND RESEARCH QUESTIONS

The speaking skill for the learners of English language has gained more and more importance since the first intercontinental phone call was made. A well structured grammar-based knowledge of a foreign language does not mean success anymore in today's world covered with communication networks and the Internet. Although the written language is still essential, speaking correctly is more important to communicate successfully in terms of time and efficiency. The word stress pattern is an essential element of spoken English and this phenomenon can be problematic for non native speakers to learn and to practice during their speech. Considering its importance for native speakers of English to identify word during communication, it is essential for learners and teachers of English to spare the sufficient emphasis on this part of pronunciation.

Despite its importance and effect on spoken English, word stress is a difficult area to limit with a number of rules that can be applied to any new word that the learner acquires. Although there are some rules about the word stress pattern of English language, the number exceptions easily outnumber these rules because English vocabulary is full of borrowed words from Germanic and Latin origin. Therefore the only way to acquire the skill of using word stress correctly seems to do excessive

amount of practice after studying the rules created by linguists and authors from the field of language teaching and learning.

This study does not aim to create a new approach to the learning and teaching of word stress. The aim here is to create a computer-based learning environment for learners and teachers to access leading authors' comments and ideas on word stress and more importantly to do practice of words that have importance in terms of word stress and compare their own voice records with native speakers' utterance on the same word. What is more important for this project in terms of purpose is to see whether developing software with limited resources, knowledge and experience for the learners of English is possible or not. Along with the purposes of assessing the efficiency of the computer based learning environment in terms of developing awareness and skills on participants, this paper aims to present an overall picture of the current approaches and applications that have the aim and practice related to the pronunciation and articulation.

This study addresses the following research questions:

1. To what extent do the freshman students of the Division of English Language Education department at Hacettepe University have a command of word stress pattern of English?
2. To what extend is the software developed for this study effective on developing awareness and sufficient skills related to word stress pattern of English?
3. Will the participants of the study have positive or negative opinions and attitudes towards the use and the quality of contents of the software used in the research?

1.4 SIGNIFICANCE OF THE PROBLEM

The use of computer aided learning environment for pronunciation teaching can be considered as an area open for discussion. However, if the current conditions of English language teaching and learning process in Turkish education system are taken into

consideration facilitating the use of software aimed for enhancing pronunciation skills seems to have the potential to be beneficial for learners and teachers of English language in Turkey. Despite this potential and space for development provided by computer technology, the number of attempts to develop computer based learning environments are very limited and when the foreign language teaching area is considered the only study in this scope is a master's thesis project by Cansel Demir (2009), entitled "Speech recognition synthesis systems for use in preschool period foreign language training".

Despite the high efficiency of computer aided pronunciation (CAP) software displayed in various studies (Anderson-Hsieh, 1994; Ducate& Lomicka, 1999; Warren et.al., 2009; Tanner& Landon, 2009) the use of CAP in Turkey is rather unsatisfactory due to the financial limitations. Moreover the available products can be hardly classified as suitable, considering the need of focus on specific parts of sound patterns of English, for aims of training prospective teachers of English with sufficient knowledge and skill related to the pronunciation of the language. The significance of the problem that current study deals with can be defined as being an attempt in Turkey to develop software aimed for teaching and learning the word stress pattern of English. Although the software developed by this attempt can be criticized in different perspectives, it still bears importance as a concrete example of what can be done to create a concrete, free to use product for English language learners and teachers.

1.5 STATEMENT OF HYPOTHESES

Following hypotheses are developed in accordance with the research questions which are asserted merely as a provisional conjecture for the current situation and the upcoming differences and findings aimed as the outcome of the research.

1. The participants of the study do not have enough knowledge and skill related to the word stress pattern of English.

2. The use of software is efficient on developing awareness towards word stress and skills to produce word stress on the participants.

3. The participants will have positive attitudes towards the use and the quality of the software used in the research.

1.6 METHOD

The scope of the study is limited to Hacettepe University, Department of English Language Teaching (ELT) at Education Faculty in Turkey. The study including pre and post tests, interviews for the participants' opinions about the efficiency of the software will be applied to freshman students in this department. To study the efficiency of the software on developing awareness and skill to use word stress pattern of English in a detailed way, the number of the participants will be limited to a number. The target group of this study will be 25 second semester freshman students of ELT department at Hacettepe University.

The software used for the project was developed over a 4 month of process. The first aim was to create the section to play the voice samples and record the users' voice. After the creation of this section other parts which have an instructional manner were developed. The voice samples were first thought to be recorded by the researcher however due to the authenticity concern the samples were taken from the Longman Pronunciation Coach CD (2008) with written permission from Pearson Education Limited.

To observe the state of ability and knowledge towards word stress prior to the introduction of the software, participants' voice recording were collected. After a 5 week period of study on word stress through the software, the pronunciation of the same words were recorded again. The improvement between the pre and post recordings were first evaluated by independent raters and then analyzed via PRAAT v.5.1.34. Then the data obtained through these evaluation processes analyzed by using SPSS 16.

1.7 LIMITATIONS AND ASSUMPTIONS

Limitations toward this study were based on some technical insufficiencies. But with more specific and complex software in the future can make the process faster and thus increase the abilities of the future researchers to access more detailed information via speech recognition and analysis and thus expand the limits of the study in terms of participant number.

The main limitations of current study can be studied under two sections. The first one is related to the nature of students' approach to the software use autonomously. The software developed can measure and log the sessions opened by the participant. However the information displayed by this feature of includes only the duration of the software in opened position. The activity on the software application could not be displayed. However this is a common problem for self study sessions and exercises and cannot be measured in terms of effort and activity.

The second limitation of this study is related to the number of participants and the gender ratio of the participants. The time spent for the development of the software combined with the detailed analysis of the voice samples gathered from the multimedia dictionary, from the participants and the analysis of these two sources of pronunciation in comparison have been more demanding and unfortunately the numbers of the participants had to be limited on a number that is statistically meaningful and reasonable for rigorous analysis.

In sum, both limitations can be considered as the results of capacity of the current accessible computation devices and the participants' efforts conducted without supervision and observation.

1.8 CONCLUSION

The word stress pattern is a very important suprasegmental feature of English words. And as stated by Roach (1991) and Kenworthy (1987), the non native learners of

English frequently experience problems while pronouncing the words isolated or in a context as they have difficulty on the correct stress pattern use. Demirezen& Sariçoban (2009) affirm that the complexity of word stress pattern with its mobile nature causing vowel reduction poses a serious problem for Turkish students learning English. Considering the emphasis stated by Kenworthy (1987) on the importance of word stress not only in the production but also In the perception of English words, the efforts for highlighting the issue in pronunciation teaching and learning should be given priority and adequate importance. The recent developments in computer assisted language learning (CALL) and teaching have been improving the conditions for more efficient pronunciation teaching through computers. Consequently, the computer aided pronunciation (CAP) pedagogy has become an active field of study in the recent years. Despite these improvements and evolution of CALL and CAP, the software application development for the suprasegmental features of English is rather slow since the production of related software applications has not gained popularity yet. The current research aims to develop a software application focused on the word stress pattern of English and then asses and evaluate its efficiency through the analysis of the pre and post tests and user suggestions. The following chapter focuses on the previous studies on word stress pattern and the applications for pronunciation teaching to set the groundwork for the development of the software application.

1.9 DEFINITIONS OF TERMS

The key terms used in this study is defined in a detailed way in order to support readers' comprehension and control over the study.

Stress: Crystal (2008) defines stress as “A term used in phonetics to refer to the degree of force used in producing a syllable” (p. 454). The force of the syllable is highly related to the prominence of that syllable. Roach (1991) states despite the long years of effort and the extensive study, there are many issues related to the stress which are controversial and unclear.

Word Stress: In a word with more than one syllable, the syllable with main stress stands out more than any other. Stressed syllable is defined by Ladefoged (2001) as one which requires more respiratory energy and laryngeal activity compared to the other unstressed syllables. IPA transcription, main stress is indicated by placing a vertical tick (ˈ) before the syllable that receives stress. Crystal (2008) lists four different types of stress which are usually distinguished, and analyzed as stress phonemes as (1) ‘primary’, (2) ‘secondary’, (3) ‘tertiary’ and (4) ‘weak’ (p.455).

Sentence Stress: Sentence stress is the stress of a single syllable in a single word of a complete sentence or phrase. The prominence of the syllable in this situation commonly changes the stress pattern of words when in isolation. Roach (2009) states that sentence stress is a rather complicated and unclear issue since with the current knowledge it is impossible to set rules or define tendencies for all languages related to the sentence stress.

Mobility of Stress: Certain affixes have the effect of manipulating the word stress and when these prefixes are added to a word the primary stress moves according to the effect of the affix. Demirezen (2010a) states that the word stress causes an internal sound change which ends up with change of the vowels of the word.

Vowel Reduction: Addition of certain prefixes and suffixes cause not only the movement of stress back and forth but also the reduction of the English vowels into the schwa sound which is also defined as the vowel reduction. (Demirezen, 2010b)

Computer Assisted Language Learning: Computer assisted language learning (CALL) describes the use of computers as an aid for language learning. However, the definition of CALL has been reshaped as the technology improves and the approach to the use of computers changes. CALL should not be seen as an individual way of language learning, it is an aid, a media for flexible and interactive content, and it is linked with the classroom instruction, therefore the use of software applications and their design should be carefully planned and supported by classroom instruction.

Computer-aided Pronunciation: Computer-aided pronunciation (CAP) defines the type of software applications that offers a medium for increasing pronunciation performance and awareness towards pronunciation.

Speech Recognition: It is the analysis of speech via computers which aims to identify it as phones, phonemes, morphemes or words. Speech recognition also refers to the ability to compare a spoken word to the words stored in the hardware.

Speech Synthesis: It can be defined as an electronic and computational process that produces speech.

Suprasegmental Features of Phonology: These features include stress, length, tone and intonation which are the properties that do not belong to single consonants and vowels.

CHAPTER 2

LITERATURE REVIEW

2. INTRODUCTION

This chapter of the study will present a review of literature on what word stress is, how it can be taught and learnt and what can software application promise for the improvement of the education of this suprasegmental feature of English language. Since the study aims to develop a software application, the focus on this part is rather located on the interaction between foreign language pronunciation education and computer use in the field. The final section of this chapter, following the review of literature on the key elements regarding the study, will focus on the future of software application and computer technology to display the potential and need further studies in the field of computer aided pronunciation education.

2.1 WORD STRESS IN ENGLISH

Stress pattern of a language is one of its distinctive features. It refers the word stress and sentence stress patterns and the formation and application of this suprasegmental feature. Trask (1996) defines stress as a certain type of prominence which, in some languages, is present upon certain syllables and states that native speakers generally have the ability to locate the syllables that have stress. As Ladefoged (2001) refers to respiratory energy and laryngeal activity while defining the physical production of stress, Richard and Schmidt (2002), in the Dictionary of Applied Linguistics, state the characteristics of a stresses syllable or word in the perspective of a hearer as “being louder, higher in pitch, and longer than the surrounding words or syllables.”

Word stress, which is also referred as lexical stress, is the stress present on a syllable within a word. In English language, all words except for function words will contain one syllable that has stress which can be distinguished as being more prominent than the others forming the word (Fromkin et. al, 2003). In such a case, the other syllables, in a word of more than one syllable, are less stressed, not as prominent or are weak,

unstressed, syllables. At this point, the degrees or levels of stress emerge as the other important element to consider in terms of word stress which will be studied in the next section of this chapter.

One of the conflicting issues related to word stress is about the way authors and linguists address to it. Roach (1991) avoids using the term “word accent” with concerns to the complexity, differentiated use of this term and different opinions of writers related to this term. On the other hand, Cruttenden (2008) avoids using “word stress” as he emphasizes the different and ambiguous use of the term in linguistics and phonetics and he prefers “word accent” (p.23). Nevertheless, current study uses the term “word stress” in order to be able to deal with the common use of this term in various studies.

Word stress must be distinguished from the one that is carried by a word in a phrase or sentence, this type of stress is called as sentence stress which is dependent on intonation. In such a location, the stress pattern of isolated words may change, disappear or be modified. In sentence stress, the pattern is generally created parallel with the typology of the particular language and the importance of the words or phrases in the sentence, intended message or the aim highlighting certain part of the sentence, therefore it has rather a flexible structure in terms of the message and the purpose of the speakers’ utterances. Sentence stress can also be defined as the features that give a language its unique, particular beat and rhythm.

The variation of the levels of stress in polysyllabic words of English creates the classification of stress as degrees of stress and the pattern of stressed and unstressed syllables which is characteristics of English language. In this respect, the mobility nature of English must be remembered here. By affixation, the place of primary stress in words of English shifts back and forth. In fact, this case constitutes an intrinsic difficulty for Turks, indicating one of the issues of this thesis.

2.1.1 Word Stress Pattern

The location of the stressed syllable in a word, in other words the stress pattern, displays differences among language families, languages within the same family, and even the

varieties of the same language. Shockey (2003) studied stress as an important bearer of meaning among the varieties of English, not only on a global scale but also within the land of United Kingdom.

Unlike some other languages like Czech, Polish and Swahili, which are reported as having fixed word stress by Ladefoged (2001), English language with its stressed and unstressed pattern has variable word stress. The perception of languages' stress pattern is classified under free stress pattern or syllable-timed languages and fixed stress pattern or stress-timed languages by Roach (1991), Skandera and Burleigh (2005). The common example for syllable-timed languages Turkish and French, and English is given as example for stress-timed languages. However, Ladefoged states that such a classification can be falsified by new facts about languages and thus the classification as languages with variable word stress such as German and English; with fixed word stress such as Czech, Polish and Swahili and with fixed phrase stress such French.

When the comparison between Turkish language and English language in terms of word stress is considered, Lewis (2001) defines Turkish language having oxytone words, that is having stress on the last syllable, and non-oxytones, which keeps stress on the original syllable despite the extension via suffixes (p.21). He also makes a nice comparison of the two languages in morphological aspect with emphasis on the agglutination which is pretty unfamiliar for the speakers of English; he says "Our English sentences are like drystone walls, with one chunk of meaning dropped into place after another. The Turk's ideas are laid in place like bricks, each cemented to the next (p. 20)".

The variable word stress pattern of English causes difficulties even at the first step of the effort a non-native speaker (NNS) of English who wants to develop a comprehensive understanding and necessary skill for word stress. The first problem which a NNS may face is about the nature of syllables in English. Ladefoged states despite the nature of stress, nature of syllables is not fairly understood (p. 243). Despite the difficulty for NNS, native speakers of English can count how many syllables in a word even if they cannot explain what a syllable is or how they can complete counting correctly (Ladefoged, 2001; Kenworthy, 1987; Roach, 1991).

2.1.1.1 The Nature of Syllables in English

Syllable is defined as “a unit of speech consisting minimally of one vowel and maximally of a vowel preceded by a consonant or consonant cluster and followed by a consonant or consonant cluster (Richards and Schmidt, 2002). Roach (1991) emphasizes that the definition of syllable in terms of phonetics in English language turns out to be problematic; especially when the division between syllables is considered. But he gives the following as examples to define the nature of syllables of English.

i) What we might call a **minimum syllabic** would be a single vowel in isolation, e.g. the words 'are' **ɑ:**, 'or' **ɔ:**, 'err' **ɜ:**. These are preceded and followed by silence. Isolated sounds such as **m**, which we sometimes produce to indicate agreement, or **ʃ**, to ask for silence, must also be regarded as syllables.

ii) Some syllables have an onset (that is, they have more than just silence preceding the centre of the syllable):

'bar' /bɑ:/ 'key' /ki:/ 'more' /mɔ:/

iii) Syllables may have no onset but have a coda:

'am' /æm/ 'ought' /ɔ:t/ 'ease' /i:z/

iv) Some syllables have onset and coda:

'run' /rʌn/ 'sat' /sæt/ 'fill' /fɪl/ (p. 67)

Another important key point for the syllables in English for stress pattern is syllabic consonants. Demirezen (1987) defines the importance of these patterns as:

“Articulatorily speaking, in such English words as *button* and *castle*, and *better* in American English, the second syllables are /n, l, r/, for they establish syllable peaks and thus called as syllabic consonants. This case is mostly produced by the pressure of stress change and is therefore a phonological happening... (p. 59)”

As an important element, the effect of syllabic consonants on stress pattern of American English and British English constitutes another change and variation that contributes to the mobility of the word stress pattern in English.

The effort to explain the nature of syllables in terms of morphology seen above may be confusing for the learners of English therefore the phonetic description must be given emphasis and more practical applications to locate syllables in a given word must be enhanced.

Orion (1997) gives some useful tips to learners of English to identify the syllables. “You can think of syllables as the number of "beats" in a word. For example, say the word "heart" while you tap your desk (or clap your hands or tap your foot) once” (Orion, 1997, p. 18). The second way seems more practical and useful although Orion states it as a hint. It can be summarized as placing your thumb underneath your chin and counting the number of times your jaw moves while saying the word slowly. When these two techniques are combined with the knowledge that each syllable contains a vowel sound, it seems pretty trouble-free to locate and count the syllables.

2.1.1.2 The Factors Affecting Word Stress in English

There are various points affecting the word stress pattern of English. Some of these have an open and fixed effect; some however have variable and more indirect effects in the formation of word stress. Authors of different books covering this issue have devised lists and definition of these factors.

Roach (1991) indicates that there are some information necessary to use to decide on stress placement in a word and suggests a four item list for this purpose. The first one is about the morphological state of the word regarding whether it is simple or complex or affixed or compound. The second information to pay attention is the grammatical category of the word. The number of syllables is another factor affective on word stress place. The last item in the list suggest that the phonological structure of the syllables forming the word.

Relatively similar to Roach, Skandera and Burleigh (2005) stated that there are three factors affecting the stress placement in a word. The first one is “word origin”, Skandera and Burleigh states the differences of tendencies of Germanic, defined as the words from Old English and Old Norse, or Romance origins, the words from French and Latin

(p. 74). Also Meyer (2009) comments on this division as an agent affective on stress placement and has the following to say about the importance of word origin for correct location of stress in English language: “During the Middle English period, however, English received an extensive number of borrowings, particularly from French and Latin (p. 211)”. The second factor affective factor, for Skandera and Burleigh, on word stress placement is “word class”, which is very important especially when some words that carry the qualities of being a verb and a noun at the same time are studied in terms of word stress. The third important factor is declared as the presence of suffixes emphasizing their effect on the word as stress shifting elements.

Crystal (2008), in his comprehensive study “A Dictionary of Linguistics and Phonetics” also states the difference among language as:

“In cross-language comparison, it is useful to note variations in the typical place within the word where the stressed syllable falls. Some languages have a **fixed stress** (or accent), e.g. Welsh, where the stressed syllable is almost always the penultimate, in polysyllabic words. Others, such as English, have a **free or movable stress** (accent) (p. 455)”.

Meyer (2009) approached the same issue after stating the historical interaction between English and other languages resulting in borrowed words. Presenting this background information about the variability of word stress in English, he expresses the followings:

...in Modern English, assignment of primary stress is dependent upon (1) the type of affix added, (2) the number of syllables a word contains, and (3) which syllables in the word are light (incapable of taking primary stress) or heavy (capable of taking primary stress). (p.211)

Although they display slight variations, classifications of factors by different authors create a general guideline to understanding the nature of syllables. It is not an easy task to locate syllables but by the help of the information and tips provided by the previous work seems to be pretty supportive for the learning of the nature of syllables. However, before studying the rules of word stress, one must also develop the understanding about the differentiating nature of word stress pattern in English through observing and

learning the factors creating the variance. Such a knowledge and learning bears extreme importance since the rules presented in the following section towards the word stress location have certain limitations.

2.1.2 Rules of Word Stress Pattern

The learners of English need rules and instruction to be able to locate and practice the word stress pattern in the words. Although when the words are used in a context these rules may change or the stress given syllable may lose its strength, the following rules will still be active to a degree. Moreover the internalization of the factors affecting stress placement given above and the rules to be given in this section are expected to develop the awareness to this characteristic of English language. Moreover as stated by Orion (1997) “making the correct syllable stress in a word creates a rhythm that directly affects the pronunciation of that word and its comprehension” (p. 20) therefore the application of these rules are very important not only for correct pronunciation but also for the comprehension which means a successful communication.

This section aims to present a collection of rules regarding the word stress pattern of English expressed by different authors. Although their approach may differ in terms of the study of the syllable and stress relation, a collaborative and mediating way is aimed. To do so the words will be studied under certain division. These divisions will be based on affixation, the number syllables and word class, in other words the grammatical category of the words. Before this categorization the morphological structure of words should be taken into account.

Morpheme is defined as the smallest meaningful unit which cannot be divided without altering or destroying its meaning (Richards and Schmidt, 2002, p. 341). Words that contain only one morpheme is called as simple words and the words which consist of more than one morpheme are classified as composite words (Kreidler, 2002). Following table is devised from the Kreidler’s book “Describing Spoken English” (2002) to represent the morphological groups of words.

Table 2 Morphological Classification of Words

	Simple Words	Composite Words		
Type		Type 1 (Compounds)	Type 2 (Words with Affixes)	Type 3
Definition	Consist of a single free morpheme	Consist entirely of independent words	Consist of at least one independent word and at least one bound morpheme	Words consist entirely of bound parts
Examples	arm, chair, happy, guitar	armchair, bedroom, ice-cold	disarm, happiness, guitarist	ambigu/ous, centi/pede, bio/log/y
Complex Words				

As the morphological kinds of words are now stated, the rules of word stress can be explained as follows:

Rule 1 Two-syllable verbs: Hancock (2003) states that many two-syllable words come from one syllable words and the stressed syllable is generally on the original word. Roach (1991) states regarding verbs with two syllables:

...either the first or the second syllable will be stressed - not both... The basic rule is that if the second syllable of the verb contains a long vowel or diphthong, or if it ends with more than one consonant, that second syllable is stressed. If the final syllable contains a short vowel and one (or no) final consonant, the first syllable is stressed. A final syllable is also unstressed if it contains əʊ (p.89).

Despite the variation for the verbs stated above, most of the course books related to pronunciation teaching gives a rather simplified rule and states that most of the two syllable verbs have stress on their second syllable (Hancock, 2003; Orion, 1997; Hewings, 2001; Baker and Goldstein 2008). Nevertheless Hancock states the exception for the simplified rule and notes “cancel”, “copy” and two-syllable verbs ending in “-er” and “-en” have stress on the first syllable.

Rule 2 Two syllable nouns: Kenworthy (1987) states that the ‘front weight’ in nouns and adjectives. He implies the strong tendency for core vocabulary to have stress on the first syllable. Roach (1991) suggests that if the second syllable of a noun contains a

short vowel the stress will usually come on the first syllable and another exception will happen if otherwise is present therefore the stress will be on the second syllable (p. 89)

Rule 3 More than two syllable words: Although Roach explains this group as a “more complicated picture” and gives complicated rules about the location on the stress, following the rules by Kenworthy (1987) seems more applicable when the foreign language learning and teaching is chosen as the medium. For the words more than two syllables, we should also consider the affixation. Kenworthy underlines that stress has a general tendency to be somewhere in the middle of the word, rather than on the first or last syllable in words of four, five, or six syllables (p. 64). Baker and Goldstein (2008) handle the long words in a simplified way and suggest that endings added to a word do not often modify the word stress pattern but they also states the existence of endings, which may be more accurate if called suffixes, that changes the word stress. When the longer words are the point, Baker and Goldstein (2008), Hancock (2003), Orion (1997) and Hewings (2001) utilizes the tables or lists of affixes showing the classification the stress changing and neutral affixes. What follows is the study of prefixes and suffixes in terms of their effect on the word stress pattern of the word.

Rule 3.a Suffixes: Kenworthy (1987) states that there is a tendency in English which suggest that suffixes are never stressed. However there are a limited number of suffixes which are always stressed.

-ee	absent ee
-eer	engine er
-ese	Japan ese
-ique	techn ique
-esce	convales ce
	Kreidler (1997 p.136)
-ette	disk ette
	Hewings (2007 p.28)

Then there are certain types of suffixes that move the stress. The suffixes listed below are the one that moves stress on the preceding syllable.

-ive	impressive
-ient	incipient
-iant	deviant
-ial	substantial
-ion	invention
-ic	geographic
-ian	median
-ious	infectious
-ical	economical
-ity	opportunity
-iate	deviate
-iary	pecuniary
-iable	negotiable
-ish	diminish
-ify	identify
-ium	premium
-ior	superior
-io	radio
-iar	familiar
-ible	impossible

Kenworthy (1987 p. 64)

-ious	industrious
-ulous	miraculous
-orous	carnivorous
-eous	outrageous

Hewings (2007 p.28)

Kenworthy states another group of suffixes which causes stress to be placed on the fourth syllable from the end of the word (p.64).

-ary	vocabulary
-ator	investigator
-mony	alimony
-acy	intimacy
-ory	category

Kenworthy (1987 p. 64)

Rule 3.b There are also suffixes which do not affect the word stress pattern on the root that they are added. These suffixes can be listed as following.

-able	reliable
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Kenworthy (1987 p. 64)

-able	drinkable
-al	musical
-er	player
-ful	helpful

-ing	boring
-ise	civilise
-ish	childish
-less	childless
-hood	childhood
-ly	friendly
-ment	employment
-ness	happiness
-ship	friendship

Hancock (2003 p. 68)

-er	reporter
-or	translator

Baker & Goldstein (2008 p.186)

Rule 4 Prefixes: These kinds of affixations are rarely defined as stress changing factors. Orion (1997) recognizes “When a prefix is added before the base of a word, the stress pattern of the base word usually remains the same. The meaning of the word, however, changes” (p. 24). She gives the following examples of prefixes.

<i>Prefix</i>	<i>Base word</i>	<i>Prefix Added</i>
auto-	biography	autobiography
dis-	agree	disagree
inter-	national	international
re-	write	rewrite
un-	happy	unhappy

On the other hand, Kenworthy (1987) in the same direction, stating that prefixes are not stressed in English, exposes that prefixes can be useful to locate the stress. He suggests that the stress in the word with the prefixes given below is commonly located on the second or third syllable.

be-	begin
in-	infer
dis-	distrust
ex-	extract
un-	undo

Kenworthy (1987 p. 64)

Rule 5 Compound Words: As stated in the Table 2, compound words refer to the words that are consisted of independent words. They can be written in two different ways; they can be written as one word or they can be written with a separation by a hyphen. Roach

(1991) states that there is no clear distinction for these two different way of compound word formation and in the second condition there would not be any indication for a foreign learner about whether to treat the word as a compound or not. The common location of stress on compound nouns is reported to be on the first element by Roach (1991) and Hancock (2003). However such a rule is more applicable to the compounds that combine two nouns. Kenworthy adds the following about the rule for stress pattern of compound nouns “Some compound words are formed from an adjective plus a noun. When the same two words are used separately in a sentence, each word will have equal or independent stress (1987, p.65).

Despite the effort to simplify them in this section of the study, the rules for word stress still seems complex and can be frightening for a learner of English. There are many different interpretations and versions of the rules in the related literature. The efficiency of these rules in pronunciation teaching and learning will be discussed in upcoming section. However to summarize the rules in a more simplified way, it is beneficial to study the following table taken from Kelly’s (2000) study regarding the word stress pattern of English.

Table 3 Rules for Word Stress (Kelly, 2000)

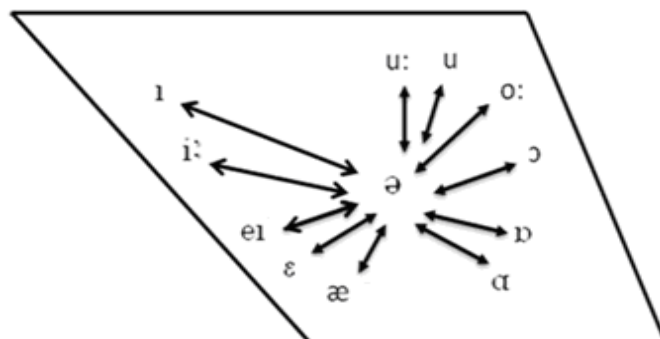
<p>Core vocabulary: Many 'everyday' nouns and adjectives of two-syllabic length are stressed on the first syllable. Examples are: SISter, BROther, MOther, WATer, PAper, TAbLe, COFfee, LOvely etc.</p> <p>Prefixes and suffixes: These are not usually stressed in English. Consider QUletly, oRIGinally, deFECTive, and so on. (Note the exceptions, though, among prefixes, like BIcycle and DISlocate.)</p> <p>Compound words: Words formed from a combination of two words tend to be stressed on the first element. Examples are: POSTman, NEWSpaper, TEApot and CROSSword.</p> <p>Words having a dual role: In the case of words which can be used as either a noun or a verb, the noun will tend to be stressed on the first syllable (in line with the 'core vocabulary' rule above) and the verb on the last syllable (in line with the 'prefix rule'). Examples are IMport (n), imPORT(v); REbel(n) reBEL (v) and INcrease (n), inCREASE (v).</p>
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The word stress pattern of English is not only variable but also mobile according to Kenworthy (1987) and the rules to govern such a variable formation of stress in words have been considered as lacking the property of being universal that is to be applicable every new word by the learners. However the internalization of these rules and the explicit or implicit instruction seems to be able to develop awareness to the word stress pattern and its importance for the communicative competence.

2.1.3 Word Stress Mobility and Phonemic Decay

The rules given in previous section implies that there is a variability of stress placement for a root when a suffix is added. This phenomenon is called as stress mobility. Cruttenden (2008) mentions this change as “word accentual instability” (p.245). Demirezen and Sariçoban (2008) studied the effect of stress mobility and defined it as a problematic part for pronunciation for Turkish people. Stress mobility is described as a condition happens “when a word is enlarged by the addition of prefixes, word-forming suffixes, inflectional and derivational suffixes” by Demirezen and Sariçoban (p. 740). At such a situation, with the effect of the suffixes which has the stress-changing quality, the stress moves on a different syllable. The related rules and examples of such suffixes are shown in previous section. Demirezen (2010a) states that mobility of stress causes an internal sound change which can reduce vowels into schwa /ə/ phoneme. This sound change introduces the condition which is called as phonemic decay or vowel reduction.

Figure 1 Vowel Reduction



The phonemic decay or vowel reduction is a change in a word's vowels in which stress mobility occurs in other words a syllable loses the quality of being primary stress and turns into an unstressed or secondary stress condition which can also be defined as a reduction. When such a change happens in the stress pattern of a word stressed syllable's "vowels are reduced and have somewhat a 'muffled' quality like that of schwa (/ə/) in English (Katamba 1989 cited in Demirezen, Sarıçoban 2008, p.211). Schwa is the vowel that is used in most unstressed syllables (Kenworthy, 1987).

The vowel reduction is especially important for the correct pronunciation when the pairs of words is concerned for which stress pattern creates phonemic changes. Cruttenden gives various examples of such pairs some of them are displayed below.

Table 4 Stress Mobility and Vowel Reduction (Adapted from Cruttenden 2008 p. 249)

	Noun	Verb
accent	'æk sɛnt	ək'sɛnt
digest	'daɪ dʒɛst	dɪ'dʒɛst
torment	'tɔr mənt	tɔr'mɛnt
transfer	'træns fər	trɛns'fɜr
transport	'træns pɔrt	trɛns'pɔrt
	Noun / Adjective	Verb
combine	'kɒm baɪn	kəm'baɪn
compress	'kɒm prɛs	kəm'prɛs
concert	'kɒn sɜrt	kən'sɜrt
conduct	'kɒn dʌkt	kən'dʌkt
consort	'kɒn sɔrt	kən'sɔrt
	Noun / Adjective	Verb
estimate	'ɛs tə mɪt	'ɛs tə mɛɪt
supplement	'sʌp lə mənt	'sʌp lə mɛnt

When such changes occur as seen in the table above learners who are not aware of the word stress mobility and vowel reduction may experience difficulties producing and perceiving the words. This situation actually displays the importance of stress pattern and related dynamics of a word for the pronunciation teaching and learning. Moreover, without the developed awareness towards these issues, the learner is always prone to

develop fossilized errors related to the word stress pattern and schwa sound. Demirezen (2010b) emphasizes the importance of these fossilized errors as they:

...contribute to the change in perceived accent both in the mental lexicon and in the speech of non-native speaking people who cannot naturally obtain the rhythm, melody, and the prosody of the target language whose results will be a pidginized and an unnatural sounding speech in the target language (p.375).

2.1.4 Degrees of Word Stress

Along with the differentiating nature of word stress pattern of English in polysyllabic words, the classification of the word stress in terms of degrees and levels is accepted as an important part to understand the pattern of stress and develop necessary knowledge and awareness.

The degrees, or levels, of stress in English display variation from author to author whose approach the issue differs in terms of phonologic perspective and pedagogical concerns. Moreover the perception of stress and its phonological roots also displays changes and variations along with the new pedagogical approaches to pronunciation education in the history.

Ladefoged (2001) suggests that there are many different levels of stress that can be studied in association with prominence, intonation peak or tonic stress and the existence of a reduced or unreduced vowel in the word. The following table taken from A Course in Phonetics (2001) displays the representation of the factors to consider while studying levels of stress in combination on four example words. The (+) suggest the presence and (-) suggest the absence of the factors in the syllables of the given words.

Table 5 Degrees of Word Stress (Ladefoged 2001)

	explain	explanation	exploit	exploitation
tonic accent	- +	- - - +	- +	- - + -
stress	- +	+ - + -	- +	+ - + -
full vowel	- +	+ - + -	- +	+ + + -

Ladefoged also stated the existence of the multilevel stress system (p. 114) which presents the levels of syllables in a word by giving values from one to four to each syllable in which the higher number means less stress. The numbers given the syllables of the word creates a representational stress pattern of it. In this way, the words in the table above can be shown (41) for 'explain', (2414) for 'explanation', (41) for 'exploit' and (2314) for 'exploitation'. However such a system is defined as impracticable and not useful by Ladefoged since it does not accord with the phonological facts.

Roach (1991) defines the difference of stressed syllable than others with the help of the term, prominence (p.86). According to him, a prominent syllable has four factors distinguishing it from other, unstressed, syllables. The first one is loudness and this quality of a stress is easily perceived the listener. The loudness is actually depends on, or at least created with, the second and third features of a stressed syllable. The second difference about a stressed syllable is length which plays an important role in prominence. The third one is the pitch which is defined as variation in the frequency of vibration in vocal folds. This important element for prominence is also very perceivable for the listener. The fourth and probably the weakest and least important factor for prominence is the quality of the syllable. In English words, this difference generally evident where the /ɪ/, /ʊ/, /ə/ vowels take place in a syllable and make the syllable weak. Similarly, Cruttenden (2008) defines prominence with pitch change, loudness and quality features and, unlike Roach; he distinguishes prominence into four degrees as:

...(a) primary accent, marked by the last major pitch prominence in a word (or longer utterance); (b) secondary accent, marked by a non-final pitch prominence in a word (or longer utterance); (c) a minor prominence produced by the occurrence of a full vowel without pitch prominence; (d) a non-prominent syllable containing no pitch prominence and one of the reduced vowels /ɪ, ʊ, ə/ (p. 237).

Roach (1991) shares a common point with the perception of stress stated above by Ladefoged and that is the unnecessary complexity of the division of stress more than three levels. He classifies word stress in three levels, the primary stress which roots from a high pitch movement or tone and the secondary stress which is relatively weaker

than primary stress but stronger than a syllable with no recognizable prominence which created the other level of stress stated as unstressed by Roach.

Kenworthy (1987), also states that the stress pattern of English can be divided into two levels as stressed and unstressed on syllables. But he also recognizes another level of stress. Unlike the first two explanations regarding the nature of stress levels in English words, he emphasizes that the tertiary stress, which is called as unstressed by Roach, can only be recognizable and effective when the word is said in isolation, when the word is in a position in a sentence where it is very strongly stressed or when full vowels are used (p. 62).

The level of stress was also distinguished with a phonetic approach into four different types by Jones (cited in Trask, 1996 p. 336) as crescendo, diminuendo and crescendo-diminuendo. However, the early studies are revised and renewed by new studies with improved technology and most of them are stated as being insufficient in certain aspects nevertheless they bear great importance as they have created the base of this field of study.

In this thesis four different stress phonemes are accepted which were described by Demirezen& Sariçoban (2009) as: “There are four stress phonemes in English, which are / ˈ ˌ ː ˒ /, which are respectively called primary-secondary-tertiary-weak stress” (p.739). However, as the main problem of most learners in pronunciation related to word stress is the location primary stress, this research focuses on the primary stress and its mobility.

2.2 TEACHING OF WORD STRESS IN ENGLISH

Word stress is an integral part of English language and it has the importance to set the very basic quality of oral communication. Kenworthy(1987) states that native speakers of English largely rely on stress pattern of words to identify the words correctly and most of the problems occurring during the communication between non native speakers and native speakers stems from the lack of emphasis on word stress patterns.

However the correct application of stress in words is a demanding skill and knowledge as the word stress pattern of English does not have concrete rules to apply every new word for foreign English learners. Despite this difficulty, considering its importance for communication, word stress pattern must be emphasized and given importance in pronunciation education.

This section aims to display importance of word stress in terms of intelligibility and the place of stress teaching and approaches to it in the current pronunciation teaching of English.

2.2.1 Intelligibility and Accuracy

Intelligibility is today's ultimate aim in foreign language education especially in pronunciation education. Developing an ability of pronunciation exactly equal to a native's pronunciation is a too demanding and complex aim and therefore it is not seen as a desired and necessary condition. Today the aim set for the pronunciation teaching is intelligibility. Kenworthy (1987) defines the intelligibility with two different approaches; the first one is a general definition which directly refers to 'understandability' but she makes this definition more applicable by referring to practice and defines intelligibility as for a more operational definition, one that we can 'put to work': 'The more words a listener is able to identify accurately when said by a particular speaker, the more intelligible that speaker is. (p. 13)'.

Intelligibility can be said as an aim emerged from the changing nature of English language use around the world. Today, English is the international language which conveys messages between different language's speakers. Jenkins (2000a) states that after the introduction of Critical Period Hypothesis, despite some shortcoming parts of it, a change has occurred in foreign language teaching process which is the increased emphasis on intelligibility rather than the effort of developing a native like accent. Jenkins, after modifying the Jenner's (1989) work which is titled as Common Core, also proposed a new target for pronunciation teaching known as the Lingua Franca Core.

The Lingua Franca Core is especially important for this study as it gives emphasis on stress pattern as a core and non-core feature. Jenkins (2000a) handles the word stress as a core feature by stating ‘production and placement of nuclear (tonic) stress within tone groups (p. 2)’. This feature may be seen a little far away from the scope of the current study but the relation of tonic stress and word stress cannot be ignored. The classification of non-core features of the Lingua Franca core includes the following: “The placement of word-stress, although at the time of writing it seems possible that new English as an international language (EIL) word stress rules may be emerging, and if so, then these will eventually become the norm in English as an international language” (p. 3). These can be interpreted as the importance and further change in word stress pattern of English.

Jenkins (2000b) states that the difference of L1 and L2’s word stress patterns, as with the Turkish and English word stress patterns, can cause serious intelligibility problems at the level of production for both L1 and L2 receiver (p. 40). Jenkins (2000b) also criticizes the lack emphasis of EIL data regarding word stress and states that it can be a real factor for the unintelligibility between the users of English.

However the opposition against the “English as a Lingua Franca” with concerns toward its negative effects on intelligibility should not be forgotten. Wells (2010a) is largely concerned with the approach of the advocates of teaching English as Lingua Franca since he claims that they ignore some key element of phonetics and phonology for the sake of simplicity and easiness. He also mentions English as a Lingua Franca as “our old friend/enemy” while complaining the clumsy English displayed on a Call for Papers announcement e-mail for a conference called ICT 2010 (Wells, 2010b).

Along with the intelligibility, accuracy is also very important especially for the people who teach English. Most of the English language teachers’ erratic articulation and pronunciation lead to the development of the fossilized pronunciation error for the learners. Therefore, the language teachers may aim developing the skills enough for the intelligibility but they should not accept the intelligibility as an aim affecting their own pronunciation. The accuracy of pronunciation a language teacher carries utmost importance as he or she constitutes the role model for the learners.

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In sum, intelligibility's importance cannot be disregarded as a goal of teaching English and related skills including the pronunciation. However, intelligibility can also be used as an undesired perspective which deteriorates the certain key points of the language and actually cause unintelligibility. Therefore the language teachers and learners must be aware of the fact that intelligibility refers to an effort to locate the foreign language at a level that is easy to teach and learn, and more importantly communicate with, not the simplification or deterioration of the language structure.

2.2.2 Pronunciation Teaching

Having stated the importance of intelligibility as the ultimate aim for pronunciation teaching, we may now analyze different views on the current approach to pronunciation teaching and locate the areas where the word stress pattern should be an item to study in the classroom. The significance of word stress along with other suprasegmental features of the language and the implications of them on classroom practices will also be stated in this section.

Kelly (2000) states the reason for pronunciation teaching by giving the example of a learner who constantly mispronounces a range of phonemes can be unintelligible for people from other language communities and despite a good competence in grammar and vocabulary the learner may have difficulties in understanding and being understood by a native speaker (2000 p.11) He also states inaccurate use of suprasegmental features cause problems. Kenworthy (1987) listed the roles of teacher in terms of pronunciation education as helping learners hear, helping learners make sounds, providing feedback,

pointing out what is going on, establishing priorities, devising activities and assessing the process.

Byrne (1987) studied the roles of teacher and learner in pronunciation teaching based on the levels of the process. The role of teacher is stated as the informant and the centre in presentation stage, in practice stage the teacher is the conductor and the monitor of the process and in the production stage they function as manager and guide (Byrne 1987, p.2). The problems of communication in the classroom and the points to consider to overcome these problems are also stated by Byrne (1987) as:

- a) Communication in the classroom is not quite the same as 'real life' (although the classroom has its own reality). In a sense, everything is contrived or the results of things that have been contrived. This does not mean, of course, that the students will perceive it in this way or that they will benefit less from it.
- b) Communication will often seem a little less than adequate. The students are all the time learning the language as they try it out and, since we cannot postpone these activities which are essential in building up communication skills, we must be satisfied with what they try to do and overlook their shortcomings. (p. 5)

Gilbert (2008) points to another view over the current condition of pronunciation teaching in English language learning classroom. She defines the common problem as:

...teachers often find that they do not have enough time in class to give proper attention to this aspect of English instruction. When they do find the time to address pronunciation, the instruction often amounts to the presentation and practice of a series of tedious and seemingly unrelated topics. Drilling sounds over and over again (e.g., minimal pair work) often leads to discouraging results, and discouraged students and teachers end up wanting to avoid pronunciation altogether. (p. 1)

Considering these views, it is not easy to define pronunciation teaching as a challenge-free and easy task. However, the importance of pronunciation cannot be ignored therefore the teaching and learning it should be given adequate emphasis and time. One of the most common solutions, which is rather superficial, to these difficulties and challenges is claiming that pronunciation should not be taught explicitly but should

rather be allowed to develop naturally as a byproduct of attempts by students to communicate (Pennington, 1989 p.20). Pennington states that the insufficient amount of studies displaying that the self-building pronunciation is possible and certain teaching processes and practices have positive effect on pronunciation teaching. Pennington suggests a top-down approach to phonology against the traditional methods of that time and states that technology can help learners to develop necessary skills for adequate pronunciation.

One of the most important parts of the pronunciation teaching is making the learning task more conceptual (Stern, 1983). The traditional way of pronunciation teaching was, and is in common, based on activities to teach how to pronounce the sound pattern of the lexical items. However Stern (1983) suggest that such effort is just teaching a sensorimotor skill and without instruction about the nature of the language to be learnt, difference of the sounds between the L1 and foreign language and phonological explanation regarding these phenomena, the learning task is far to be conceptual (p.310). Therefore the pronunciation teaching should include not only drills and practices but also phonological information detailed and appropriate enough to the level of the learner.

Wells (2005) suggests two questions for teachers to address in order to define the goals of pronunciation teaching (p.1). The first question is “Are we teaching EFL, ESL or EIL?” For the answer, Wells states that it is not possible anymore for the learners to choose between EFL and EIL since the English is today used as the lingua franca and therefore any learner who aims to learn English will use it for communicating to non native speakers of English. The second question, on the other hand, is more applicable in terms of communication among non native speakers; it asks “Do you and your students want to be able to interact with native speakers or only with non-native speakers?” Here the answer is actually related to the answer of the first question; however, it can contain more detailed information about the aim of the learners. If the learners aim to have an international use of English, they need to consider both native speakers and non-native speakers. On the other hand, if the aim is to communicate with the members of a specific language community, for specific purposes such as

commercial interaction, then the focus should maybe moved on the aspects of language stated in the Lingua Franca Core by Jenkins (2000a).

Lim (2010) in Colorado State University's "Teaching Guide: ESL Volunteer Guide" states the ingredients of the pronunciation as "word stress, sentence stress, intonation, and word linking" along with the individual sounds of English (p. 1). And she summarizes the importance and goal of English pronunciation teaching as:

"English pronunciation involves too many complexities for learners to strive for a complete elimination of accent, but improving pronunciation will boost self esteem, facilitate communication, and possibly lead to a better job or a least more respect in the workplace. Effective communication is of greatest importance...remember that your students also need to learn strategies for dealing with misunderstandings, since native pronunciation is for most an unrealistic goal."

Along with the shared ideas related to the importance of pronunciation teaching and advices to consider to realize the chosen goals of pronunciation, the importance given to stress pattern and other suprasegmental elements of pronunciation should not be ignored within the perspectives of different authors stated above.

2.2.3 Word Stress in Pronunciation Teaching Texts

The approach to pronunciation may differentiate among different authors and pedagogical perspectives as states in the previous section. However, despite the uncertainty and difference among views regarding the approach to pronunciation teaching, many writers have stated exercises and guidelines for word stress pattern of English. This section aims to display a view of the place of word stress in terms of given importance and the way of introduction of the issue from course books aimed for learners and books aimed for teachers and advanced learners.

Orion (1997) is obviously more focused on the word stress pattern since the subtitle of the book is "Sounds, Stress and Intonation". She presents the instruction and exercises for each sound in English in a detailed way after the introduction and separate units

related to the word stress. Units which are based on instruction about word stress are given under “Part 2- Stress and Intonation” (p. 18). These units are “Identifying Syllables”, “Syllable Stress”, “Reduced Vowels in Unstressed Syllables”, “Stress in Words with Prefixes and Suffixes”, “Shifts in Stress”, and “Stress in Compound Nouns”. There are also parts between the units entitled “Check your Listening” where the students are expected to listen to the recordings and do the exercises most of which are based on locating a stress. Orion explains the importance given to stress in the book in the introduction part as:

“In this text, stress and intonation are presented first for a reason. The reason is if you do not learn the stress and intonation patterns of American English, no matter how well you articulate the individual sounds of the language, you will still not be easily understood. Neither will you easily understand what is said. Research has shown that while communication is taking place, the native English speaker relies more on stress and intonation to understand what one is saying than on the individual sounds of the language (p. 18).”

Hancock (2003) spares five units in his book for word stress and he handles the issue explicitly. After introduction in each unit, certain rules and examples of these are given along with some examples of exceptions. The instruction in the units is supported with audio samples located in the CD. Each unit is followed by one exercise page where the structures and rules are put into use by learners. While some of these exercises are paper based, others are based on and supported by the recordings given via CD with the book. The order of titles of the units can reflect the approach to the word stress teaching which are “Stress in two-syllable words”, “Stress in compound words”, “Stress in longer words” and “Stress in longer words 2”. The last two units mainly deal with the effect of affixation on word stress pattern.

Hewings (2008) also handles the word stress under separate units and with detailed examples. The number of examples, exercises and detailed descriptions about the stress pattern and prominence may provide the opportunity to compare the change in stress pattern for learners. This book is also includes a sound CD which includes parts of instruction and exercise. Hewing handled the word stress with more detail than the

previous books stated above and he spared 11 units titled as “Word stress and prominence”, “Suffixes and word stress 1, 2, 3”, “Prefixes and word stress 1, 2”, “Stress in compound nouns”, “Stress in compound adjectives”, “Stress in longer compound nouns”, “One-stress phrasal verbs” and “Two-stress phrasal verbs”.

The common aspects of these three course books aimed for learners of English is that they all provide audio samples to use in instruction and in exercises. Therefore, it can be concluded that the audio CD is an important element for pronunciation education as it enhances learning by creating different types of exercises. Another shared point is that the flow of the instruction beginning from syllable level and developing to compound nouns so we can see an easy to complex path for the instruction. However these texts are course books and they are meant to be studied under the supervision or guidance of a teacher.

There are also some important notions in the books that are rather aimed for language teachers or advanced learners. These are especially important to understand the flow of the classroom instruction to help learners to realize and understand the use and the importance of the word stress pattern of English. They are also quite beneficial to display the point to begin and the path to follow while introducing the topic to the learners.

Kenworthy (1987) emphasizes the importance of building awareness and the development of the concern for pronunciation by students. He states the scope of this concern as: “they must recognize that poor, unintelligible speech will make their attempts at conversing frustrating and unpleasant both for themselves and for their listeners” (p. 27). She gives exercises and activities to develop the awareness for two different levels; the first one is for lower level and these activities are based on proper names and place names while the second set of activities are for more advanced learners and focused on the study of the lexical items that display degrees of word stress. The activities on the first level aim developing awareness toward the word stress on the other hand the second level aims developing strategies for assigning and locating word stress for new learned lexical items.

Roach (1991) begins the introduction of word stress with the stressed syllable and prominence relation. He identifies what makes a stressed syllable different and prominent than others. This first part is followed by “Levels of stress” and “Placement of stress within the word” giving detailed information and rules toward the word stress. At the end of this first unit entitled “Word stress in simple words”, Roach states the pedagogical concerns related to the complexity of the word stress teaching and two different notions related to it. The first notion towards the word stress is that it is too complex and cannot be predictable by sets of rules therefore word stress pattern for each word should be learnt individually while learning the word itself. The second notion is that although the complexity of the task, the rules about the word stress must be taught and learnt. However, Roach disagrees with the second one as it can be confusing and too complex for learners and citing Kingdon’s work on the stress tendencies in a corpus the analysis he states that phonological structure can be insufficient to understand the word stress and etymology and morphology should also be referred. Although he displays the sets of rules, Roach is obviously advocates the learning of word stress pattern of English integrated with the vocabulary learning.

Kreidler (2004) handles the word stress with a distant approach to classroom activities however he gives valuable information about the nature of the stress and the rules governing it. Unlike his previous study (2002) in which he studied phonological and morphological structure of word stress, he studies the rules of stress under the classification of information source and states: “Stress rules are based on three kinds of information: syntactic, morphological, and phonological (p. 180)”. After detailed instruction about the rules for simple words and complex words, he emphasizes the importance of neutral suffix recognition for the correct construction of word stress pattern. The following units are based on stress on compound nouns and phrases; therefore Kreidler can be said following a step by step instruction from word stress to sentence stress.

Cruttenden (2008) studies the word stress under the title “Word Accent”, however the current study considers “the word stress” as the term to identify the same suprasegmental feature. Cruttenden studies the rules of word stress similarly to the authors mentioned above. In the section titled “Word Accent—Advice to Foreign

Learners”, he reminds the fact that English does not have a regular stress pattern which may be different from the learners’ native language. He states that despite the lack of regular stress pattern there are tendencies regarding the issue and learning these tendencies may help the learner to develop a correct command on word stress pattern of English.

Whether to call them as rules or tendencies, English language has a certain, yet variable with exceptions, way towards the word stress pattern. Most of the course books and texts related to teaching of word stress display these rules and tendencies after establishing sufficient knowledge about syllables and developing awareness towards the issue. This section was aimed to gather information about the nature of word stress and the way of classroom instruction to develop a solid base of knowledge and information to be used in the software application as a result of the current study.

2.3 COMPUTER AIDED PRONUNCIATION (CAP) PEDAGOGY

This section mainly deals with the interaction between computers, English language teaching and pronunciation. Computer aided pronunciation (CAP) bears importance for this study, therefore the focus is on this part of the interaction stated above. To begin with, the concept and history of CAP should be studied and understood parallel with the development history of technology and computer assisted language learning (CALL). Computer-assisted language learning (CALL) has been defined as "the search for and study of applications on the computer in language teaching and learning" (Levy, 1997, p. 1). The three areas, technology, language teaching and pronunciation pedagogy, are very strictly connected to each other and a difference in one of them generally triggers a wave of innovation or revision for others.

2.3.1 History and Types of CALL

The changes in the history of technology and the implication of the evolution can be seen on Delcloque’s (2000) web exhibition regarding the history of CALL. By the help of this visual timetable, the beginning for the development of technology in the way which will connect to language teaching and learning field can be said to start in 1876,

the year Alexander Graham Bell invented the telephone. Telephone is definitely an important item for the teaching English as a foreign language as it caused many tremendous changes on how a foreign language is perceived as a way of communication. In 1882, Bell introduced the gramophone which was the oldest data storage system in a way. The tabulating machine, which was a kind of a giant calculator, opened the way for computational technology in 1890; later it would be the International Business Machine (IBM). The processing and storing of data on devices at this era also inspired people to use the way of information handled at that time in education. In 1911, the first record players for education were introduced. After the first computers like Z1 and ENIAC, Norbert Wiener introduced the term cybernetics after studies on communication theories in 1945. Following the first commercial mainframe computers and the first computer assisted learning program, PLATO (Programmed Logic for Automated Teaching Operations) in 1960, technology started moving with giant leaps which inevitably changed the place of technology and science in every aspect of life. The spread of computers, development in multimedia capacity of computer technology and the introduction of the World Wide Web for public use are the milestones for computer- education- communication interaction.

Along with the history of computer and communication technologies, the CALL history itself is studied under three phases by Warschauer and Healey in 1998 (cited in Bax, 2003). The classification is "Behaviouristic", "Communicative" and "Integrative" phases of CALL. Actually, considering just the order of these phases, one can see direct link with the development of different methods and approaches to foreign language teaching. However, Bax (2003) states that there are some inconsistencies and unclear points with such a classification and thus suggests a new approach to the history of CALL. His first term to define the earlier history of CALL is the "Restricted CALL" which is slightly similar to Behavioristic Phase. Bax states the reason for the choice of this term and the lacking point of the previous one by:

...'Restricted' is more satisfactory since it allows us to refer not only to a supposed underlying theory of learning but also to the actual software and activity types in use at the time..., other dimensions all were relatively 'restricted', but not all were 'behaviourist' (p. 20)

The second part is “Open CALL”, and the final part is the “Integrative CALL” which is valid according to Bax. He defines these three parts of the history of CALL in Table 6.

Table 6 is specifically defines the current, at least the desired, attitude of CALL on the Integrated CALL row. What this paper aims, as a product, is planned to fit or at least share some common features with the definition given in the table. However the broad definition and guidelines at this point is not enough for the development of a new software application thus the rest of this section will deal with the CALL and Pronunciation interaction and integration

Table 6 CALL Overview (Bax, 2003)

Content	<i>Restricted CALL</i> Language system	<i>Open CALL</i> System and skills	<i>Integrated CALL</i> Integrated language skills work Mixed skills and system
Type of task	Closed drills Quizzes	Simulations Games CMC	CMC WP e-mail
Type of student activity	Text reconstruction Answering closed questions Minimal interaction with other students	Interacting with the computer Occasional interaction with other students	Frequent interaction with other students Some interaction with computer through the lesson
Type of feedback	Correct/incorrect	Focus of linguistic skills development Open, flexible	Interpreting, evaluating, commenting, stimulating thought
Teacher attitudes	Exaggerated fear and/, or awe	Exaggerated fear and/or awe	Normal part of teaching—normalized
Position in curriculum	Not integrated into syllabus—optional extra Technology precedes syllabus and learner needs	Toy Not integrated into syllabus—optional extra Technology precedes syllabus and learner needs	Tool for learning Normalised integrated into syllabus, adapted to learners' needs <i>Analysis of needs and context precedes decisions about technology</i>
Position in lesson	Whole CALL lesson	Whole CALL lesson	Smaller part of every lesson
Physical position of computer	Separate computer lab	Separate lab—perhaps devoted to languages	In every classroom, on every desk, in every bag

2.3.2 CALL for Pronunciation: CAP

A detailed description of the expectations of pronunciation teaching is stated by Pennington (1999) which will act as the guideline for the current study’s aim and effort to develop a software application focusing on the word stress pattern of English.

Pennington first focuses on the needs of adult learners, especially the difficulties for them to acquire necessary skills for pronunciation as their critical period has passed leaving traces of embedded native language effect as obstacles. She states the importance of CAP as:

“Computer-aided pronunciation (CAP) offers a medium for increasing users' access to their own and others' pronunciation performance and underlying phonological systems, for focusing their attention on phonology, and for acquiring new pronunciation patterns (p. 428)”

After stating the current capacity and potential power of technology for the development of materials and applications for pronunciation teaching, she emphasizes the most beneficial abilities of pronunciation teaching software are rapid analysis of the users' pronunciation and feedback in a reliable way. The feedback feature of the software can be in a multi model presentation bringing different multimedia representations together. Pennington summarizes “the Properties, Potentials and Limitations of Computer-Aided Pronunciation (CAP) Pedagogy” in a table which is given below.

Table 7 Pros and Cons of CAP (Pennington 1999)

Pros	CAP is	Cons
Motivating	<i>quick</i>	Restricted to some features
Stimulates effort	<i>repeatable</i>	Limited for whole-class use
Raises awareness	<i>precise</i>	Analysis must be adjusted for different voices
Increases understanding	<i>reliable</i>	No baseline for acceptable performance
Enhances learnability	<i>authoritative</i>	Weak curriculum
Increases automaticity	<i>highly salient</i>	Focus on decontextualized articulatory mechanics
Fosters precision	<i>multi-modal</i>	
Builds confidence	<i>individual</i>	
Develops skills	<i>variable</i>	

Along with the ones stated in Table 7, the limitations of this technology are stated by her as the incompatibility of some certain aspects of pronunciation to visual representation therefore the need of awareness raising for users and the developers of such application is an important element. The other important drawback of the

pronunciation teaching software applications are about the users' position as individual learners since most of the current pronunciation teaching software is not suitable for classroom teaching.

Eskenazi (1999a) also puts forward some recommendations to consider while utilizing and developing CAP software applications by referring studies of (Kenworthy, 1987; Laroy, 1995; Richards and Rodgers, 1986; Celce Murcia & Goodwin, 1991), these recommendations are: (1) The database should provide large quantities of speech, (2) The database should provide speech from different native speakers, (3) Learner should be able to produce utterances (4) and receive pertinent feedback, (5) The context of the speech provided by the software application should be significant, (6) The software application should have the qualities of being able to increase motivation and self confidence, (7) The process should be assessed and monitored by the teacher (p. 448). He concludes from the research based on speech-interactive CALL that such technology can help pronunciation instruction however he emphasizes that there is still need for further analysis of the effectiveness of computer use in pronunciation and space for development for further techniques and approaches to the interaction of computers and their classroom applications.

The most important aspect of Pennington's work regarding CAP is the path to follow for the developer and devisers of such software applications. The route is given step by step and includes these key checkpoints; first of all "Start from a theoretical position", then "Establish a baseline for pronunciation" and "Set an overall goal for performance" which will be followed by "Build in specific targets for performance" and "Build skills in stages". The route goes on with "Link pronunciation to other learning and communicative goals", "Design on a principled curriculum", "Design based on creative use of properties of computer medium" which is infinite with current computer and multimedia technology and "Raise awareness of contrast with L1 and range of targets for L2" and finally "Provide for exploration of database"(p. 433). Despite some complexities, these ten items are not only the instructions to build the most effective software application but a set of good criteria to evaluate the software developed for pronunciation teaching.

2.3.3 Key Technologies for CAP

As stated in the detailed expectations from, potential and limitations of Computer assisted Pronunciation by Pennington (1999), the fast and accurate analysis and rapid feedback features of computer technology regarding pronunciation teaching bear utmost importance. However, the conceptualization of these aims and realization of them largely depend on a certain aspect of technology which is speech recognition (Holmes and Holmes 2001). The other key element of technology related to CAP, especially when it comes to producing or collecting samples, which can be used either the teaching material or the feedback element, is speech synthesis. Eskenazi (1999b), on the other hand, uses the term “speech processing technologies” to define the computer based speech analysis and production. The following sections aims to provide brief information related to these technologies and their qualities.

2.3.3.1 Speech Recognition

The speech recognition on computer technology is known as Automatic Speech Recognition (ASR). Holmes and Holmes (2001) reports that the earlier studies for speech recognition started at 1950's however these studies were based on the foundation of rules for speech signals for different speech sounds. ASR systems generally work on the principle of comparing the stored data, acoustic patterns, in the machine with the speech sound of the user. This comparison can be done with various techniques as pitch analysis, time alignment analysis and at different levels such as isolated word analysis, connected and continuous speech analysis. The success of an ASR application generally depends on the quality of the sound of speech which is connected with the background noise, the user's tone and way of speaking. To overcome these problems and increase the efficiency of recognition dynamic programming (DP) was developed and it is now a very common form of analysis used in speech recognizers. DP is actually a mathematical technique and also known as dynamic time warping (DTW) (Holmes & Holmes 2001).

The technology in this field is constantly developing and the large storage capabilities of computers enable ASR to contain more samples to analyze the speech. More

advanced ASR technologies have a rather flexible construction and can create a unique database for each user. The common uses of ASR are studied by Tan and Lindberg (2008) on mobile devices and over communication networks and they distinguished these uses under three main titles which are Network Speech Recognition, Distributed Speech Recognition and Embedded Speech Recognition (p. 20). Although these areas are not directly linked to language education, the potential of ASR for language education can be seen at the mediums it functions. Despite the complexity and problems varying from software to software ASR is frequently used to provide feedback in pronunciation education however the feedback is generally based on visual representation or complex calculations. Although without a proper pedagogical and theoretical base such feedback cannot be claimed as beneficial for the learner as stated by Pennington (1999), the capacity of ASR, in co-operation with user training, can create effective educational implication for pronunciation teaching and learning.

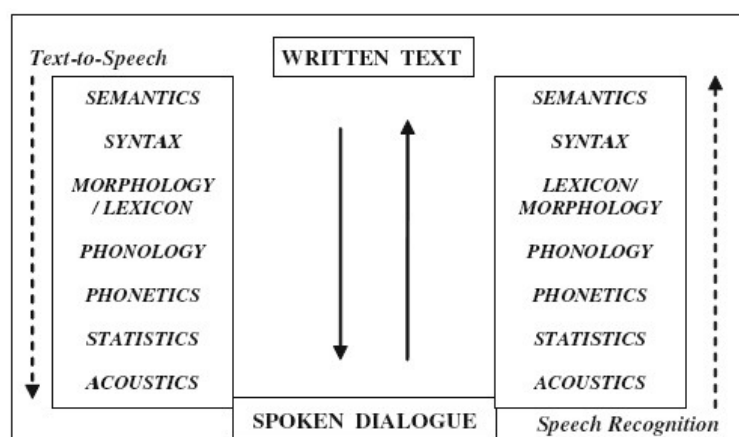
2.3.3.2 Speech Synthesis

Speech synthesis unlike ASR is the production of speech by the computer. Many voice dictionaries and readers for visually impaired people uses text-to-speech synthesis (TTS) which is more directly related to educational purposes. However the issue related to naturalness of the TTS should be taken into consideration especially when used in pronunciation education. Holland and Fisher (2008) refer to this issue as stating the need for deeper representations of knowledge of the world and of language to guide the placement of stress and intonation in speech in order to achieve human-like speech synthesized by computers. One of the common uses of TTS is the production of listening materials for listening comprehension since TTS can provide various opportunities such as choosing speed and type of voice and choosing a specific part to listen from a text. TTS is also used for checking the pronunciation of words by many learners from multimedia dictionaries especially the ones located on the Web. The other potential for TTS, by manipulating the samples from speech or part of a speech by changing vowel length, vowel quality, and stress position, the samples can be used to improve the awareness of students towards elements of pronunciation. Dynamic Programming (DP), stated in previous section, is also used for creating the desired

product from TTS. The sound pattern, stress and intonation of the utterances and sentences are basically defined by the phonetic rules but variations are created by the DP (Holmes & Holmes 2001).

Holland and Fisher (2008) displays the interaction and similarities between ASR and TTS as follows:

Table 8 ASR and TTS (Holland and Fisher, 2008)



As seen in the table, both technologies have links with semantics, syntax, morphology, phonology, phonetics, statistics and acoustics and follow the steps to produce speech or written text. The table is especially important to realize the focus of ASR and TTS technologies and the interdisciplinary nature between the linguistics and its subfields.

2.3.4 Word Stress Pattern Teaching in CAP

The opportunities of CAP by the help of ASR and TTS may imply that suprasegmental features of languages like word stress pattern have the ability to be handles and taught through computers. Suprasegmental teaching and feed back is referred as one the trends in voice interactive CALL by Ehsani and Knodt (1998). They also stated that visual displays can and have been used to provide valuable pronunciation feedback to students which are more beneficial when combining both visual and audio feedback (p.62).

Similarly Hincks and Edlund (2009) studied the potential and the opportunities of CAP and specifically emphasized the importance of visual feedback and note that

visualization of pitch movement is beneficial but the fact that current techniques have limitations should not be ignored (p. 36). Therefore the ASR technology is one the most applicable technology for words stress teaching through computers as it enables the learners to see the visual representation of their pronunciation and compare it with the sample provided by the software application. However these visual representations may be abstract and confusing for learners as stated by Shudong, Higgins, & Shima (2005) therefore the realization of such confusions before the software application is developed carries great importance.

TTS also have certain limitations in terms of stress pattern in language. As TTS reads a text aloud, the stress pattern of the sentence or any phrase or word in a context can be a problem. TTS only works on the sound production in connected ways to mimic the human speech, it cannot, at least for now, locate the stress pattern based on the meaning of the sentence and intention of the speaker. Holmes & Holmes (2001) describe this problem as

“...in many cases truly expressive prosody cannot be obtained without really understanding the meaning of the text. However, although some simple semantic effects are sometimes incorporated, comprehensive semantic and pragmatic analyses are beyond the capabilities of current TTS systems (p 97)”.

Despite the limitations, the computer, ASR and TTS technology provides a beneficial, open-to-develop and effective medium to language teaching and learning along with the CAP. However the application of such systems bring along some certain difficulties and challenges. The most important one of these is the financial requirements which seems pretty demanding if learners are expected to afford the cost of such software applications. The second one is probably about the same challenge with the introduction of new technology in every field which is the hesitation and fear to use these innovations. Bax (2003) suggest a process of normalization for the acceptance of new technology, which is CALL in the scope of his study, and he orders certain steps for this process. These are:

“1. Early Adopters. A few teachers and schools adopt the technology out of curiosity.

2. Ignorance/ skepticism. However, most people are skeptical, or ignorant of its existence.
3. Try once. People try it out but reject it because of early problems.
4. Try again. Someone tells them it really works. They try again. They see it does in fact have relative advantage.
5. Fear/awe. More people start to use it, but still there is (a) fear, alternating with (b) exaggerated expectations.
6. Normalising. Gradually it is seen as something normal.
7. Normalisation. The technology is so integrated into our lives that it becomes invisible” (Bax, 2003 p.24-25)

For CAP, we can say we are about to pass to stage 6 since we still have fears, hesitations and unrealistic expectations related to CAP and the technologies adaptable to pronunciation teaching. However the use of software for language teaching and learning has gained popularity and spread to a large medium in terms of device, type of application, scope and aims.

The importance of the word stress is presented in a clear way with examples displaying meaning changes, function changes and also changes in grammatical category with a slight movement of the stress within a word. The promise, capacity and the key elements of the CAP pedagogy are also stated in an elaborative way at this final section of the research. These two connected fields of study’s intersection can be located on the problematic pronunciation and fossilized mistakes of Turkish students on the word stress pattern and the related dynamics of these patterns which are vowel decay and stress mobility. Therefore the opportunities and abilities of the CAP pedagogy can be used to enhance the teaching and learning of word stress pattern and lessens the level of complexity experienced by the learners through the multimedia presentation and exercise using the technology of the computers and software application. Actually, this probability is chosen as the aim of this research and the following section present the information related to the realization and application of the project step by step.

CHAPTER 3

METHOD

3. INTRODUCTION

In the first chapter of this research, brief information about the problem of the study, the research questions which set the framework for the study have been presented. Chapter 2, the review of literature which provides the background information for the study has focused on the areas which are important for the process of research.

The aim of this study is to find out the effects of computer aided pronunciation teaching on the participant's awareness and command on word stress pattern of English language. In order to do so, a software application focusing directly on the word stress pattern of English was developed after the research on the CAP pedagogy and related studies in previous chapter. The aim of this chapter is to present the methodological issues regarding the participants, teaching material, instruments and data collection instruments.

3.1 RESEARCH QUESTIONS

In order to have a better understanding regarding the rationale employed throughout the study, it is important to examine the research questions which define the aims of the current research on teaching word stress pattern of English language through computers. In the research following questions are posed:

1. To what extent do the freshman students of ELT department at Hacettepe University have a command of word stress pattern of English?
2. To what extend is the software developed for this study effective on developing awareness and sufficient skills related to word stress pattern of English?

3. Do the participants of the study have positive or negative attitudes towards the use and the quality of contents of the software used in the research?

3.2 DESIGN OF THE STUDY

Parallel with the research questions of the study stated in the previous section, the study was designed to be conducted in three main steps. As the software application developed for the study can be classified as an extra curricular application and an aid for the classroom instruction, the steps in the study aimed to see the effects of the introduction of the software application on the participants.

In the first step data, voice recordings, regarding the prior knowledge and command of participants to the word stress pattern of English are gathered. The second step was based on the introduction of the software application, distribution of it and brief online and offline sessions with participants to give information about the use of the software application. In the third step the voice recordings of the participants and the log files were gathered and the analysis of these data was conducted to answer the research questions.

The amount of time spent by the participants on the software application were planned to be five weeks and the duration of their interaction with the software application was presented by the log file generated by the application. This feature of the software enabled the analysis of the amount of time spent by the users on the software application.

The interaction between the researcher and the participants took place online mostly which enabled fast written and verbal communication enriched by visuals. This easy and fast communication was also very beneficial for the solution of technical problems or any concerns related to the participants control over the software application.

3.3 SETTING AND PARTICIPANTS

The study was conducted at English Language Teaching Department at Hacettepe University, Ankara, Turkey. Convenience sampling method was used in the selection of participants who are 5 male and 16 female freshman students. Although the number of participants was aimed to be 30, 9 students left the research process due to their limited access to computer and the Internet leaving 21 participants. The number of the participants was aimed to be kept at a level which will be enough for statistically meaningful results and is reasonable for the detailed process and analysis of the possible improvement considering the demanding process and duration.

The study was carried out at the second semester of academic year 2009-2010. The duration of the application and the data collection procedure was 7 weeks. Prior to the 5 week period of the participants' interaction with the software application, voice samples were taken as pre-test and to analyze the effect of the software new voice samples gathered after the 5 week application.

3.4 INSTRUMENTS

The instruments used in the current study can be presented in two groups according to their aims, one is for the software application as the teaching material and aid for CAP and the other group is for data collection. For both groups of instrument, the study aimed to be original and develop necessary software applications as instruments to the point.

3.4.1 Software Application for Data Collection

As the study is based on the participants command on the word stress pattern of English language, the voice recordings were at utmost importance as the data. To collect such data can be time consuming for participants if the voice to be recorded by the researcher therefore other methods were searched for this process and the most effective method was found to be active, individual contribution from the participants. However, despite

the large number software applications for voice recording, certain shortcomings of these such as limited recording time and the complex and time consuming converting process of wav format sound recording into MP3 format are taken into consideration. The action taken to overcome this potential problem was to develop a simple voice recording software application that converts the wav format into MP3 format simultaneously. The only chore for the participant was to send the MP3 format to the researcher. The following picture displays the voice recording software.

Figure 2 *Voice Recording Software*



For the instruction of how to use this simple software application, e-mails sent to the participants, also an online blog page (<http://callwordstress.blogspot.com/>) was opened however after this first initial step, the activity and updates on blog page was stopped due to the issues of copyright and distribution agreement made with Pearson Education Limited for the “Word Stress Practice Software” (WSPS) developed for this study. Some participants also recorded their voice through other software application and their mobile phones.

The most crucial point here was the variation of the recordings in terms of voice level and quality that basically depends on the used software application, the hardware which is the microphone and the background noise. These variations of the quality of sound recordings had the biggest potential for the data collection process. However the sound filters provided by digital audio editor Audacity helped the process to edit the voice samples from the participants and regularize the differences. “Click Removal”, “Noise Removal”, “Normalize”, “Glame High Pass Filter” and “Glame Low Pass Filter” were used in this step to clean the problematic parts and editing process. Despite the effort

some undesired effects stayed same at a level which is not decaying the quality of analysis as the analysis of the sound samples were done according to the pitch level visualization generated by PRAAT version 5.1.32 and co-rating with an independent rater.

The software application developed for voice recording was used at both pre and post step of the period of WSPS use by the participant. The detailed description of WSPS is presented in the next section.

3.4.2 Software Application for CAP

The software application developed for the enhancement of learning word stress pattern was developed and devised by the researcher with the humongous amount of help regarding the pedagogical issues from Professor Mehmet Demirezen and technical expertise and help from an amateur programmer, Serkan Avci. The software application, called “Word Stress Practice Set” (WSPS), was developed using Microsoft Visual C# 2008 Express Edition with C# (C Sharp) 4.0 programming language which is a multi-paradigm programming language encompassing imperative, functional, generic, object-oriented (class-based), and component-oriented programming disciplines developed by Microsoft within the .NET initiative (C# Facts, 2010).

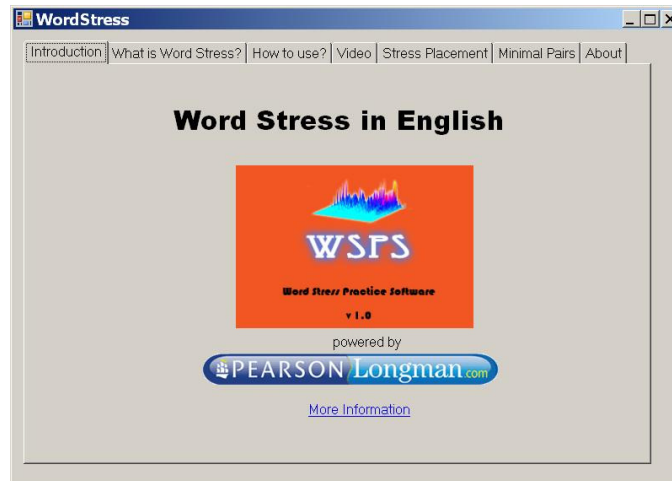
After more that six moths of developing and revising process, the outcome can be said as a flexible software framework that can be easily edited and renewed for different purposes. The main structure and contents of the WSPS are given in details in the following subtitles originating the parts of the software application.

3.4.2.1 Introduction Section

The opening screen of the WSPS contains the logos of itself and Pearson Longman and a hyperlink to the blog page related to the project. The upper section of the windows displays the tabs section that is the common visible section for each part of the WSPS and these parts are “Introduction”, “What is Word Stress”, “How to Use”, “Video”,

“Stress Placement”, “Minimal Pairs” and “About”. The screenshot 3.2 displays the introduction screen of the software application.

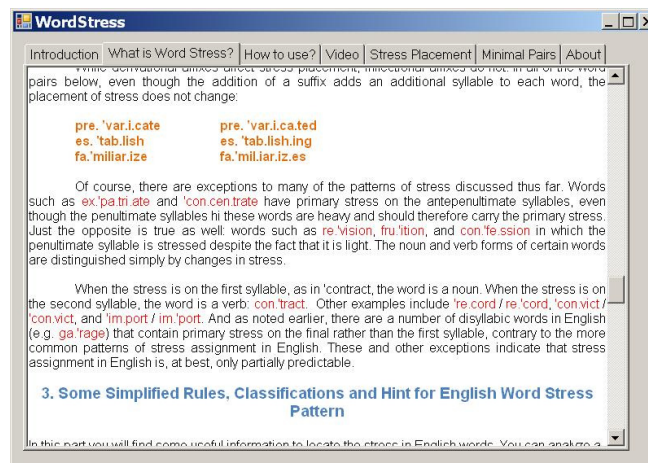
Figure 3 *Introduction Screen*



3.4.2.2 What is Word Stress?

This section is aimed to give the instructional information regarding the nature of word stress pattern in English. As the current study does not aim to develop a new approach to word stress pattern teaching, this section contains information about the issue and a compilation of rules from different sources in order to simplify the complex nature of word stress pattern and increase motivation. Screenshot 3.3 displays the instructional section of the WSPS.

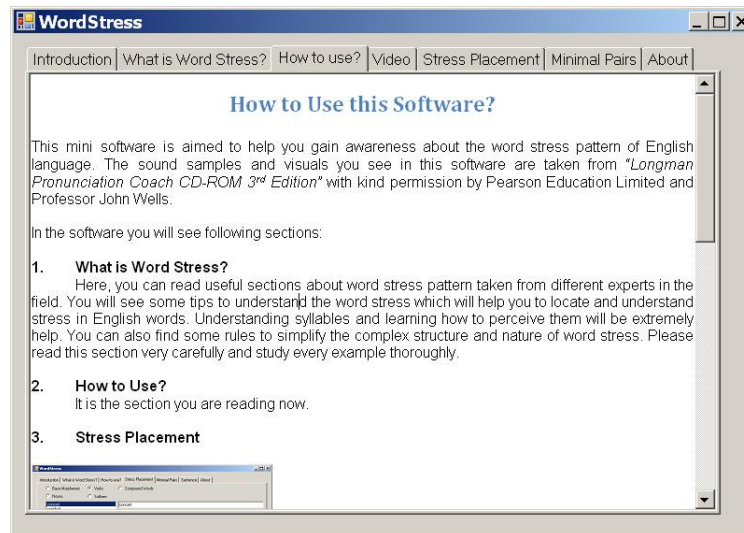
Figure 4 *Instructional Section*



3.4.2.3 How to Use?

This section gives brief information about the content of the software itself and reminds participants how to use the sections in WSPS. Screenshot 3.4 displays this section.

Figure 5 “How to use” Section

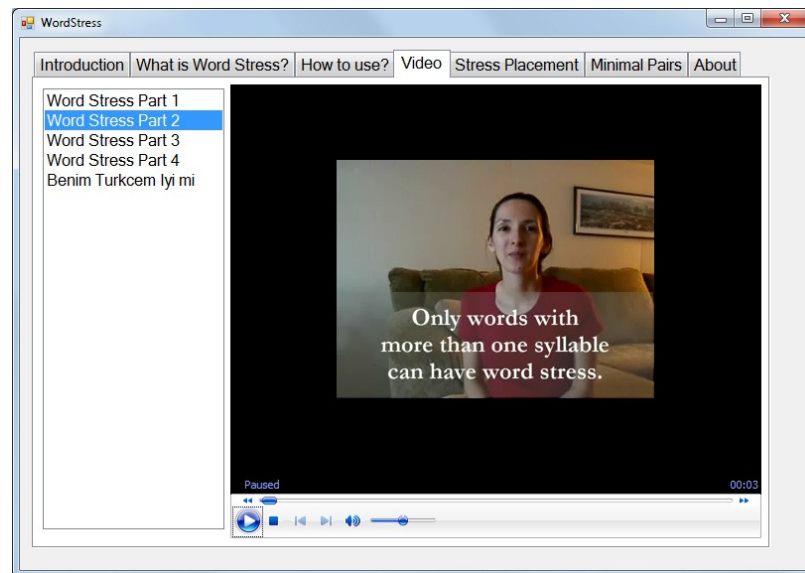


3.4.2.4 Video

This section is aimed to provide video materials for learners. It includes a text box and Windows Media Player 11. For the focus of the current project, the word stress pattern of English, the amount of educational videos is limited. However this section can be improved in terms of content for further efficiency. At the initial stage, this section contains videos taken from Youtube which are thought to be related to the issue. The first video is taken by a user of Youtube named “martinharrell”, despite the efforts he have not been managed to contact so further information about his background is missing. The video is thought to be important and enjoyable in terms of depicting the effect of incorrect word stress pattern. The user in this video is reading a dialogue in Turkish, although pronunciation can be defined as decent, he has problems with the word stress pattern of Turkish. Although the aim of the software application is to enhance the development of command and knowledge about the word stress pattern of English language, this video was chosen as an aid to make the participant aware of the importance of word stress by changing the role of them as foreign language speaker to

native speaker to visa versa. The feedback about the video was also positive from the participants since most of them expressed that it is an enjoyable and interesting experience for them regarding the incorrect word stress pattern application. The screenshot 3.5 displays this section while it plays the first video.

Figure 6 *Video Section*



3.4.2.5 Stress Placement

This part is the core of this software as it realizes what is aimed by the software application project. As a notoriously difficult area of English, locating word stress and practicing it correctly requires countless exercise. The need for extra time for exercising the samples used for instruction of word stress pattern can be too demanding for a classroom teacher who needs to deal with the large variety of topics in pronunciation teaching. Therefore computer assisted activities which enhance autonomous learning are helpful for teachers and learners. The voice recording used in this section are taken from Longman Pronunciation Dictionary with written permission due to the concerns about the accuracy of non native speakers' command on word stress pattern of English. This section of software includes following parts which are created parallel with the rules and hints given in the first section of the software "What is Word Stress?"

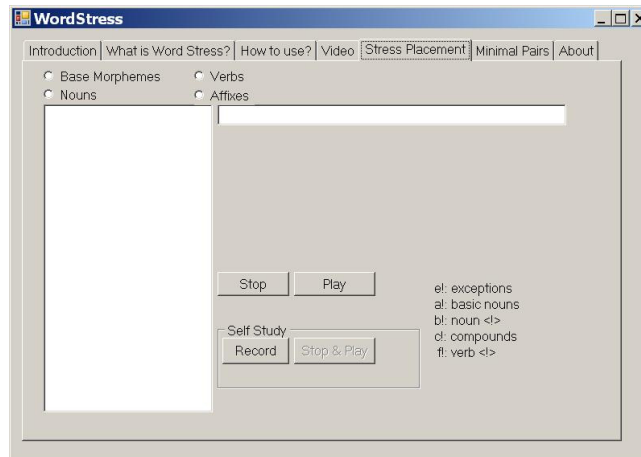
a) “Base Morphemes” including 32 words like “impracticable”, “overcome” where the primary stress is on the base morphemes and also exceptions to the rule like “picturesque” and “uniform”.

b) “Nouns” including 70 words, from the very basic, everyday nouns like “college” and “paper” to compound nouns like “hairpin” and “notebook”.

c) “Verbs” section has 24 verbs corresponding to the rules like “present” and “produce” with emphasis on the change of stress pattern when they are used in the grammatical category of nouns.

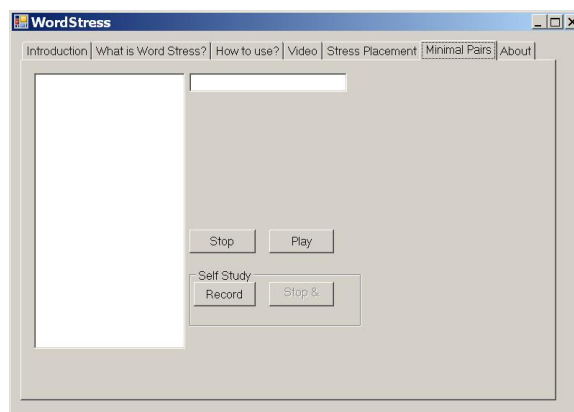
d) “Affixes” section has 157 words with prefixes and suffixes. This section is especially important to develop awareness towards mobility of stress and thus hosts the most common stress-based problematic words for learners like “competition – competitive” and “famous – infamous”.

When the participants check any of these sections, they see a set of examples displayed in the list box. Upon clicking on an entry, a visual depicting the pronunciation of the word with emphasis on which part is stressed is displayed. Participants also hear the pronunciation. Buttons; “Stop”, “Play” will control these sound samples. Under the title of self study, there are the buttons “Record” and “Stop& Play”. By using these buttons participants can record their own voice and listen it immediately and compare it with the original record played by the software. This gives unlimited opportunity to practice the words and check the correctness of participants’ stress placement by themselves. Actually what is aimed in this section was to create a simulation of one of the most famous classroom applications which is drilling without concerns related to accuracy of spontaneous expressions by the teachers and their limited time for controlling each student’s performance during drills. Here, the participants gain an autonomous position regarding feedback as they compare their utterance with a native speaker and check the accuracy of the word stress placement with the opportunity of infinite repetitions. Important exceptions regarding the words, or some other stress changing features are also noted with small warning signs next to self study part in this section. Screenshot 3.6 displays this section of the software.

Figure 7 *Stress Placement*

3.4.2.6 Minimal Pairs

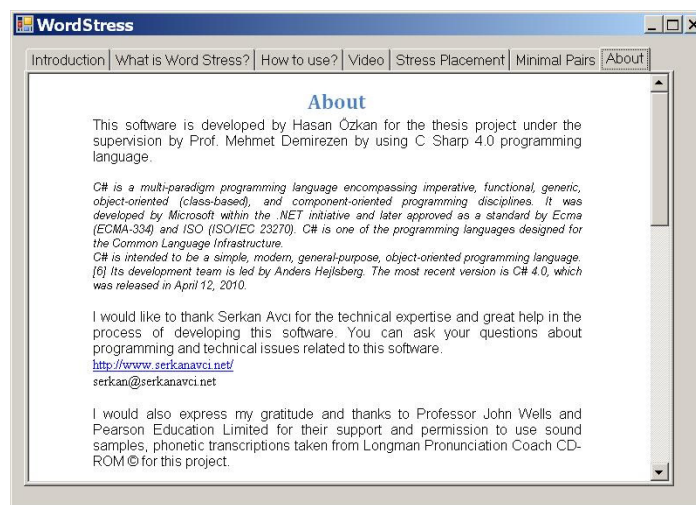
In phonology, minimal pairs are pairs of words or phrases in a particular language, which differ in only one phonological element, such as a phone or phoneme and have a distinct meaning (Richards & Schmidt, 2002). Although this definition can be criticized as being too specific for this section it is helpful to use it as broad definition of what this part aims. Here the participant can see the list of words similar to each other with different stress patterns. It is a useful section for learners to compare and practice the vital variation in meaning and classification of words. This part uses the same sound recordings used in Stress Placement section of the software without the classifications given in that section. Screenshot 3.7 displays this section's structure which is pretty similar to the previous section.

Figure 8 *Minimal Pairs*

3.4.2.7 About

This part aims to give information about the software itself. Contact information for further suggestions and questions are given. This section also contains technical information about the software, legal permission taken from Pearson Education Limited and the copyright information regarding the distribution of the software. Screenshot 3.8 depicts this section.

Figure 9 *About*



3.4.2.8 The Corpus of the Software

The database of the WSPS, 388 words, were chosen by the researcher by observation of undergraduate and graduate students' pronunciation in the classes at Hacettepe University and these words were also presented to Prof. Mehmet Demirezen, Assoc. Prof. Arif Sariçoban and Assoc. Prof. Arda Arıkan for professional approval and further consultation on the words bearing importance in terms of teaching and learning word stress pattern. The corpus does not only focus on the problematic words in terms of stress location but also some daily, simple words. For the aim to present a pedagogical approach to the issue, simple and well known words that do not pose problems regarding word stress are also given place along with the problematic words with word stress for the learners. The following is the list of the corpus compiled with simple

words posing no difficulty in word stress pattern and more complex ones which are used in the software application.

Section 1. Stress on the Base Morpheme

1. antisocial
2. discredit
3. disparity
4. documentary
5. domesticate
6. eccentric
7. economize
8. enormity
9. entrance
10. glorious
11. impossible
12. impracticable
13. incompetent
14. incorrect
15. misconduct
16. overcome
17. supersonic
18. transparent
19. unfriendly
20. untimely

Exceptions

21. anteroom
22. antipathy
23. foresight
24. picturesque
25. superman
26. surcharge
27. transport
28. underwater
29. underwear
30. uniform
31. unisex
32. upbeat

Section 2. Nouns

33. baby
34. bacon
35. barber
36. basket
37. brother
38. city
39. college
40. country
41. cousin
42. dinner
43. elder
44. father
45. human
46. market
47. mother
48. mountain
49. neighbour

50. nephew
51. paper
52. people
53. river
54. sister
55. student
56. uncle
57. actress
58. boyhood
59. caption
60. captor
61. childish
62. doggy
63. duckling
64. fascist
65. foursome
66. friendship
67. kingdom
68. landscape
69. manly
70. milkman
71. piglet
72. teacher
73. threefold
74. treeless
75. zealous
76. concert
77. conduct
78. contrast
79. convert
80. convict
81. object
82. pervert
83. present
84. project
85. subject
86. suspect
87. transport
88. bedhead
89. beehive
90. birthday
91. classroom
92. coursebook
93. drugstore
94. eyelash
95. hairpin
96. handbag
97. homework
98. hometown
99. lunchtime
100. notebook
101. suitcase
102. teapot

Section 3. Verbs

103. concert
104. conduct
105. convert
106. present
107. produce
108. respect
109. suspect
110. transport
111. befriend
112. begin
113. disrespect
114. foresee
115. infer
116. inspect
117. mishear
118. overcome
119. overstate
120. prefer
121. repeat
122. supersede
123. uncover
124. underestimate
125. understate
126. undo

Section 4. Affixation

127. absorb
128. absorptivity
129. anxiety
130. anxious
131. artist
132. artistic
133. beneficiary
134. benefit
135. censor
136. censorial
137. censorship
138. ceremonious
139. ceremony
140. cheap
141. cheapen
142. cheer
143. cheerful
144. child
145. childhood
146. cigar
147. cigarette
148. circular
149. circulate
150. competence
151. competition
152. competitive
153. complex

154. complexity	198. expressivity	242. patient
155. congratulate	199. extravagant	243. period
156. congratulation	200. extravaganza	244. periodic
157. context	201. friend	245. peripheral
158. contextual	202. friendly	246. peripherality
159. continuant	203. grammar	247. person
160. continuation	204. grammarian	248. personality
161. continue	205. grammatical	249. personalization
162. continuity	206. grammaticality	250. personify
163. copula	207. humid	251. photograph
164. copulate	208. humidity	252. photographer
165. create	209. hunger	253. photographic
166. creation	210. hungry	254. photography
167. critical	211. impress	255. politician
168. criticize	212. impressive	256. politicisation
169. critique	213. induce	257. politics
170. decide	214. induction	258. popular
171. decisive	215. inductive	259. popularity
172. denial	216. influence	260. press
173. deny	217. influential	261. pressure
174. desire	218. insect	262. pressurization
175. desirous	219. insecticidal	263. question
176. devil	220. insecticide	264. questionnaire
177. devilish	221. interest	265. regular
178. devilry	222. interested	266. regulate
179. diplomacy	223. invent	267. ridicule
180. diplomat	224. invention	268. ridiculous
181. diplomatic	225. inventive	269. sadist
182. disaster	226. librarian	270. sadistic
183. disastrous	227. library	271. social
184. economic	228. minimal	272. society
185. economy	229. minimise	273. sociocultural
186. educate	230. miracle	274. sociolinguist
187. education	231. miraculous	275. solution
188. educationalist	232. molecular	276. solve
189. educative	233. molecule	277. super
190. employ	234. monotone	278. superior
191. employer	235. monotony	279. superiority
192. explain	236. multiple	280. tutor
193. explanation	237. multiply	281. tutorial
194. exploit	238. negotiate	282. universal
195. exploitation	239. negotiation	283. universe
196. express	240. negotiator	
197. expressive	241. patience	

Along with these words in the four main section of the software, the “Minimal Pairs” section focuses on the words which present stress mobility and vowel reduction. This section plays an important role as an opportunity to exercise the words which poses difficulty for non native learners of English regarding the word stress pattern and the primary stress location. The corpus for this section is compiled with the words from the sections that are mentioned above and with the words from the studies of Demirezen&

Sarıçoban (2009), Demirezen (2010a, 2010b). What follows is the list of the words in alphabetical order given in the Minimal Pairs section of the software.

- | | | |
|---------------------|--------------------|--------------------|
| 1. academic | 36. divinity | 71. photographer |
| 2. academician | 37. energetic | 72. photography |
| 3. academy | 38. energy | 73. present (n) |
| 4. accusation | 39. erratic | 74. present (v) |
| 5. accuse | 40. error | 75. procedural |
| 6. adapt | 41. famous | 76. produce (n) |
| 7. adaptability | 42. ferocious | 77. produce (v) |
| 8. adaptation | 43. ferocity | 78. production |
| 9. comedian | 44. identifiable | 79. productivity |
| 10. comedy | 45. identification | 80. project (v) |
| 11. comparable | 46. identification | 81. project (n) |
| 12. compare | 47. identify | 82. promiscuity |
| 13. comparison | 48. idiot | 83. promiscuous |
| 14. complement | 49. idiotic | 84. promise |
| 15. complementary | 50. immune | 85. rebel (n) |
| 16. complementation | 51. immunize | 86. rebel (v) |
| 17. concert (n) | 52. infamous | 87. recognition |
| 18. concert (v) | 53. Japan | 88. recognizable |
| 19. conduct (n) | 54. Japanese | 89. recognize |
| 20. conduct (v) | 55. magic | 90. respect (n) |
| 21. contemplate | 56. magician | 91. respect (v) |
| 22. contemplation | 57. maniac | 92. ridicule |
| 23. contemplative | 58. maniacal | 93. ridiculous |
| 24. convert (n) | 59. nation | 94. sadist |
| 25. convert (v) | 60. nationalistic | 95. sadistic |
| 26. convict (n) | 61. nationality | 96. salutation |
| 27. convict (v) | 62. necessarily | 97. salute |
| 28. democracy | 63. necessary | 98. strategic |
| 29. democrat | 64. necessity | 99. strategy |
| 30. democratic | 65. omen | 100. suspect (n) |
| 31. deprocedure | 66. ominous | 101. suspect (v) |
| 32. diplomacy | 67. paradigm | 102. suspicion |
| 33. diplomat | 68. paradigmatic | 103. suspicious |
| 34. diplomatic | 69. photograph | 104. transport (n) |
| 35. divine | 70. photographic | 105. transport (v) |

Although the corpus is currently limited, further research and studies on the common problems of learners on the word stress pattern can provide more items to locate in the software application. The revision and new item adding to the WSPS' database is designed to be simple for the purpose of easy updating by the user. The number of the items presented by WSPS can be claimed as sufficient to develop awareness and present the importance of the word stress pattern of English to the learners.

3.5 DATA COLLECTION PROCEDURES

The first step was the phase in which the research aimed to gather data regarding the participants knowledge and command on the word stress prior to their use of the software application “Word Stress Practice Software” (WSPS). At this phase the data gathered through voice recordings of the 60 chosen words representing the basic classification regarding the word stress pattern. Since the practical knowledge is given emphasis related to word stress pattern of English in the study and the existence of the large variety of paper based test, the practice of the knowledge is aimed to be used as data. As a research based mostly on the scope of CALL, the recordings were mostly on through computers online. In order to prevent any intervention to the process or anxiety stemming from the stress of evaluation, participants were sent the list of the words through email with the attachment of another simple software application developed for the study which records voice and convert the file into MP3 format which make the online data transfer easier and faster.

After the introduction of WSPS and informing the participants about the use of it, participants are given a 5 week period of self study through the software. During this time, they are contacted with individually through the Internet and phone calls and the process was checked. The aim was to keep the participants interested in the use of the software.

After 5 weeks the 60 sound samples were gathered from the participants using the voice recording software by meeting in person unlike the previous data gathering session done online in order to prevent any interference. Along with the sound recordings, the log files generated by the software were also gathered. The students were not informed about the log files in order not to manipulate their approach to the software as an assessment or evaluation tool. After the log files were sent through the participants, related explanation was made about the purpose of this type of data collection. It was also surprising that some participants explored the function of the log file prior to the explanation but they have expressed that they do not make any changes on the log file or any deceptive change in their use of the WSPS. As stated above, most of the communication and data gathering through transfer were conducted online and it was

not only time and energy saving but also very appealing to the students as they use the communication and information technology in a pretty effective and impressive way. Their experiences and suggestions regarding the features and quality of the WSPS were also gathered and are presented in the next chapter. The following list displays the 60 words from four different groups chosen for the analysis.

Section 1. Stress on the Base Morpheme
1. antisocial
2. discredit
3. documentary
4. economize
5. enormity
6. entrance
7. impossible
8. impracticable
9. incompetent
10. incorrect
11. misconduct
12. overcome
13. unfriendly
14. foresight
15. uniform
Section 2. Nouns
16. neighbor
17. concert
18. conduct
19. contrast
20. convert
21. convict
22. object
23. pervert
24. present
25. project
26. subject
27. suspect
28. transport
29. hometown
30. notebook
Section 3. Verbs

31. concert
32. conduct
33. convert
34. present
35. produce
36. respect
37. suspect
38. transport
39. foresee
40. mishear
41. prefer
42. uncover
43. underestimate
44. understate
45. undo
Section 4. Affixation
46. absorptivity
47. censorial
48. cigarette
49. competitive
50. congratulation
51. contextual
52. continuity
53. diplomatic
54. educate
55. education
56. expressivity
57. influential
58. monotony
59. solution
60. solve

3.5.1 Evaluation of the Voice Recordings and Reliability of Co-rating

One of the most demanding parts of the data analysis is the evaluation of the voice recordings at pre and post test phases of the study. The consistency of evaluation for this research would be questionable if the voice recordings were analyzed and graded only by the researcher. Therefore a scale was developed and grades given by the

researcher were compared with an independent rater's grades for both sets of data at the pre and the post test phases. The scale developed for the evaluation is displayed in Table 9.

Table 9 Scale for Scoring

Score	Criteria
1	Highly problematic use of stress / Difficult to perceive
2	Use of stress on the wrong syllable
3	Use of stress on the correct syllable with problems
4	Correct use of stress

The aim to develop the scale for evaluation was to improve the accuracy of the evaluation since grading a verbal utterance can be quite complicated and without such criteria, the evaluation could be subjective and biased with the raters' perception. The evaluation process was also supported with a software application named PRAAT which visualizes the sound and pitch values. The use of this software application was very beneficial for the researcher and the independent rater in order to check their perception of stress with the visual depiction of the pitch. The followings are the depictions of the same word's analysis with PRAAT which received grades according to the scale given above.

Figure 10 Analysis of "documentary" on PRAAT

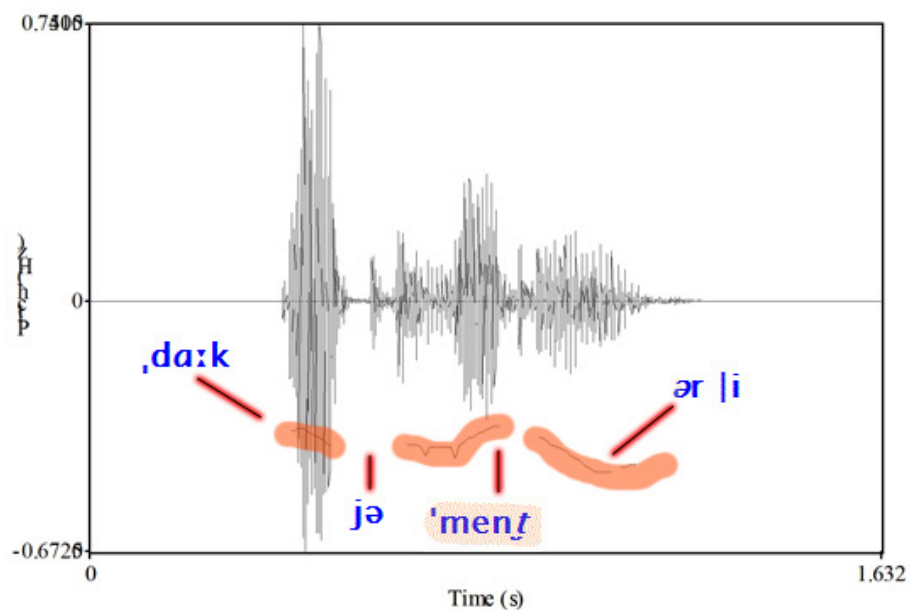


Figure 10 shows the analysis of the record of the word “documentary” taken from the Longman Pronunciation Coach CD (2008) with the PRAAT software, the colored parts were added by the researcher in order to describe how the analysis was done. The figure displays the sound waves along with the pitch indicator colored with orange highlighter. Sometimes the pitch indicator line could be located as an overlay on the sound waves as seen in the examples with the first syllable of the chosen word, therefore highlighting is added here to clarify the technique. The graph is also very important as it shows the effect of /ə/ phoneme on the pitch indicator line. When the /ə/ takes place the pitch indicator disappears or displays a decrease in the pitch. The following graphs display the voice analysis of “documentary” gathered from different participants.

Figure 11 Analysis of “documentary” on PRAAT (P1)

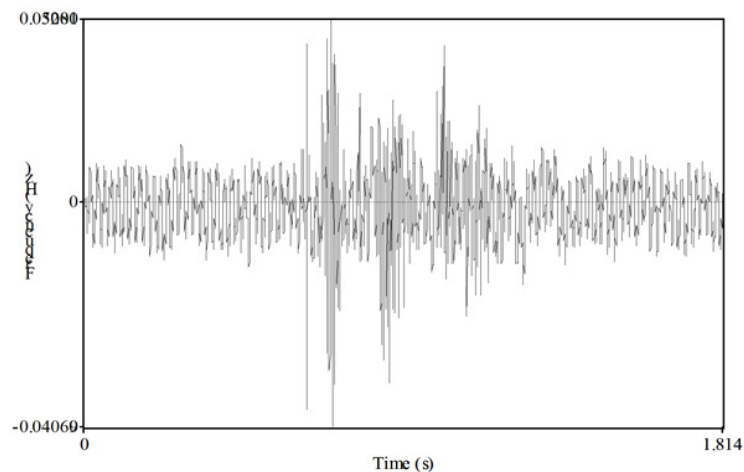


Figure 12 Analysis of “documentary” on PRAAT (P2)

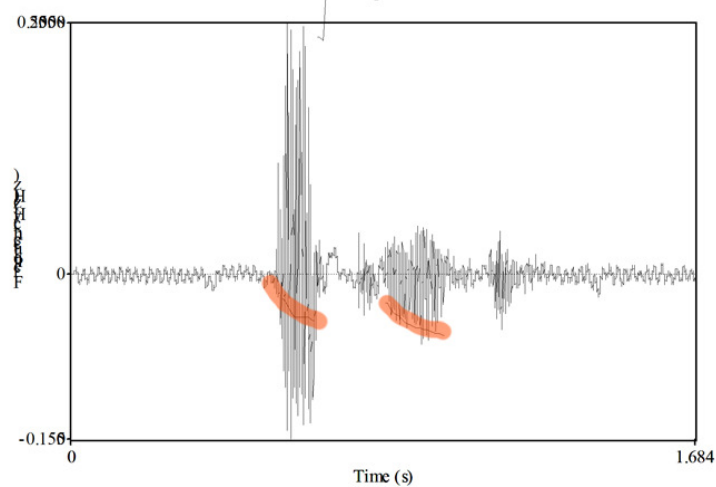


Figure 13 Analysis of “documentary” on PRAAT (P3)

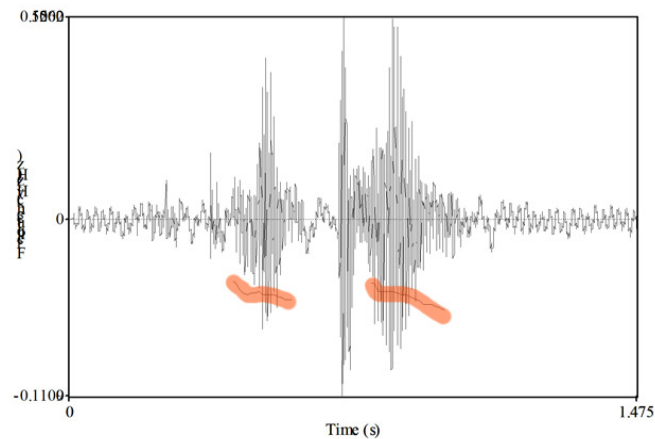
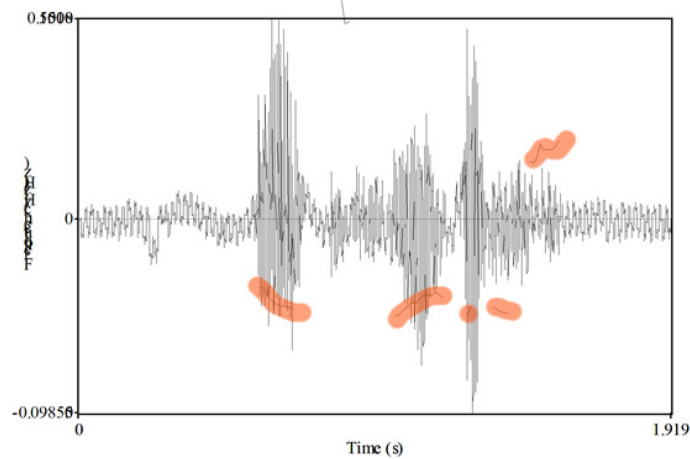


Figure 14 Analysis of “documentary” on PRAAT (P4)



The voice sample depicted in Figure 11 received 1 point as the grade corresponding to the scale given in Table 9 for the reason that it is pronounced in a very monotonous way and it does not have any perceivable word stress pattern. Figure 12 displays another record which received 2 points, which means it has an incorrect stress pattern. As seen in the graph, the two separate pitch indicator lines are identical and moreover the sound waves show that the participant used more energy pronouncing the first syllable. On the other hand, Figure 13 displays the opposite pronunciation, the pitch is identical but more energy is consumed on the third syllable; thus, this pronunciation received 3 points. Finally Figure 14 displays the pronunciation from a participant who received full points. Although the third part of the pitch indicator line displays difference in forms of splits when compared to sample, this difference was ignored as the “clicks” caused by the hardware and the “beats” caused by breathing or lip movement generally cause such

deceptive visualization by the software. Detailed analysis like this was used by the researcher and the rater only when there were doubts about the given grades.

Another attempt to prevent the subjective evaluation was to use two source of evaluation independent from each other and analyze the consistency. To gain an objective evaluation, consistency of the scores given by the researcher with the ones given by the independent rater were analyzed with the 2-tailed Pearson Correlation on SPSS version 16. The following tables display these analyses for both pre and post phases of the study.

Table 10
Descriptive Statistics Pre-Test

	Mean	Std. Deviation	N
Rater 1	1.5344E2	21.33674	25
Rater 2	1.5148E2	22.08340	25

Table 11
Correlations

	Rater 1	Rater 2
Rater 1 Pearson Correlation	1	.984
Sig. (2-tailed)		.000
N	25	25
Rater 2 Pearson Correlation	.984	1
Sig. (2-tailed)	.000	
N	25	25

Table 10 displays the mean and standard deviation of the scores for the pre-test phase of the study from two raters, one is the researcher and the other is an independent rater. Table 11 is the results of the Pearson correlation as significant at the 0.01 level (2-tailed). The post-test scores from these two raters are also analyzed in the same way and displayed below in Table 12 and 13.

Table 12
Descriptive Statistics Post-Test

	Mean	Std. Deviation	N
Rater 1	1.9412E2	21.56000	25
Rater 2	1.9508E2	20.46526	25

Table 13
Correlations

	Rater 1	Rater 2
Rater 1 Pearson Correlation	1	.988
Sig. (2-tailed)		.000
N	25	25
Rater 2 Pearson Correlation	.988	1
Sig. (2-tailed)	.000	
N	25	25

The consistency between two sources of evaluation which are independent from each other is found to be significant by analysis. Although the analysis and evaluation of the sound samples collected from the participants were quite demanding, they enabled the researcher to gather a more objective evaluation regarding the participants' command on the word stress pattern of English. After the analysis to prove the evaluation is reliable, the following sections are designed to answer the research questions of the current research. The scores used in the rest of the analysis are gathered by the arithmetical mean of the scores from the researcher and the independent rater.

3.6 DATA ANALYSIS PROCEDURE

To display the effect of WSPS on the participants' accuracy regarding the word stress pattern of English, descriptive statistics were employed. However in order to create the descriptive data from the sound samples a scale is developed from 1 to 5 to grade the participants pronunciation and in order increase the reliability of this grading the correlation of the scores gathered by the researcher's grading and an independent rater grading is calculated.

After establishing the correlative scores for each 21 participants' pronunciation of 60 words in preceding period to the software use and following period the software use are calculated, the data is used for to display the effect of the WSPS on participants' command on word stress pattern. The 60 words are chosen according to the four classes of words important for word stress as stated in the previous section and these classes were stress location on "Base Morphemes", "Nouns", "Verbs" and "Affixes". As students were asked to study all the 388 words located in the database of the WSPS and

no information given regarding the post recordings, the focus on the first 60 words were distributed and students were motivated to use the WSPS without any anxiety of tests, scores or failure-success concerns assuring the anonymity of the recordings.

The change in the participants' awareness and command on word stress pattern of English were analyzed by using SPSS 16.0. The participants' duration of interaction with the software was also analyzed and presented in a table in order to display information that can lead to new studies regarding the use of the self study software applications. Finally, the feedback from the participant regarding their ideas and attitudes about the WSPS and expressions about the use of WSPS were also studied to consider for further studies in the field and attempts to develop new versions of WSPS.

3.7 CONCLUSION

This chapter has presented the research questions to define the methodological path to follow. Software applications developed for this study and other software used in the study are presented in detail by the help of visuals in the instruments section. Data collection and analysis procedures are give to describe how the research was completed from the beginning of the collecting of voice recordings as data and the process of converting this data to into the form that descriptive analysis could be accomplished. The problems and their solutions regarding the collected data, which will be studied in detail within a cause effect relationship, were also stated in this chapter to identify them. The next chapter will present the gathered data, the processing of it and the analysis of the descriptive statistics to answer the research questions.

CHAPTER 4

DATA ANALYSES RESULTS

4. Introduction

The aim of this chapter is to present the descriptive analysis of the data collected through data collection procedure stated in the previous chapter. The focus of the study was on the efficiency of CAP on students' awareness and competence for the word stress pattern of English. In this chapter the efficiency of the software application develop for this study is aimed to be presented via statistical analysis with pre and post testing of the participants' command on the word stress pattern of English. The analyses of the data are displayed correspondingly with the research questions of this research stated in previous chapters following the analysis of the consistency of evaluation of the voice recordings gathered from participants.

4.1 Analysis and Results for the Research Question 1

The first research question of the current study was to find out to what extend the participants have command on the word stress pattern of English. This question bears importance as the answer of this question will a play a crucial role to see whether the software application developed for the study is effective or not. To describe the participants' level of command, the following table displays the participants' total scores for the 60 words chosen for the study. As the highest grade for the correct pronunciation is 4, the total score for the pre-test is 240.

Table 14
Pre-Test Total Scores

Participant	Rater 1	Rater 2	Mean Score
1.	152	154	153
2.	150	148	149
3.	142	130	136
4.	177	178	178
5.	140	133	137

6.	159	157	158
7.	168	165	167
8.	139	138	139
9.	187	175	181
10.	104	102	103
11.	196	196	196
12.	141	141	141
13.	160	158	159
14.	170	174	172
15.	135	128	132
16.	143	145	144
17.	141	141	141
18.	136	137	137
19.	192	192	192
20.	176	177	177
21.	160	158	159
22.	153	153	153
23.	141	141	141
24.	130	126	128
25.	144	140	142
Mean	153	151	152

As the mean value of the total score gathered from the participants indicates that the scores of the participants does not indicate a highly problematic situation prior to the introduction of the WSPS. The fact that the participants had been taking the “Listening and Articulation” course at their department prior to this research can be stated as the reason of level of competence, 152 points over 240 points in total, which is 63.3 percent according to the table stated above. Nevertheless, their level of command on the word stress pattern still presents space for development. The difference of the participants’ received score in the post-test will be analyzed in the following section.

4.2 Analysis and Results for the Research Question 2

The research question 2 is about the efficiency of the software application, WSPS, which will be analyzed in this section by the t-test which will whether the means of two sets of scores are statistically different from each other. In this section on which words, scored at pre and post phases of the research, participants displayed improvement are also going to be displayed. The other issue to be presented here is the time interval spent on the software in each week of the 5 week period of the research spared for participants’ use of the WSPS. The presentation of this detail constitutes the aim for the

study of displaying and analyzing the frequency and duration of software application by the participants and their effect on the improvement of the participants' command on word stress pattern.

Table 15 and 16 displays the results of t-test conducted via SPSS to analyze the difference of the scores given to the participants' pronunciation for the words at pre and post tests.

Table 15
One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Pre Test	25	1.5246E2	21.62219	4.32444
Post Test	25	1.9468E2	20.92590	4.18518

Table 16
One-Sample Test

	Test Value=0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Pre-Test	35.255	24	.000	152.46000	143.5348	161.3852
Post-Test	46.517	24	.000	194.68000	186.0422	203.3178

As seen in the Table 16, the significance value is .000 which means that there is a significant difference between the pre and post tests scores which implies that the WSPS caused a positive difference on participants' success on the word stress pattern of the analyzed words by the current research. The analysis of the sum of each participant's scores separately will also be studied in the upcoming part to display the level of change for each student. Before this analysis the level of difference for each word between pre and post tests' evaluation should be studied in order to see the improvement enhanced by the WSPS. Table 17 displays the related data of the words under the groups developed for better analysis and given scores. The difference between the initial and final scores displays the level of the improvement. To make the mean scores more accurate and easy to analyze, they are converted to p-values and the analysis continues with this values as seen in the Table 17

Table 17
Analysis of Pre and Post Tests' Scores

	Word Entry	Pre Test	Post Test	Diff.
Base Morphemes	1	0.77	0.85	0.08
	2	0.77	0.84	0.07
	3	0.69	0.82	0.13
	4	0.60	0.78	0.18
	5	0.59	0.77	0.18
	6	0.65	0.89	0.24
	7	0.64	0.83	0.20
	8	0.53	0.78	0.26
	9	0.63	0.77	0.14
	10	0.53	0.70	0.17
	11	0.64	0.71	0.07
	12	0.65	0.77	0.12
	13	0.69	0.79	0.10
	14	0.65	0.82	0.17
	15	0.62	0.75	0.13
Nouns	16	0.59	0.73	0.14
	17	0.62	0.74	0.12
	18	0.60	0.72	0.12
	19	0.63	0.82	0.20
	20	0.73	0.80	0.08
	21	0.65	0.81	0.16
	22	0.63	0.78	0.16
	23	0.65	0.87	0.23
	24	0.73	0.86	0.13
	25	0.61	0.84	0.23
	26	0.53	0.76	0.24
	27	0.54	0.69	0.15
	28	0.52	0.73	0.21
	29	0.55	0.81	0.27
	30	0.55	0.82	0.27
Verbs	31	0.56	0.79	0.23
	32	0.68	0.81	0.13
	33	0.63	0.81	0.18
	34	0.65	0.84	0.19
	35	0.66	0.83	0.17
	36	0.64	0.86	0.22
	37	0.86	0.95	0.09
	38	0.75	0.86	0.11
	39	0.59	0.85	0.26
	40	0.76	0.93	0.17
	41	0.57	0.76	0.19
	42	0.65	0.82	0.17
	43	0.63	0.78	0.15
	44	0.60	0.76	0.16
	45	0.59	0.83	0.24
Affixation	46	0.67	0.82	0.15
	47	0.64	0.89	0.25
	48	0.66	0.85	0.19
	49	0.66	0.85	0.19
	50	0.72	0.85	0.13
	51	0.61	0.82	0.21
	52	0.63	0.79	0.16
	53	0.69	0.87	0.18
	54	0.68	0.83	0.15
	55	0.73	0.86	0.13
	56	0.64	0.84	0.20
	57	0.57	0.86	0.29
	58	0.57	0.82	0.26
	59	0.55	0.84	0.29
	60	0.54	0.78	0.24
Total Scores		0.64	0.81	0.18

The differences in the scores, more than 0.20 in p-value, are highlighted as these are the ones the pronunciation of which displayed the highest improvement. The further analysis of these words will be presented in the next chapter since these words bear importance in terms of the nature of the learning regarding the word stress pattern. The overall analysis of the difference in the scores displays improvement with a 0.18 in p-value which can be considered as an indication of the efficiency of the WSPS on the enhancement of developing awareness and improving command of the participants on the word stress pattern. For further analysis, however, the participants' scores should be

studied separately with the data regarding the time interval spared for the use of the WSPS at each week of the 5 week period. The Table 18 displays related data for this analysis.

Table 18 Analysis of Individual Scores

Participant	Pre-test Mean Score	Post-test Mean Score	Difference	Use of The WSPS (Minutes)					Total use of the WSPS
				Week 1	Week 2	Week 3	Week 4	Week 5	
1	153	200	47	14	19	0	0	6	39 min.
2	149	205	56	16	12	6	4	9	47 min.
3	136	204	68	41	11	6	3	14	1hrs. 15 min.
4	178	214	36	12	13	0	0	12	37 min
5	137	177	41	24	0	21	6	6	57 min.
6	158	185	27	16	22	10	4	3	55 min.
7	167	172	6	12	9	13	3	6	43 min.
8	139	179	41	9	9	12	0	11	41 min.
9	181	201	20	16	12	14	10	9	1 hr 1 min.
10	103	195	92	42	25	17	23	12	1 hr 59 min.
11	196	222	26	12	0	9	13	5	39 min.
12	141	146	5	32	10	0	12	22	1hr 16min.
13	159	193	34	15	9	0	0	12	36 min.
14	172	174	2	14	16	3	0	0	33 min.
15	132	199	68	23	20	11	0	9	1 hr 3 min.
16	144	210	66	19	16	14	4	12	1 hr 5 min.
17	141	209	68	21	15	11	14	5	1 hr 6 min.
18	137	214	78	46	38	21	10	23	2 hrs 18 min
19	192	228	36	19	0	0	0	6	25 min
20	177	221	45	29	15	9	9	4	1 hr 6 min
21	159	215	56	18	15	11	16	9	1 hr 9 min
22	153	198	45	11	19	14	9	0	53 min
23	141	168	27	20	4	2	5	0	31 min
24	128	163	35	13	15	0	0	9	37 min
25	142	175	33	48	21	12	9	4	1 hr 34 min

Table 18 displays the improvement of participants' scores improvement and their time spend on the WSPS. Although the WSPS is designed as a supplementary computer based software application and an aid for the teaching and learning of word stress pattern the data related to participants 10, 18 and 17 displayed above should be noted for attention to infer assumptions regarding the use of software. Similarly the data related to the participants 14 and 12 display interesting results. The questionable state of the data presented in Table 18 to claim that there is a relation between the time spend on

WSPS by the participants and the improvement of the scores is obvious, the data within this table can be analyzed to present the participants' overall attitude towards the use of the software. The mean values of the duration spared for the use of software by the participants for the each week of the 5 week period in the research can be displayed in a graph which is given below.

Figure 15 Graph of Participants' Study Time

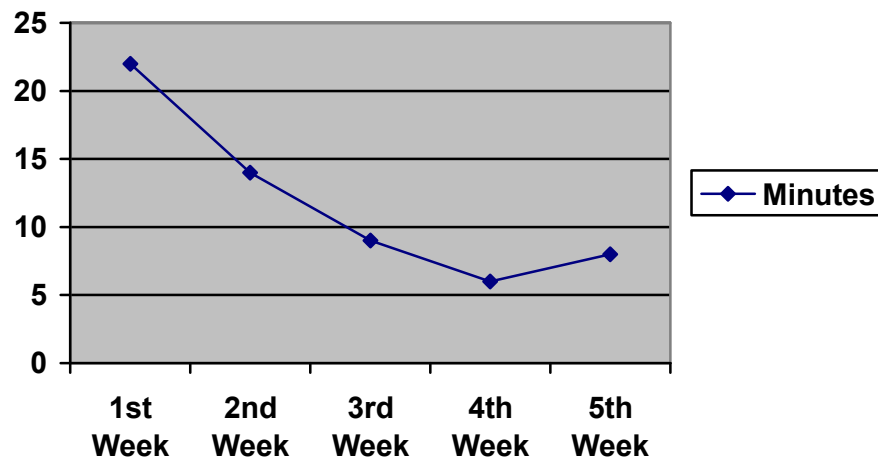


Figure 15 displays a steady decrease, until the last week where a slight increase occurs, of the time spared for the use of the WSPS, which may indicate the motivation to use the software application decreases in the course of time. The further analysis on this situation will be presented in the next chapter. The next section of the current chapter deals with the presentation of the feedback and evaluation of the WSPS by the participants.

4.3 Analysis and Results for the Research Question 3

The participants' attitudes towards the use and the quality of contents of the WSPS are the core of the last question that this research aims to present answers. Prior to the application of the research procedure, this analysis regarding this section was aimed to be conducted via questionnaires however the flow of the research produced much more

vivid and interesting information to consider while describing the nature of the user-software application interaction. Therefore, this section is designed to present the compilation of ideas, feelings and feedback expressed and given by the participants about the WSPS following the research procedure and focusing on the content and presentation of the software application. Most of these participants' expressions were taken from the personal notes of the researcher and the e-mail communication among the researcher and participants.

At the phase of studies to find the group of students who will be the participants, it was interesting to see the motivation of them to use computer technology to study pronunciation. Considering the current situation, it is impossible to think the everyday life and computer technology separately, but despite this integration, CALL and CAP still carry the power to excite and motivate the learners. As many of them are competent computer users, the participants' critique for the WSPS and its contents enabled the researcher to do modifications on the software application with the help of its flexible structure.

One of the most common feedbacks on the software application was about the visualization of the stress pattern of the words located in the software. Although the stressed syllable is highlighted in the picture box in the software, participants commonly suggested a more active and enjoyable depiction of the stressed syllable with more perceivable separation of the syllables. The visual structure of the WSPS was also criticized and one of the participants wrote about it and expressed that the software application is "too Windows-like". In fact this issue also taken into consideration during the designing process of the software but due to technical limitations, the WSPS stayed in the way as it is. The sound quality, voice recording facility and the corpus of the WSPS generally received positive feedback and comments. The video section was also appreciated by the participants but the need for more videos related to the issue was frequently expressed.

Another suggestion was about the absence of a voice recognition system, which was largely referred as "voice analyzer" by the participants. Many participants stated that

such a voice recognition system that can analyze stress pattern of the words pronounced by them would be more beneficial and efficient. But they also stated that playing the recording of their pronunciation and the native speaker's pronunciation was an interesting and effective practice for them.

The last important feedback was related to the instructional part of the software. Although the section displaying simplified rules and large amount of examples taken from different authors was described as beneficial and easy to read, the absence of written exercises within the software application that can give scores to the participant was described as one of the shortcomings of the software. Along with these beneficial comments and critiques on the software, the participants expressed that they were generally content with the WSPS. To summarize the participants' opinion and suggestions, Table 19 is presented below displaying the positive and negative features of the WSPS.

Table 19 Participants' Evaluation of WSPS

Advantages	Drawbacks
<ul style="list-style-type: none"> - easy to use - large corpus - good sound playing and recording quality - beneficial instructional section - free 	<ul style="list-style-type: none"> - poor visual design - the visual depiction of word stress pattern needs improvement - absence of ASR - absence of test that can be evaluated by the software

4.4 Conclusion

This chapter of the current research aimed to describe important parts of the data analysis procedure and presented the analysis and results of data. Before presenting the descriptive statistics related to the research question, this section described the process of sound samples gathered from the participant and the conversion of these into score. The reliability and objectivity of the scoring were the key elements to sustain the integrity of the research. The rest of the chapter mainly displayed data and the results of

the analysis which presented the inference, based on the meaningful difference between the pre and the post test scores' analysis, displaying the use of the WSPS seems to be effective on developing awareness and command of the participants on the use of the word stress. The last section of the section was a presentation of the feedback received from the participants and these were emphasized as being important for the future studies in the field.

CHAPTER 5

DISCUSSION AND CONCLUSION

5. INTRODUCTION

This chapter focuses on the discussion of the analyses and results presented in the previous chapter in a detailed way. After a brief summary of the results revealed by the research, the discussion of findings takes place in this chapter. The pedagogical assumptions section summarizes the importance of the word stress pattern of English language and states the assumptions of the current research related to the issue. Prior to the conclusion, suggestions for the future studies and research with similar scope will be focused on.

5.1 SUMMARY OF THE RESULTS

The initial aim of the current research was to find out to which degree the freshman students of English Language Teaching division at Hacettepe University have command and awareness related to the word stress pattern of English language. The following aims was to develop a software application, later named as WSPS, for supporting the in-class teaching and learning of pronunciation by focusing on the word stress and evaluate and analysis of this software efficiency on the participants level of success regarding the set of words bearing importance for the focus of the research. Then the participants', who were not only subjects to a research but also the users of the developed software application, opinion and feedback were analyzed for further modification and development and the future researches in the field.

The first research question was to clarify the level of correct application of word stress pattern before the introduction of the WSPS as a computer based aim. To do so, the analysis of the independent raters' evaluation and scoring for the pronunciation of the word chosen with the approval of a counseling group by the participants (n=25). The analysis of the two rater's scorings was found to be reliable and consistent by the results

of the Pearson correlation which was significant at the 0.01 level (2-tailed). After the analysis, the mean values of the scores of the participants was calculated and the result displayed that the success rate, which refers to the 4 point scale developed for this research, for the participants was around 63.3 percent.

After the 5 week period of participants' use of the WSPS, the same words were analyzed in the same way and the scores were correlated again as stated in the previous section. When the mean values of pre and post test scores are analyzed with one sample t-test, a meaningful difference in positive direction was found. The former scores given to the participants' pronunciation was displayed to be improved by 42 points when compared as mean difference. This improvement made the overall success of the participant to 80.9 percent. Nevertheless, the analysis of the individual success and the improvement level for each word chosen for the research were still important to present the real effect of the WSPS. In this manner, 20 of the 60 words were presented as the ones on which participants were able to develop their level of awareness and command. These 20 words will be studied in the section focusing on the pedagogical assumption.

To improve the quality of the analysis regarding the individual success on word stress pattern in interaction with the WSPS, the time spend on the software application was added to the analysis. And this set of data led to another important implication regarding the motivation towards the use the WSPS.

The last set of data was gathered by the analysis of the participants' opinion and feedback regarding the use and the content of the WSPS which have been very beneficial for the study itself and it will probably useful for the further studies as a road map.

5.2 DISCUSSION OF FINDINGS

Considering the highly problematic and mobile nature of the stress, the initial test results were found to be above average with the mean score of 152.4 over 240 points. Although the first response to such a situation may question the necessity of the research, the importance of the word stress pattern for English necessitates the further

emphasis and study for itself as well as with other aspects of the pronunciation. Moreover, the participants in the current research have taken related courses and received instruction over the issue. But as stated above, the pre-test results pointed out the space for development.

The second phase of the data analysis presented the results of the WSPS over the participants' level of command and awareness on the word stress pattern. Although it is relatively a simple software application, its direct focus on the issue with enrichment via videos, sounds, visual depictions about the nature of syllable and the word stress pattern combined with large amount of example words and simplified instructional section were appreciated by the participants. The analyses of the post test scores displayed the improvement of participants' pronunciation and command on the word stress pattern. For further analysis, the words displaying the highest rate of improvement are studied. The following table displays these words and the improvement of the scores given to them.

Table 20 The Highest Score Variations

	Word Entry	Pre Test	Post Test	Diff.
<i>Base Morphemes</i>	<i>6 antisocial</i>	0.65	0.89	0.24
	<i>7 documentary</i>	0.64	0.83	0.20
	<i>8 enormity</i>	0.53	0.78	0.26
<i>Nouns</i>	<i>19 conduct</i>	0.63	0.82	0.20
	<i>23 contrast</i>	0.65	0.87	0.23
	<i>25 object</i>	0.61	0.84	0.23
	<i>26 project</i>	0.53	0.76	0.24
	<i>29 subject</i>	0.55	0.81	0.27
	<i>30 suspect</i>	0.55	0.82	0.27
<i>Verbs</i>	<i>31 concert</i>	0.56	0.79	0.23
	<i>36 suspect</i>	0.64	0.86	0.22
	<i>39 transport</i>	0.59	0.85	0.26
	<i>45 undo</i>	0.59	0.83	0.24
<i>Affixation</i>	<i>47 cigarette</i>	0.64	0.89	0.25
	<i>51 congratulation</i>	0.61	0.82	0.21
	<i>56 contextual</i>	0.64	0.84	0.20
	<i>57 continuity</i>	0.57	0.86	0.29
	<i>58 diplomatic</i>	0.57	0.82	0.26
	<i>59 monotony</i>	0.55	0.84	0.29
	<i>60 solution</i>	0.54	0.78	0.24

As seen in Table 20, the words that displayed highest level of improvement are related to mobility of stress and the vowel reduction which are given ultimate emphasis for the correct articulation and pronunciation. (Demirezen, Sariçoban 2009; Demirezen 2010a; 2010b). One cause of the improvement is the introduction of these two important stress changing mechanisms were openly displayed in the instructional section of the software and the visual depictions connected to the words given in the software. The other cause of this high improvement may be the result of the infinite opportunity to exercise these words without any limitations via the WSPS and the effect of these free exercises to break down the fossilized errors developed by the lack of emphasis on these important issues.

The analysis of the time spent on the WSPS software displayed an interesting pattern as the level of the WSPS use decrease in each week. Figure 15, given in previous chapter, is actually the depiction of the rapid motivation decrease of the participants to the software application. To prevent such a decrease, necessary precautions should be taken into consideration by the developers and the most valuable information and suggestion can be deduced from the participants' feedback and expressions of the current research. The analysis of these sets of important data can be found in the previous chapter and they will be analyzed as the pedagogical implications in the next section.

5.3 PEDAGOGICAL IMPLICATIONS

The pedagogical implications, which can be drawn from the research findings given above, mainly focus on two distinct areas. The first one is the importance of the word stress pattern teaching and learning, especially in the setting of the research, that fact that people from the Turkish language origin are prone to develop fossilized mistakes are obvious. The second main focus for the pedagogical implications to be deduced from this research is on the software application data and effectiveness of the CAP software applications.

5.3.1 The Importance of Word Stress Teaching in English

As stated in the previous chapters from references to different authors, the word stress pattern occupies a very important position in terms of correct articulation and pronunciation. Without correct pronunciation enhanced with awareness and command of the word stress pattern of English words, the accurate and satisfying verbal communication seems to be a dream that will never come true. Although the difficulty and the demanding nature of the word stress with the close connection to the stress mobility and vowel reduction is an undeniable issue, the emphasis put on these in English teaching and learning in Turkey at any level of educational institutions is insufficient and mostly superficial.

The level of knowledge, awareness and command of language teachers on the word stress must be improved urgently. Despite the importance, many English educationalists underestimate the word stress pattern and perceive the issue as an insignificant detail of the pronunciation which will be learnt in an intrinsic way by the students in the course of time. What must not be forgotten at this point is the typological and morphological difference between Turkish and English. The word stress pattern of English is reported to be variable and the rule governed nature of it is very open to the exceptions on the other hand, Turkish has a very predictable nature of stress and displays very little variation and change. Expecting a learner who is living in a linguistic context where the word stress is not an overtly studied as it does not bear great importance, as Turkish, to learn the word stress pattern of English by his or her own effort and in a natural learning process does not constitute an achievable goal. Teaching the word stress, leading learners to find out the importance of word stress pattern of English and develop awareness to this reality is one of the most important tasks of language teachers. Dickey (2006) states one of the articles in Draft Code of Ethics of the TESOL Law as:

2.7 The foreign language/second language teacher shall recognize his/her duty to manifest responsibility, individual initiative, and integrity in his/her teaching and other professional actions within guidelines laid down for the profession. (p. 19)

Considering this article of code and the necessity of the word stress pattern of English instruction and emphasis revealed by the numerous studies Demirezen (2010a; 2010b) in the language classroom of Turkey, the necessary steps must be taken towards the improvement of the issue. The language teacher education, in this respect, bears great importance as it is the source of the potential improvement or the unfortunate deterioration of the pronunciation teaching and learning.

One of the chief reasons of faulty pronunciation is due to the change of primary stress to other syllables, as seen in the following words:

object (n.) /áb dʒekt/

object (v.) /əb dʒekt/

negotiate (v.) /nɪ góʊʃɪ eit/

negotiation (n.) /nɪ góʊʃi éiʃən/

negotiable (adj.) /nɪ góʊʃiəbəl/

The examples given above displays the drastic change in the pronunciation of a word based on the word stress pattern. As it is obvious above, the word stress poses difficulty for learners as it includes not only the location of the primary stress but also refers to the mobility of the stress and the vowel reduction. Therefore, this important element for intelligible and accurate pronunciation should be taught and studied in detail in language learning environments.

One of the most striking results of the research, which is highly related to the issue stated above, is displayed on Table 20 and stated in the previous chapter. The data regarding the word displaying highest improvement are actually frequent and well known words, at least when the setting of the research and the participants are taken into account. The words given in this table states the fact that the stress mobility and the vowel reduction to schwa /ə/.

The pedagogical implication that can be drawn the emphasis given in the literature review chapter and analyses of the data collected in this research is that word stress

teaching is not an impossible or too demanding task and it can be supported with computer based applications like the simple software application developed for this research with limited resources and technical expertise. The development and modifications that can easily be done on the WSPS with its flexible framework and the enrichment of its contents may enlarge its scope and the efficiency of the free software as an aid to pronunciation teaching. The implications for the software development and the further corrections to be done on WSPS will be analyzed in the next section.

5.3.2 The Study of WSPS within the CAP Pedagogy

To study the pedagogical implication of the WSPS and the process conducted based on this software application, Pennington's (1999) work on the CAP pedagogy and plainly described way to follow in it should be taken into consideration. This section, therefore, will analyze the responses gathered from the participants related to the use and the efficiency of the WSPS with the key elements stated by Pennington.

Pennington (1999) has stated that the most beneficial abilities of pronunciation teaching software are rapid analysis of the users' pronunciation and feedback in a reliable way. In this respect WSPS has disadvantages since it does not possess such a recognition and analysis system of the users' utterances. Possibly the next step of the development of WSPS in order to improve its efficiency will be the integration of its structure with an open source voice analysis and recognition engine. This will make the WSPS to gain the full ability of giving feedback not only in the form of pre recorded sound samples from a native speaker, but also in the form of the visualization of the sound waves, pitch indicator lines or other ways of voice analysis based feedback. However, the current situation can be defined as user friendly and easy to use since it does not require the study of a manual for the correct interpretation of the visualized feedback. The comment and suggestions from the participants of the study, on the other hand, point out the necessity of such system since the learners are always looking for more accurate and rapid feedback from the software application. Therefore, the addition of feedback ability for the users' pronunciation in visual forms seems like a very important and demanded feature that can be taken into consideration as an important pedagogical implication.

When the Table 7 stated by Pennington (1999) and Table 19 is compared to each other some key factors for both pros and cons stated in these tables can be seen as overlapping. This similarity displays the corresponding features of the WSPS with Pennington's description of the promise and limitations of the CAP pedagogy. One difference between this description of CAP and WSPS is about the motivation. As the results given in Figure 15 states, WSPS does not have the quality of sustaining the motivation of the users as it displays a steady decrease until the last week. The slight increase of the use of the WSPS at the last week of the research may be the result of the motivation stemming from aim of the participants to be more successful at the post test. Therefore, the motivating quality of the WSPS should definitely be developed with deeper analysis of the reasons behind this undesired condition.

The third pedagogical implication that can be drawn from the experience with the software development and participants' comments and suggestions on the use of the WSPS is about the visual quality of the design and the visual content displaying the nature of the software. These parts regarding the WSPS should not be seen as the lacking points but rather features that received suggestions for further revision and enrichment. These items can also have strong connections with the insufficient motivating feature of the software as the WSPS largely relies on the visuals located in the software prior to the distribution of the copies to the participants. With a visual generating sound recognition and analysis engine, such needs can be met with the dynamic production of the visual feedback for the participants' pronunciation.

The followings are given by Pennington (1999) as the steps to follow to improve CAP Pedagogy. Although these are for the overall development of the field of study but they can be used as a list of criteria for the analysis of the WSPS.

1. "Start from a theoretical position"
2. "Establish a baseline for pronunciation"
3. "Set an overall goal for performance"
4. "Build in specific targets for performance"
5. "Build skills in stages".
6. "Link pronunciation to other learning and communicative goals"

7. “Design on a principled curriculum”
8. “Design based on creative use of properties of computer medium”
9. “Raise awareness of contrast with L1 and range of targets for L2”
10. “Provide for exploration of database” (p. 433).

Considering these suggestions, WSPS needs further study about the integration to the curriculum of the learning environment to fully support the word stress teaching and learning within the related course for pronunciation training.

5.4 SUGGESTIONS FOR FURTHER RESEARCH

The limitations of this research, as states in the first chapter, were largely based on technical limitations. Therefore the primary suggestions for the further research will be related to these limitations and possible solutions for them. The secondary suggestions will be stating the further study topics to develop a more comprehensive approach and understanding related to the present and future of the CAP and its application in Turkey.

Technical insufficiencies were the most disadvantageous aspect of the current research. Since the processing of the sound samples gathered from the participants require complex procedures and demanding durations of these analyses, the number of the participants need to be limited. However, with a larger group of researchers and cooperation the effort and time required by the process can be lessened to reasonable levels. Also, the computer used for such analysis should be chosen carefully since the new products of the computer world like net books or outdated systems can negatively affect the process.

The other research topics suggested for the future research can classified under two different titles. The first one is related to the computer aided pronunciation software applications and the second one is based on the use of educative software by the learners individually. The word stress pattern and the stress changing dynamics in the words of English has been a research topic since the second half of the previous century, therefore the further study for this field will probably be a repetition of the effort for a satisfied need to a degree. CAP software applications has gaining popularity for a

decade, however these software applications are difficult to purchase since they do not have such broad market. Therefore the analysis of the current software application used for CAP focusing on their efficiency innovation and problematic aspects can be a valuable topic to study on. Moreover the open source library for the sound recognition and sound synthesis engines should also be developed in terms of content and accessibility. The open source is very important for the free or cheap software application development. Open source is

...is a development method for software that harnesses the power of distributed peer review and transparency of process. The promise of open source is better quality, higher reliability, more flexibility, lower cost, and an end to predatory vendor lock-in. (OSI, Open Source Initiative, 2010).

The second important area to lead studies and researches are the use of software applications aimed for language teaching and learning. Most popular software applications on the market are known by the users via commercials or the suggestions from their social environment. The attitude, satisfaction and possible habitual use of these applications will probably be a fruitful area for further research as they will display the broader picture of CALL and CAP technologies and application in Turkey. This second area also includes the learners' attitude towards the use of computer based activities as homework or self-study sessions, since the current study had issues related to the unstable motivation and use of the WSPS. Research of these will provide direct analysis of the unknown features of the Turkish CALL and CAP users.

5.5 CONCLUSION

The aim of the research was to analyze the effect of computer aided pronunciation teaching on the teaching and learning of word stress pattern of English. As the topic is focused on a single but very crucial suprasegmental element of the English language, the use of products that can be found on the market seemed a little bit out of the scope of the study. Therefore, the development of a software application with focus on the word stress pattern, the mobility of the word stress and the vowel reduction.

The software WSPS was distributed to the participants of research after their pre-test results was analyzed and to be able to see the effect of the software on participants' ability to accurate use and command of the word stress pattern of English words. The post-test results of the data analyses displayed that the WSPS has a positive effect on the teaching and learning of the word stress. The suggestions and comments of the users were also gathered indoor to create the evaluation of the software itself by the participants and thus the pros and cons of the software was defined.

The CALL and CAP technologies have played an important role for the current research since they draw the borders of the study and the way to follow to develop a functional and effective software application that can be used as a supplementary teaching material to support the classroom instruction. The automatic speech recognition and speech synthesis are the important technologies occupying a significant place within the scope of CAP. These technologies can be used for effective feedback abilities that help learner to receive feedback rapidly and accurately regarding his or her pronunciation. Such features are very useful to improve the efficiency of the software applications as providing users an autonomous learning environment.

Whether it is supported by CAP software applications or not, the ultimate importance of the word stress pattern of the English language is one of the basic focuses of this research. Ignoring the teaching and learning the word stress pattern definitely deteriorates the quality of pronunciation and perception of the elements in verbal communication. Despite the difficult and complex nature of the word stress occurring with the effects of mobility and vowel decay, the adequate emphasis of the issue in pronunciation education should never be disregarded.

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APPENDICES

Appendix A – Permission from Pearson Education for the Use of Content from Longman Pronunciation Coach CD Dictionary

Subject	Re: About Longman Pronunciation Dictionary
From	John Wells <j.wells@ucl.ac.uk>
Date	Monday, April 19, 2010 9:56 am
To	Hasan OZKAN <ozkanhasan@hacettepe.edu.tr>
Cc	"Mayor, Mike" <Mike.Mayor@pearson.com>
<p>Hasan -</p> <p>Thank you for your email. As far as I am concerned I would be happy for you to make use of LPD in this non-commercial way, as you ask. However, you must first ask permission from my publishers, Pearson Longman.</p> <p>John Wells</p>	

Subject	RE: 13954 RE: About Longman Pronunciation Dictionary
From	"PearsonEMA, Permissions" <Permissions@pearson.com>
Date	Thursday, May 13, 2010 3:36 pm
To	Hasan OZKAN <ozkanhasan@hacettepe.edu.tr>
<p>Dear Hasan</p> <p>We are happy to grant your request free of charge as approved by Professor John Wells and our Editorial Director Mike Mayor. You have permission to include the sound recordings from The Longman Pronunciation Dictionary on the software you will be using in your study of "Teaching Word Stress Through Computers". Use of the recordings is limited to non-commercial study. You must not make the recordings available to any other persons other than those involved in your study and may not use them yourself for any other purpose other than completion of your thesis.</p> <p>Your request to use the logo and hyperlink have also been approved by our Editorial Director, but again this is only for the purpose of your study and is not for any commercial purpose.</p> <p>Yours sincerely</p> <p>Julie Jenkins Permissions Department Pearson Education Limited</p>	

Appendix 2 – Permission for the Videos Used in WSPS

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Subject	Re: Important- Permission Request -- Mail from englishwithjennifer.com
From	Jennifer Lebedev <jenniferlebedev@yahoo.com>
Date	Monday, June 7, 2010 6:20 pm
To	Hasan Ozkan <ozkanhasan@hacettepe.edu.tr>

Dear Hasan,

Thank you for writing to ask my permission. I am flattered and pleased that someone would like to make use of my material to support academic work at the graduate level. You may certainly select some of my videos and refer to them in your thesis. I wish you the best of luck.

Regards,
Jennifer Lebedev