Implementing a Speech Analyzer Software to Enhance English Pronunciation Competence of Thai Students

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บทคัดย่อ

การวิจัยแบบกึ่งทดลองในครั้งนี้มีวัตถุประสงค์ในการวิเคราะห์ค่าผลสัมฤทธิ์ทางการเรียนรู้ของความสามารถในการออกเสียงภาษาอังกฤษของนักเรียนไทยระหว่างกลุ่มควบคุมและกลุ่มทดลอง โดยใช้เทคโนโลยีทางเสียงในระบบการใช้คอมพิวเตอร์เป็นพื้นฐาน โดยกลุ่มเป้าหมายแบ่งออกเป็น 2 กลุ่มได้แก่กลุ่มควบคุมประกอบไปด้วยนักเรียนชั้นปีที่ 2 สาขาภาษาอังกฤษ จำนวน 51 คน และกลุ่มทดลองประกอบไปด้วยนักเรียนชั้นปีที่ 2 สาขาภาษาอังกฤษ จำนวน 52 คน ในภาคเรียนที่ 2 ปีการศึกษา 2559 โดยกลุ่มควบคุมจะเรียนโดยวิธีการสอนแบบปกติ ส่วนกลุ่มทดลองจะใช้โปรแกรมคอมพิวเตอร์ชื่อ ‘Speech Analyzer’ เป็นเครื่องมือเสริมในการเรียนการสอน ผลการวิจัยพบว่าการที่การศึกษาก้าวพร้อมไปกับเทคโนโลยีทำให้ครูผู้สอนสามารถใช้โปรแกรมคอมพิวเตอร์ในการพัฒนาความสามารถทางการออกเสียงของนักเรียน และยังช่วยครูผู้สอนในการลดอคติในการประเมิน การออกเสียงของนักเรียนอีกด้วย โดยโปรแกรมนี้ให้ข้อมูลเกี่ยวกับความรู้เรื่องเสียงในรูปแบบของ คลื่นเสียง ความเข้มและสเปคโตรแกรมของเสียง ซึ่งมีบทบาทสำคัญสำหรับนักเรียนในการนำเสนอคำอธิบายที่ชัดเจนว่าทำไมและอย่างไรการออกเสียงของพวกเขาถึงมีความแตกต่างจากเจ้าของภาษา นอกจากนั้นโปรแกรมนี้ยังส่งผลประโยชน์ต่อการเรียนรู้ของนักเรียนเพราะว่าโปรแกรมดังกล่าวทำให้ความสามารถในการออกเสียงของนักเรียนดีขึ้น อีกทั้งนักเรียนสามารถใช้สื่อการสอนนี้ได้ในทุกเวลาและสถานการณ์ ยังส่งผลให้ผลสัมฤทธิ์ทางการเรียนทางด้านการออกเสียงของนักเรียนกลุ่มทดลอง สูงกว่ากลุ่มควบคุมอย่างมีนัยสำคัญที่ 0.05

Abstract

This quasi-experiment research aimed to investigate the learning achievement of pronunciation competence of Thai learners of English between the control and experimental groups, using speech technology in computer-based systems. The participants were divided into two groups, one control group and one experimental group. The control group consisted of 51 second-year students majoring in English and the experimental group comprised 52 second-year students majoring in English. This investigation was conducted in the second semester of the academic year 2015. They were enrolled on the course related to Practical English Phonetics.

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In each case, the control group was given an ordinary lecture whereas the experimental group was offered an additional tool, the computer software named 'Speech Analyzer'. The result revealed that, in keeping pace with technology, teachers could use the computer software to increase students' pronunciation competence. It also helps the teachers to reduce subjectivity in evaluating their students' pronunciation. This program also provides the acoustic information in terms of waveform, intensity and spectrogram which plays a crucial role for the students by offering vivid explanation to show why and how their pronunciation is different from that of an English native speaker. Additionally, this software is highly beneficial for the learning dynamics of students because it enhances their pronunciation competence. Furthermore, the students can access the teaching materials anytime or anywhere. As a result, the learning achievement of the pronunciation competence of the experimental group was higher than that of the control group at a significance level of 0.05.

Keywords: phonetics, computer software, pronunciation competence**,** EFL students

Introduction

In the Thai context, possessing strong English skills has become an issue related to the chance of gaining better job opportunities, career advancement, and prestige. As English is seen as an invaluable asset, it enables Thais to efficiently communicate with the wider community in the age of globalization and being the Asean Economic Community (AEC) member country. As a result, successive Thai governments have put substantial effort to Thai learners in improving their English performance (Kanoksilapatham, 2007). In order to respond to the demands for developing an improved English ability, the Roadmap of the Asean Community 2009-2015 has been formed to deal with the language policy in Thailand. The Thai government started the year 2012 with a new English learning resolution, 'English-Speaking Year' as a way toward improving English language proficiency among Thai people putting them on the same level with the neighboring countries by 2015 (Hodal, 2012). The new initiatives have been launched in all aspects of the Thai educational system to improve the quality of English education including syllabus design, principles of teaching, types of tasks and materials, speaking assessment and facilities. However, an average Thai is still considered to have very low English proficiency (62 out of 70 countries) according to the EF English Proficiency Index (EF EPI) in 2015. Likewise, Bunnag (2005) indicated that, based on the scores of two international standardized tests: TOEFL and TOEIC, the Thai test takers' scores were significantly low, compared to those of other Southeast Asian countries.

Regarding the process of English language acquisition, speaking seems intuitively the most important of all the four skills (Ur, 1996). According to the previous studies in the Thai context of learning English, there is certainly a number of factors leading to speaking difficulties in English. Firstly, English speaking or oral communication is deemed to be difficult since English is not their native language (KhamKhien, 2010). Secondly, English education in Thailand is mainly spent memorizing English grammar rules in order to pass the written university entrance exams instead of using English to communicate. Thirdly, Thai students have an intense fear of making mistakes or being embarrassed in public based on the concept of face in Thai culture. As the concept of 'face' in Thailand is abstract and refers to one's reputation, social standing and dignity, Thais will avoid any embarrassment to lose their face and do everything to preserve their face (Larry, 2008). Based on my personal experience and observation in Thai society, many Thai people have an acute version of glossophobia resulting in getting extremely nervous and panic stricken when they have to speak in public no matter what language they speak, especially English. Next, the lack of an English environment is a major obstacle for Thai students to improve their speaking skills.

Additionally, the mother tongue interference in the form of differences between Thai and English phonemes has also become a major source of pronunciation difficulty for Thai learners (Richards, 1969). By the time they start to learn the English sounds, they encounter a fossilized sound system of their mother tongue, which significantly affects their acquisition of English speaking skills. Furthermore, inadequate skilled teachers are the important factor in student learning progress (Geringer, 2003). As Noopong (2002) reported, 60% of Thai English teachers had knowledge of English and teaching methodologies below that of the syllabus level at which they were teaching. Of the remaining top 40%, only 3% had a reasonable level of fluency, and only 20% were teaching class-levels for which they were both qualified and competent. Dhanasobhon (2006) also mentioned that 65% of primary school teachers who were teaching English had not taken English as their major of their studies. As a result, the students have long been misled when they were young in their primary school and they produce English sounds incorrectly.

Consequently, the present study focuses on the speaking skill, particularly in pronunciation. As Wei and Zhou (2002) stated, teaching English pronunciation seems to be overlooked in some university curricula in Thailand. Romwapee (2013) further supports that teaching pronunciation is insufficient for Thai students. As a result, the inability to pronounce English in a standard way leads to misunderstandings, miscommunication and frustration (Lu, 2002). Regarding teaching pronunciation at Chiang Mai Rajabhat University, the students encounter endless difficulties on their mission to develop their pronunciation skills as a key to gaining full communicative

competence. With a high proportion of students from ethnic minority groups, differences between English and their mother tongue phonological levels can cause difficulties in their acquisition process. In addition, most of the students are from outlying rural schools where academic issues are not much concerned. That's why their English proficiencies are poor. To handle the problem, English teachers need to find practical tools to achieve their goals. According to Schnorr (1999), Computer in Language Learning benefits students-learning environment by helping them increase their understanding where other methods have had limited success. This is because this tool supports the constructivist theory which is the development of learners-capacity for goal setting, self-planning and self-monitoring where they are able to assimilate knowledge at their own learning pace. Thus, this study aimed to investigate the effectiveness of English pronunciation competence of Thai learners by using speech technology in computer-based systems. As Ratsameeprom (1988) mentioned, the computers have a crucial role for helping teachers to solve their teaching problems in large classes and the difference of individual problems. It enables them to present the contents, exercises, tests, animation, graphics and feedback in one program.

Thus, this study will provide the students to gain a deeper understanding of how to pronounce English sounds correctly. With the program, visual images are very important for the students to offer clear explanation to show why and how their pronunciation is different from that of the English native speaker. Additionally, students can access the teaching materials anytime or anywhere which is highly beneficial for the learning dynamics of students with different learning styles. For the teachers, the program will help them as a practical tool for teaching English pronunciation skill in EFL classroom.

Objective of the Study

The aim of this study is to find out whether the speech software is effective in improving the students' achievement in English pronunciation.

Literature Review

The literature review covers three main aspects: teaching pronunciation, differences between English and Thai sounds, and Computer Assisted Language Learning (CALL).

1.Teaching Pronunciation

Dalton (1998) defined 'pronunciation' as the production of significant sound in two senses. First, sound is significant because it is used as a part of a code of a particular language. Second, sound is significant because it is used to achieve meaning in contexts of use. In this study, it is defined as the way in which the sound is produced.

According to Reed and Michaud (2005), pronunciation is an integrated system, claiming that it is an integral component of language instruction. In their view, pronunciation consists

of speaking and listening (or production and perception). In the previous studies in pronunciation, there are three groups used in pronunciation instructions: articulatory; minimal pairs; and technology assistance. The evidence is revealed in the following examples. Celce-Murcia et al. (1996) summarize two general approaches to the teaching of pronunciation in the field of modern teaching: the Intuitive-Imitative approach and the Analytic approach. Besides, Kelly (2000) categorizes two key sides in pronunciation teaching, namely, the teaching of productive as well as receptive skills. While Gorjian et al. (2013) conducted a study to explore the effectiveness of a computer software program named 'Praat' to help students to acquire prosodic features of the English language by visualizing pitch contours. The result showed that this approach was more successful than the tradition non-CALL approaches.

2. Differences between English and Thai Sounds

As Thai students must learn English as a compulsory subject, pronunciation is considered as a fundamental skill which students should primarily acquire (Celce-Murcia et al.,2000; Derwing, et.al, 2006). Ramelan (1985) mentioned that there are two kinds of speech features in pronunciation: segmental feature and suprasegmental features. Segmental features refer to sound units including consonant and vowel whereas suprasegmental features refer to stress, pitch, length intonation and other features that always accompany the production of segmental.

According to Dulay and Burt (1983), the structures and shapes of the first language of an individual are different from those of the second language that could create errors in speaking, reading and writing. Different sound systems represent different language units. Therefore, the pronunciation errors Thai students make while learning English, a second language, are due to their native language interference.

Even though Thai and English do not belong to the same language family, the vast majority of Thai sounds have a reasonably close equivalent in English. There are also some differences between these two languages that can interfere with English pronunciation.

Here are the English consonant phonemes that do not exist in Thai sound system: /v/, /T/, /Δ/, /z/, /∑/, /Z/, /t∑/, /dZ/, /g/ (Sah-iam, 2006).

According to Trakulkasemsuk (2012), there are eighteen monophthongs in short and long vowels and three diphthongs in Thai. It is said that Thai has richer vowels than English. Therefore, there should not be many serious problems for Thais to produce English vowels.

Thai is a tonal language whereas English is a non-tonal language. Tone is defined as the pitch contour on a word that can distinguish lexical meaning while non-tone is vice-versa. Moreover, an English word has different pitch accents, as well as different boundary tones but a Thai word always has only the same boundary tones. English also has stress. In contrast, there is

no stress in Thai. These differences can become the most problematic for Thai speakers.

As mentioned above, English and Thai are different at all segments: consonants, vowels, diphthongs, tones and intonations. However, this study focuses only on consonant sounds. The reason is that the vowel sounds seem to cause less problems than the sounds of consonants. As Luksaneeyanawin (2005) stated, the English consonants can be very problematic from the systemic, structural, and phonetic differences whereas the English vowel sounds have not created problems of intelligibility.

3. Computer Assisted Language Learning (CALL)

As the language is much more complex, computer assisted language learning is designed to develop and facilitate language learning. Levy (1997) defined this term as 'the search for and study of applications of the computer in language teaching and learning'. The focus of CALL is learning, and not teaching. CALL materials are used to promote self-paced learning of the students both outside and within the school settings. As a result, many studies have been done concerning how the use of CALL affects the four language skill development. However, using CALL technology for the development of speaking abilities has gained more attention than others. In using CALL, it not only enhances the speaking skills closely linked to communicative competence but also provides controlled interactive speaking practice outside the classroom (Domingo, 2007).

With a flourish, one of the applications created for increasing interest in pronunciation learning was the CAPT (Computer-assisted Pronunciation Training) systems. It was widely used as a tool in previous studies in pronunciation training (Dalby, 1999; Goronzy, 2002; Bouselmi, 2007). These studies have demonstrated the effectiveness of audio and visual training in improving learners' pronunciation skill. To implement the program software in the classroom changes the role of the teachers. Teachers become guides as they construct the activities students are to do and help them as students complete the assigned tasks. For students, the program software provides them with a psychological privacy that promotes their speaking ability. It reduces the bashfulness felt in normal classroom situations and encourages shy students to speak. The use of this language learning system encourages student to talk freely. Students learn to interpret new information and experience on their own terms. This will raise their self-esteem and improve their knowledge (Ugochukwu, 2011). This is in line with Ravichandran (2000). He noted that because the use of technology redistributes teachers' and classmates' attention, less-able students can become more active participants in the class because class interaction is not limited to that directed by the teacher.

As Spaai and Herms (1993), Lambacher (1996), Eskenazi (1999), Wennerstrom (2000) mentioned, a combination of audio and visual feedback may have a major impact on learners

and enhance their ability to learn both segmental and suprasegmental aspects of pronunciation. The present study therefore will utilizes the Speech Analyzer, one of the most well-known speech analysis tools from SIL international, as a tool for pronunciation instruction.

Research Methodology

The methodology of the research procedure included four major sections: participants of the study, research design, research instrument, and data collection and analysis.

1. Participants of the study

The participants of the study were divided into two groups: one control group and one experimental group. The control group consisted of 51 second-year English students and the experimental group consisted of 52 second-year English students in the second semester of the academic year 2015. So the total number of the participants was 103. They were enrolled on a core course related to the practical English phonetics.

2. Research Design

The research design was pretest posttest control group design. Before studying Phonetics course, both groups were required to take a pre-test to obtain the knowledge background in Phonetics. After that, the control group was given an ordinary lecture by using the phonetics course book. This book was a compilation from various sources and the topics included introduction to Phonetics, the basic sounds of English, problem sounds in English and English phonological rules, stress and intonation and sentence stress. However, the experimental group was offered an additional tool, the computer software named 'Speech Analyzer' which is a tool that shows different graphical representations of speech and music recordings. This will allow the users to perform a phonetic analysis of human voice recordings and ethnological studies of music recordings. The program can show the users the phonetic graphs that give the users an accurate visual representation of the pitch and the intensity of the speech or any of its components. At the end of the course, both groups were taken the post-test to compare their learning achievements. Both groups including the experimental and control groups were given a pre-test and a post-test which used the same patterns.

In order to gain an insight into the basis of this study, the research framework is presented in Figure 1.

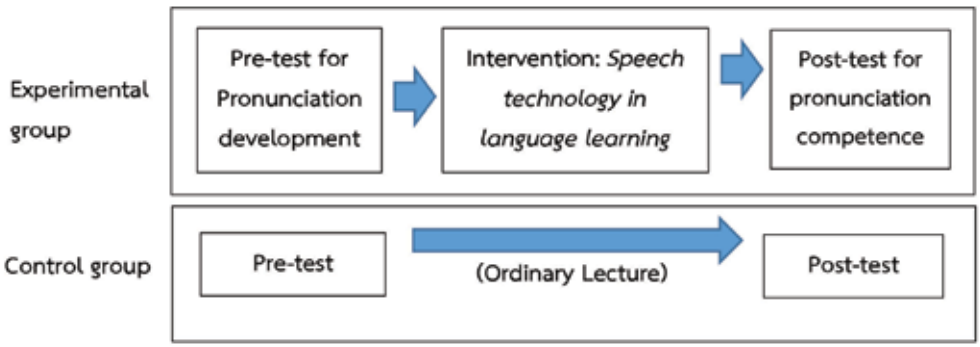

Figure 1: The research framework of the current study

3. Research Instrument

To enhance pronunciation competence, the 'Speech Analyzer' software was selected as a tool in this study. As mentioned before, most students are hill-tribe ethnic minority students who are from rural schools where the learning and teaching are paid less attention. As a result, most of them have little knowledge of computer skills. To meet the students' constraint, the 'Speech Analyzer' was chosen for a user-friendly program, a freeware and it allows the users for anytime access, even without the internet. The software was introduced to the students, the experimental group, at the beginning of the class. It allows the students to record their speech sounds and visualize them in the form of the acoustic properties. After recording, the students can compare and evaluate their pronunciation with those of native speakers. An example of the raw waveform, intensity and spectrogram of /S/ sound is shown in Figure 2.

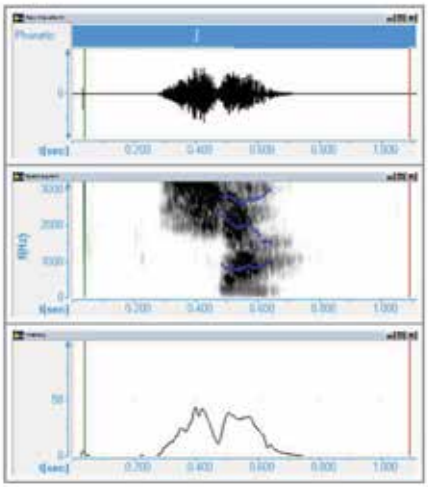

Figure 2) The Acoustic Properties of an English Native Speaker's Speech of /∑/ Sound

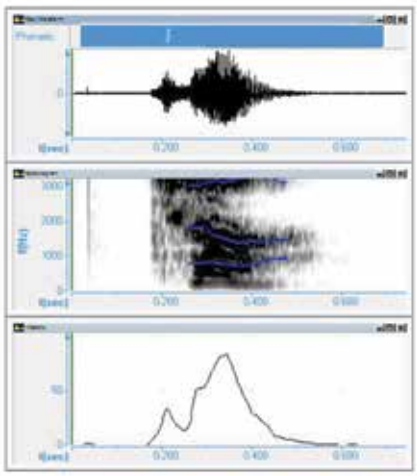

Figure 3) The Acoustic Properties of a Thai Student's Speech of /∑/ Sound

Figure 2 and 3 above show the differences between the acoustic properties of /∑/ sounds produced by a native speaker and a Thai student respectively. Through these visualizations, the students will know why and how their pronunciations are different from what an English native speaker does. As /∑/ sound is considered as a voiceless post-alveolar fricative, this sound is produced by forcing air through a narrow oral cavity by placing the articulators close together. The turbulence in the vocal tract arises from 2 causes: (i) when air passes through a constriction, the tip of the tongue and the position behind the alveolar ridge; (ii) when air hits a stationary sharp-edged obstacle, lower teeth. This produces turbulence in a jet of air emerging from the vocal tract causing a random pressure variation.

Additionally, Shadle (2012) states that the presence of the obstacle in the front cavity affects its resonant characteristics in the range 2-4 kHz for /∑/ sound. Comparing these two patterns, the differences are clearly visible. The air passing through the oral cavity in Figure 2 flows at a high speed whereas the air in Figure 3 flows at a low speed. In Figure 2, the resonance is predicted in the range 2-3 kHz which is closed to the fricative sound while the resonance in Figure 3 is not close to the fricative sound at all.

4. Data collection and analysis

The investigation was conducted with two classes during the 16 weeks of practical English phonetics course. The 'Speech Analyzer' software was implemented in the experimental group while the control group was given an ordinary lecture. The oral exams took place in the exam period before and after the instruction. It took approximately ten minutes and was worth 20 marks. In the oral examination, each student had to choose 10 phoneme cards. If he/she could pronounce each sound correctly, he/she would get two points per phoneme. If not, the teachers needed to correct their student's pronunciation while the students would get no points. Then, the researcher compared the students' achievements in pronunciation between the experimental and control groups by using the t-test, standard deviation, mean and percentage.

Findings

The result of comparison of pronunciation achievements from the pretest between the control and experimental groups was analyzed by means of t-test by using the computer application that provides statistical analysis of the data. The result is shown in Table 1.

Table 1: Comparison of pronunciation achievements from the pretest between the control and experimental groups

Group	N	$\bar{x}$ of pretest	S.D.	t	Sig.
Control group (without using the speech analyzer software)	51	2.78	0.986	0.078	0.938
Experimental group (using the speech analyzer software)	52	2.77	0.983		

Table 1 presents the comparison of pronunciation achievements from the pretest between the control and experimental groups. The mean of the control group pretest scores was 2.78 whereas the mean of the experimental group pretest scores was 2.77. The t-test indicates that there is no significant difference between the control group pretest mean scores and the experimental group pretest mean scores at 0.05 level. It can be concluded that both groups had the same level of knowledge in English phonetics.

Regarding the comparison of the pronunciation achievements from the posttest between the control and experimental groups, the result is shown in Table 2.

Table 2: Comparison of pronunciation achievements from the posttest between the control and experimental groups

Group	N	$\bar{x}$ of posttest	S.D.	t	Sig.
Control group (without using the speech analyzer software)	51	13.22	1.880	-6.955	.000
Experimental group (using the speech analyzer software)	52	16.00	2.154		

Table 2 presents the comparison of pronunciation achievements from the posttest between the control and experimental groups. The mean of the control group pretest scores was 13.22 whereas the mean of the experimental group pretest score was 16.00. As the software motivates the students to correct their pronunciation problems, the learning achievement posttest of the experimental group was higher than the posttest of the control group. The t-test indicates that there is a significant difference between the control group pretest mean scores and the experimental group pretest mean scores at 0.05 level. It can be concluded that using the speech analysis software could significantly enhance the students' pronunciation.

As the software shows different graphical representations of speech, the comparative analysis will help the teachers give explicit explanation for why and how this pronunciation is similar or different from a native speaker's pronunciation. With this explicit result, the student has an objective feedback of his or her production. To provide a comprehensive understanding of speech production will be easy to convince the students to improve their pronunciations in the correct way. It also enables the students to focus more closely on their problems in pronunciation. Furthermore, this software makes the students more independent to access the teaching materials anytime or anywhere which meet the needs of their demanding lives and for their learning styles.

Conclusion and Discussion

Apparently, using this speech software is highly beneficial for both language teachers and their students. As Busa (2008) states, Computer Assisted Language Learning applications promote language learning objectives and overcome traditional language classroom constraints. The result of this study showed that the speech analyzer software can be one of the applications used to study the physical properties of speech sounds in order to improve language learning, particularly pronunciation. It seems to be an aid in pronunciation teaching to visually compare their own pronunciation with the native speaker's in terms of the waveform and its spectrogram. This software provides a tool to reduce subjectivity in evaluating the students' pronunciation. This is in line with Johnston (2005). He mentioned that speech technology can be useful for teaching intonation, lexical stress, the pronunciation of phones that are often mispronounced, detecting errors, evaluating the pronunciation quality, and improving the comprehension and the conversational skills. For the benefits of the current study, the teachers have a practical tool for teaching English pronunciation, as well as raising their awareness in English teaching. However, the teachers should keep in mind that speech analyzer software cannot handle everything. The teachers themselves need to select the appropriate and efficient ways to meet their students' needs and contexts. For students, the use of the speech analyzer in phonetics not only develops their pronunciation competence but also their computer knowledge. It facilitates them to be autonomous. Visual images are regarded as gap-filling to promote a greater depth of understanding in the students' pronunciation concept. Using the visual representation of the pitch and the intensity of the speech extends the pronunciation concept far more easily than with just words, opening new horizons to a better future. Besides, the students can access their instructional materials at anytime and anywhere, not just only in the classroom.

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