Research Article

Enhancing EFL Learners Diphthong Pronunciation Ability's using PRAAT

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A B S T R A C T

Pronunciation is one of the most important aspects for learners in studying English. Today, pronunciation tends to be neglected by instructors in EFL (English as a Foreign Language) classes, especially for vowel sounds. Computer-assisted language learning (CALL) is one of the alternative methods in enhancing students' ability in pronunciation. PRAAT is software used to measure the quality of students' pronunciation. They were able to enhance their pronunciation practice by using the visual spectrogram. The purpose of this research was to determine the efficacy of employing CALL in pronunciation classes. The numbers of students in this research were 30 Acehnese EFL students. The methodology was quantitative through experimental research. A Word list was used as an instrument to obtain data from the learners. Based on the results, there was a significant improvement after the learning process. The learners had difficulty with five significant mistake sounds: [e], [ei], [i], [e], [e]. They recognized these sounds as monophthongs. This inaccuracy was caused by unfamiliarity with English diphthongs, because these sounds did not found in L1 and L2. After a few repetitions, the students began to use more diphthongal and higher F1 and F2 sounds. Hence, it can be concluded that the CALL had a positive impact in enhancing the student's ability in pronunciation.

INTRODUCTION

One of the most important aspects of a discussion is pronunciation. It is a sub- skill from speaking that should be paid more attention by EFL learners, because, pronunciation is a significant contributory factor for the success in oral speaking (Priya & Prasantha Kumar, 2020). It is impossible for the learners to speak fluently if they fail in pronunciation. On the contrary, the negative impact of a pronunciation error can give rise to misunderstanding and ambiguous communication among listeners. Based on the communicative language teaching (CLT), the primary motivation for people who are learning another language is to improve their communicative competence. It means that the students not only learn about the rules of the language in constructing sentences, but also learn about proper pronunciation(Priya & Prasantha Kumar, 2020). Furthermore, each learner must be aware of appropriate pronunciation, if they want to achieve successful speaking in English (Abdulrahman & Ramamoorthy, 2021).

Phonetics cannot be isolated from good pronunciation. It is one of the parts to practice pronunciation correctly, because it is able to describe intonation and help the students to recognize, understand, and practice intonation patterns. Similarly, phonetics plays an important role in assisting students in learning about the speech organs and the role of articulation in appropriately forming English sounds. Ultimately, the more students are able to understand and pronounce the words phonetically and correctly, the more likely they are able to produce sounds

similar to   native speakers (Dandee & Pornwiriyakit, 2022).

More than half of research about this area of topic suggested that the difference of quality and various numbers of each vowel including diphthongs has a unique structure frequency indicating the quality of the vowels. They are a challenging factor for learners when pronouncing words that contain diphthong sounds. To measure parameters of diphthongs, it can be seen by the relationship between F1 and F2. Both of these formants determine the quality of the vocoid articulation (Widagsa, 2017). This study of vowel sounds revealed that the differences between L1 (regional language), L2 (second Language) and L3 (targeted language) influenced pronunciation. This becomes a complicated problem for EFL learners in Indonesia (Jannah, Zuhra, & Wati, 2023). It was brought on by how different and distinct each language's sounds were. It offered 12 diphthongs based on the previous list of the Acehnese vowels. In centering position was (/iə/, /ɯə/, /uə/, /ɛə/, /ʌə/, /ɔə/) and rising diphthongs was (/ui/, /əi/, /oi/, /ʌi/, /ɔi/, /ai) (Yusuf, Fata, Aziz, Surya, & Pillai, 2022). By contrast, English only had 8 sounds such as [ɪə], [ʊə], [eə], [eI], [aI], [ɔI], [əʊ] and [aʊ](Roach, 2009). Being, there are a numbers of important differences between English and Indonesia. The sounds of [ɪə], [ʊə], [eI], [eə] and [aʊ] do not exist in Indonesia diphthongs (Anwar & Kalisa, 2020). As a result, the Acehnese learners experience serious difficulties. These separate diphthongs from L1, L2, and L3 are a result of mistaken sounds. The more phonological differences there are between two languages, the more interference errors there will be (Jordan, 2017).

Notwithstanding, there are several issues that need to be addressed in order to improve the way pronunciation is taught. In the present day, pronunciation is still being neglected by teachers and students in EFL classes. Many of them tended to ignore many aspects of pronunciation especially in vowel sounds. Most of them do not realize about the differences or the quality of each vowel sounds. as a result, the learners produce the same sounds for all the vowels, as They cannot distinguish the differences in diphthongs. This was certainly true in the case of Pasto learners; they were unable to differentiate the sound of [ei]. There is no significant trajectory or no glide between [e] and [i] in the words ape, say, aid, raised, and pace. The quality of F1 Roc was in the negative result. Meaning that they produced monophthong sounds in those words (Iqbal, Ali, Ullah, & Ahmad, 2021). Another issue that Acehnese EFL students were grappling with was their inability to pronounce the sounds of [eə] and [au]. There was no glide or movement for both of these sounds. The learners realized as the monophthongs of [ɔ] and [ɛ] in wordlist of bear, and baut (Ghafur, 2022). In a similar case dealt with Arabic learners. The informant misidentified the sounds of

/eə/ as/ɜ:/ in the diphthongs. They also confused between /ɪ/, /e/ and the back vowels of, /ʊ/, /əʊ/. All of these sounds, they pronounced them similarly (Evans & Alshangiti, 2018).

The aforesaid issue was also encountered by EFL learners from the University of Iskandar Muda. They made mistakes when pronouncing vowels, especially for the words that contain diphthongs such as " play /plei/" become /pley/ without sound [i], " here / hɪər/" become / hi:r/, "ear /Iər/" pronounced as /ir/. Most of them failed to pronounce the diphthongs, and instead they were pronounced as monophthongs. Despite the fact that the present curriculum was carefully targeted and included several courses like phonology and phonetics that helped with pronunciation. The issues are still present. These difficulties were perhaps affected by the differences diphthongs from L1, L2 and L3 as a target language (Anwar & Kalisa, 2020). In other cases, Indonesians were using Indonesian and their mother tongues more than the target language (Al-Auwal, 2017). Thereby, the percentage of people using English is only a few percent. It means that the Acehnese EFL learners only practice English in class or university environment. In addition, the age of the EFL learners from UNIDA was above CPH (critical period hypothesis). Their average age was around 23-25 years old, and as a consequence, their pronunciation will be affected by the neurological factor or the biological period.

Based on the problems mentioned beforehand, it is necessary to solve the problems that are faced by Acehnese EFL learners in pronunciation. Based on the teaching-learning and effective instruction methods, this study attempts to complete and analyze the obstacles and demands of the learners. CALL is an alternative method to help the Acehnese EFL learners in their pronunciation skills. This application provides learners with the opportunity to improve them in learning English. With this application, EFL students can apply self- studying and practice outside of their classroom activities, which serves as a way to become more immersed in the target language (Kane, Mishra, & Dutta, 2016). Additionally, students who used CALL were more motivated to learn as it was simple to comprehend and remember. They also could study at home without the limitation of time (Joy Calvo Benzies, 2017). The amount of results was recognized to have an effect on English components such as pronunciation, vocabulary, listening, speaking, writing, reading, and grammar. As such, CALL significantly assists teachers in improving their students' English learning abilities (Syafryadin, Pratiwi, & Wardhana, 2021).

There are some relevant studies about the contribution of CALL in teaching pronunciation. In one study involving Pakistani learners, suggested they had a huge motivation in learning pronunciation through CALL program, compared

to using the traditional method of learning. There were some activities that can be completed using the CALL, such as vowels, consonant, short and long, stress, rhythm and intonation. The learners were overall more interested as they can study out of the classroom using the software, internet and laptop (Akhter Farhat & Dzakiria, 2017). Another significant aspect of CALL was also mentioned by ESP (English for Specific Purposes) students in Spain. In such study, the students were keen on learning pronunciation through "Talk to Me", an English language based software. There were many features, including phonetics exercises, segmental and suprasegmental. An advantage of the software was that the students were able to create intonation and look at their results immediately. As a result, the students in this study were able to pronounce similarly to native speakers after joining CALL class (Joy Calvo Benzies, 2017). As a response to the attraction and benefits of CALL, computer technologies have been brought into class rooms where they were considered as a tool to enhance the students' learning and also as a form of addressing a certain education problem. In addition to these recent findings about the role of CALL with Pronunciation Coach Software, a study on Algerian students learned at a fairly remarkable pace on how to pronounce the vowels and consonants of their target language. Hence, this software is effective in contributing to the quality of vowel and consonant sounds by learners (Ghounane & Rabahi, 2021).

The Acehnese Photenic, especially for dipthongs has various of measurment result of each sounds. It devided into two categories namely rising and centering, All of these sounds only four sounds found in English dipthongs such as [iə], [uə], [ɔi] and [ai] . It cannot be denied that all of these sounds has different quality of sounds between them. The quality of Acehnese dipthongs, [iə] was 483 for F1 and -6456 for F2. The duration was 3126 Hz/Sec. This sounds was dipthongal. The trajectory was move signifacantly. Furthermore for the sound [uə] was also similar. The F1 was 882 and 4123 for F2. In the same way, rising diphthong sounds also have bigger and dipthongal. The numbers of measurement of [ɔi] was -1302 of F1 and 5188 for F2. The qulity of [ai] was -164 and 2985. data (Yusuf & Pillai, 2013).

Misspronunciation error are the most common type of interference between regional language and language target. Pronunciation was pretty high occur for the learners. They difficult to determine the quality based on the standard of English sounds, They need one of the sofware to enhance their ability in pronunciation especially for dipthongs.

PRAAT is generally seen as a factor strongly related to enhance the students' pronunciation especially for diphthongs. The purpose of PRAAT is to examine the vowel system of a language or a variety of languages. This software is able to provide the quality and the position of F1 and F2 for the diphthongs (Cruselles, n.d.). The phoneticians used this software to measure the diphthongs sounds. Most importantly; this software can show the feature of diphthongs. As mentioned, diphthongs had a unique measurement features. It was difficult to determine the quality of F1 and F2. There was a movement which slides from F1 to F2, the changes of tongue and mouth significantly to obtain the diphthongs pronunciation clearly(Huang, 2016). Another significant aspect of PRAAT was used to measure the differences of dialect between SSBE and SE in diphthongs. As expected, the magnitude and direction of formant trajectories was greatest for the five nominal diphthongs in scatter plot. This software could differentiate both of these dialects significantly (Williams & Escudero, 2014). PRAAT also can increase the students' ability in measuring the vowel sounds, the significant results appear in Acehnese EFL learners in studying, measuring, and producing the monophthong through this software. The learners were motivated and independent in improving their ability without attending class. They could access, save, and measure their sounds by themselves (Jannah et al., 2023) the highlight of PRAAT is that it is a freeware program, which can be downloaded instantly. The learners can select the authentic models. Besides this, the software showed clear graphic movement of diphthongs. Moreover, it was easy to interpret and practice their pronunciation (Li, 2019). Last but not least, the usage of PRAAT provided significant improvement for the quality of F1 and F2 that produced by the learners from Thai. There was a longer period of time following training for the sounds [eɪ], [əʊ] and [eə]. The learners' feedback mostly reflected their satisfaction with PRAAT as a tool to practice their pronunciation.

Therefore, the effort in enhancing the Acehnese EFL learners' ability in English pronunciation can be a priority. For that reason, this study intends to complete the previous study by using PRAAT in teaching monophthongs for the EFL learners. In this study, the learners had to practice all the numbers of English diphthongs during 2 months. All their result would determine whether or not PRAAT is a feasible CALL for the implementation of pronunciation pedagogy for the Acehnese EFL Learners.

METHOD

This research was quantitative through experimental- only one group. It means that the participant got the test before and after training. The data collection took two months to

complete. The participant spent their training with around 12 meetings in the class. In the last section they got the test to obtain the valid result after spent time for learning process. The table below has explained the steps of the learning process section.

Table 1 The procedure of Experimental Research

First meeting	Pre- Test	Venue
Second –twelfth meeting	Treatment	Classroom
Last Meeting	Post- Test	Phonetics lab

Participants

The technique of sampling was purposive sampling. This technique could give the data sources with a certain consideration as the data was more accurate. The participant in this study was the English department students at UNIDA University, Aceh. They were at fifth semester, aged around 23 – 25 years old including twenty five females, and five males. All of them do not have a dental problem, have no lips deformation and have no hearing problems. This can be seen in the table below.

Table 2 Overview of Participants

Age	Total	Gender
23	7	Female
24	8	Female
25	10	Female
24	3	Male
25	2	Male
Total	**30 Male & Female**	

Source of Data

Thirty informants who participated in this study were used as a source of data for this research. They resided in Banda Aceh, Aceh Province. The F1 and F2 from the pronunciation of diphthongs were gained through giving the treatment and recording word list. There are eight world lists that contained the diphthongs.

Instrument

There were two kinds of instruments that are used in this research. They were:

1. Word list

Elicitation sheet become an instrument. There were eight diphthongs. All of these sounds were put in the carrier sentences "please say......... again". It aims to help the informant to pronounce the diphthongs. Before that, the informants need to insert the word list in the elicitation sheet one by one (Pillai & Delavari, 2012). Laptop and

headset was used to record and to filter the sounds in keeping the quality of informant voice. In addition, this instrument was able to save directly without need to transfer from another tool. Moreover, the file can be readable by the WAV format on the computer software. It also could evaluate. Table 3 showed the elicitation word for diphthongs.

Table 3 the Table of Word List

Vowel	Word
ei	Bayed
ai	Bide
ɔi	Boyd
əu	Bode
iə	Beard
ʊe	Poor
eə	Bear

2. Software PRAAT

PRAAT 6.3.03 is software used as the instrument for this study. This software is free software that can be downloaded freely by the informants without buying. This software suitable for the informants to measure the vowel sounds to find out the F1 and F2 (Boersma & van Heuven, 2001).

3. Data Analysis
   a. Acoustic analysis

The spectrographic display in PRAAT was a set at the view range of 5500 Hz as this is the frequency range that is commonly adjusted for male and female speaker (Yusuf & Pillai, 2013). To capture the change in vowel quality pronunciation, ROC (Range of Change) recommended measuring the formant by applying the following formula. The formula was shown in the column below:

$$F1end – F2\ onset\ /\ duration\ in\ Seconds = ROC\ (Hz/\ S)$$

The ROC formula was found in Herts and needs to convert into another measurement. Bark was a good measurement to analyze the data of diphthongs. For the next step for all of the data from Bark, is that it would transfer into excel sheet to illustrate the position of the vowel spaces produced by the informants.

   b. Measurement with T – test.

t- Test was used to measure the quality of diphthong pronunciation by the informants. It determined the different results before and after gaining the treatments. Each acoustic measurement was statistically analyzed with the t- test at $p<.05$. SPSS helped the researcher in gaining the accurate data.

RESULTS AND DISCUSSION

The Acoustic Result

The quality of the Acehnese EFL learners pronunciation ability represented in eight sounds. They were [eɪ], [aɪ], [ɔɪ], [aʊ], [əʊ] [ɪə], [eə], and [ʊə]. All of these sounds divided into two categories ; centering such [Iə], [eə] and [uə] and closing [I]; [ei], [ai], and [ɔi] and [ʊ]; [əʊ] and [oʊ] (Roach, 2009). Each the informant repeated the pronunciation of word list six times during the recording process. They used carrier sentence such as "please say bayed again". The total numbers of token for each informant were 48 tokens. These tokens were calculated for their ROC values for both F1 and F2 at the beginning and end of each diphthong. These findings between before and after treatment result were showed in the table below.

Table 4. The Average Measurement Quality of Informant Before Treatment

Diphthongs	Target Word	F1 ROC (Hz)	F2 ROC (Hz)
ei	Bayed	-4	598
ai	Bide	-284	2419
ɔi	Boyd	61	4377
əʊ	Bode	-120	96
au	Baut	171	1427
Iə	Beard	318	-1890
uə	Poor	133	12
eə	Bear	130	-256

This shows the larger F1 ROC average value for informants [ai], which indicates the greater formant movement in vowel height compared to other diphthongs, while the smaller F1 ROC average value for [ei] and [ɔi] indicate a lack of change in vowel height for these diphthongs. However, the average of F2 ROC for [ɔi] is higher than the other. Then it followed by the F2 ROC [əʊ] in the word bode. It was only 96. The average measurement for males are presented in the table.

Table 5. Average Measurement Quality of Informants After Treatment

Diphthongs	Target Word	F1 ROC (Hz)	F2 ROC (Hz)
ei	Bayed	-234	1068
ai	Bide	524	2131
ɔi	Boyd	-175	3512
əʊ	Bode	-133	3
au	Baut	519	524
Iə	Beard	385	-3687
uə	Poor	203	3652
eə	Bear	130	-254

After the informants underwent the process t for 2 months, there was such a significant improvement for their pronunciation. It can be seen in the table above. The big improvement was in sounds [ei] and [ɔi].It indicates that

there was a rising trajectory from the lower target to the higher target. It can be seen that the higher value of the measurement of F1 ROC. Then it followed by the sounds [əʊ], and [eə]. There was a huge movement of the trajectory of this sound that can be seen in the scatter plot below.

1. The Trajectory of [ei]

Based on the result that found after obtained the treatment,the trajectory was more fronted thatn before. It can be seen in the figure below.
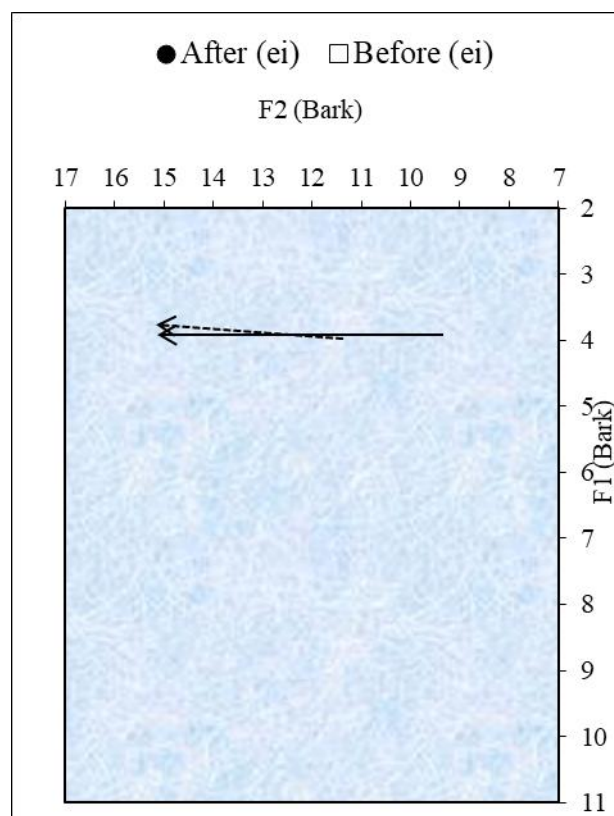

Figure 1. The trajectory of [ei]

The sound of [ei] was one of the closing diphthongs. This sound has a characteristic with the entire and a glide toward a closer vowel. This sound was produced by 60 times. The average value before and after shown in the table 3 and table 4. There were substantial results before and after the attending CALL class.Before participants attended CALL class, the average of participant results was very small. It was only -4; whilst for the F1 ROC was 598 Hz. After attending CALL class and using PRAAT, their average value was increased 1234 Hz for F1 and F2 was 1068Hz. Besides it can be seen, there was a significant movement from F1 to F2.

2. The Trajectory of [ɔi]

The sound of [ɔi] was the combination of sounds [ɔ] and [i]. It was in the centering position. The result found that the value of participant before treatment was more

diphthongal movement compare after treatment in the word boyd. The figure 6 illustrated the movement of [ɔi] by the participants before and after treatment.
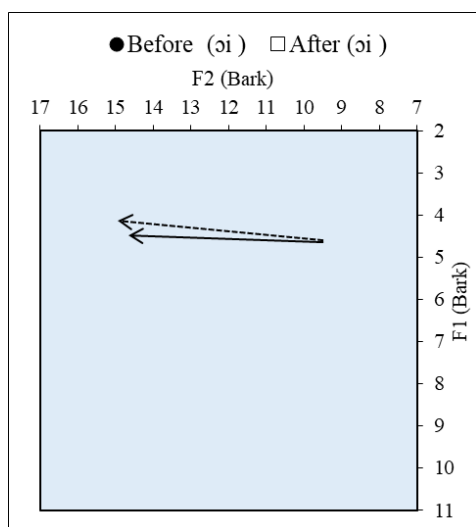

Figure 2. The Trajectory of [ɔi]

The figures above showed that the different between both of these sections. The average value before treatment, the participant produce sound [ɔ] was more fronted and [i] was lower than after. However, they produced diphthongal movement for this sound.

3. The Trajectory of [əʊ]

[əʊ] is the closing diphthong with ending in [ʊ]. The sound [əʊ] in the word bode was produced by females with larger F1 and F2 ROC average values (see Table 4 & Table 5) and with more movement than males. The average value for both females and males for F1 ROC is in a negative value. Figure 4.17 illustrates the raising of the trajectory between before and after.
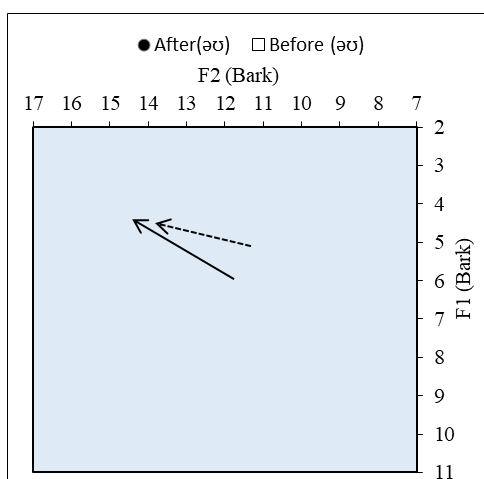

Figure 3 The Trajectory of [əʊ]

In this case, the participant got the problem in word Bode for the sound [əʊ]. The participant has a short and little slowly movement. After obtaining the treatment, there was

a large movement from [ə] to [ʊ] sound. The qualities of F1 and F2 after treatment changed become -133 and -3.

4. The Trajectory of [eə]

The result of this sound in word bear was not really significantly different. The participants have little different movement from sound [e] to [ə] before and after treatment. The average value of F1 and F2 was 130 and -256. While after treatment the participant become 132 and -254. It means that before treatment the quality of F1 and F2 little diphthongal than after treatment. The comparison of the trajectory was depicted in the figure 4.
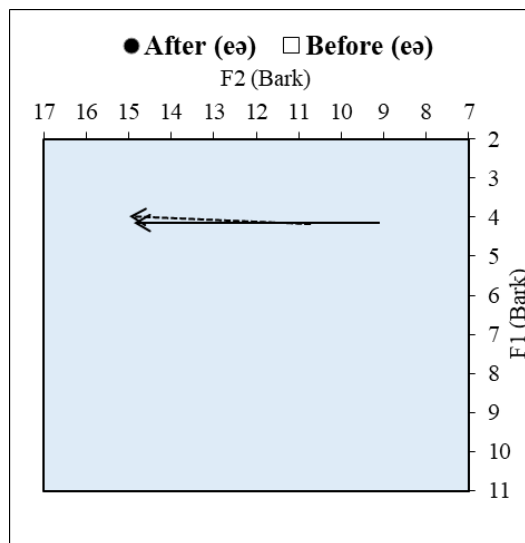

Figure 4 The Trajectory of [eə]

The learnes had a little large of [eə]sound. They have a wide movement from the [e] to [ə]. The quality of F1 was 130 and the ROC of F2 was -256. After lesson class, they F2 ROC decrease to be -254. It means that the movement become lower than before.

T- Test Result

What can be clearly seen in the table was differences between before and after treatment class was the finding evidence after calculating the result of students pronunciation ability. The description of statistics consists of before and after treatment class result.

Table 6. The Descriptive Statistics of One Groups Before and After Treatment

Paired Samples Test								
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	Different 95% Confidence Interval				
					Lower	Upper			
Pair 1	Before and After Treatment	19,50000	10,20057	1,86236	-23,30896	15,69104	-10,471	29	,000

The table showed the evidence of comparing between the learners before and after CALL class. It can be seen that CALL using PRAAT software provided the significant difference between before and after learning with CALL. The value of t- sig (2-tailed) was 000<0.005. It means that there was a significant difference between before CALL class and after treatment ofthe CALL class.

CALL gave a huge impact for the learners in enhancing their pronunciation, especially for the diphthongs. The total numbers of diphthongs were [ei], [ai], [ɔi], [əʊ], [au], [Iə], [uə], [eə], and all of these sounds put in the carrier sentences using the word list such as bayed, bide, boyd, bode, beard, poor, and bear. The learners were asked to pronounce these words using the carrier sentences. All of them should replace this sentence six times for example please say bide again. The researcher tried to record their pronunciation before they went to CALL classes. It was to be set as an early data for the pre- test, and be made as a comparison for the end data. It aimed to measure their ability about their pronunciation before joining PRAAT software or treatment section.

Before the treatment class or the pre- test result, the Acehnese EFL learners seem overwhelmed in saying certain words. Acehnese and Indonesian have similar diphthongs with English such as [ai], [au], [Iə], and [uə]. However the quality of F1 and F2 was little movement in the scatter plot. On the contrary, for some other sounds, there were many learners that seem to struggle with diphthongs which do not exist in the L1 and l2 sound system. The presence of unfamiliar sound was likely to trigger some obstacles in diphthongs pronunciation such as [ei], [ɔi], [əʊ], and [eə]. All of these sounds tend to be mispronounced as [e],[o], [ou], and [e]. Most learners were not able to differentiate diphthongs and monophthongs. Overall, there was no significant movement of the trajectory in the scatter plot. The average value of F1 and F2 was lower. Hence the sounds of [ei] in the word bayed become as bed [bed], [boyd] [bɔid] as boy [boy], bode [bəʊd] as [bod], and bear [beər] become as ber [ber]. Some of these error sounds seemed unfamiliar to them, this is due to the fact that they have never been taught how to pronounce such sounds. Hence there are three types of error; substitution, omission, and insertion. The students omitted the English diphthongs sounds by the pure vowels sounds. Most of them are incorrect in producing these sounds (Anwar & Kalisa, 2020).

After the learners attended the twelfth meeting, almost 2 months in, there was a significant improvement of the quality of their pronunciation. The students showed more confidence in assessing their pronunciation using CALL through PRAAT software. The quality of F1 ROC and F2 ROC of their pronunciation in diphthong showed a significant improvement. The trajectory showed more diphthongal in the scatter plot. There was no overlapping of the sounds. Moreover, they could observe their performances directly through visual spectrogram. This made them aware of the differences between monophthongs and diphthongs. On the other hand, it was really helpful for them to achieve their pronunciation of two vowels combination during their practice sections.

Most of Acehnese EFL learners in this study tended to show a positive feedback after their period of individual practice in CALL class. They realized the beneficial aspects of this study can help their pronunciation ability. CALL through PRAAT software has a positive impact on EFL learners. It needed some more time for training on this program (Osatananda & Thinchan, 2021).

CONCLUSION

CALL using PRAAT has a good advantage for the Acehnese EFL learners. This software can help the learners in enhancing their pronunciation practice using the visual spectrogram. This software was a useful tool to aid self-guided learners practice outside of the classroom for the learners. The learners enjoyed used this software without any hesitation or stress. They were able to manage their time to practice their pronunciation after class. Besides, they can practice as an individual at home or settle their own time out side of the class. CALL can be as a strategy to encourage English teachers to teach English pronunciation for their students. In the same way, this software is suitable for the learners to practice their English pronunciation.

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