

# Improving EFL Secondary Learners' Pronunciation through Multimodal Teaching

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## Abstract

This quasi-experimental study investigated the effect of multimodal teaching on Thai EFL secondary learners' pronunciation. Their perception regarding the implementation of multimodal teaching was also explored. Selected from an intact class, the participants were 20 eighth graders receiving a teaching method based on the analytic-linguistic approach through audiovisual media combined with hand gestures. The English pronunciation pretest and posttest were administered to collect the data before and after the treatment, which lasted 6 weeks. In addition, a perception questionnaire and a semi-structured interview were conducted to investigate the participants' perceptions pertaining to the multimodal teaching method. The quantitative data were analyzed using descriptive and inferential statistics, including means, standard deviations, dependent and independent sample *t*-tests. The qualitative data were analyzed using thematic analysis. The results demonstrated that multimodal Teaching utilizing audiovisual media combined with hand gestures significantly improved the participants' pronunciation. Moreover, the participants showed their perceptions about multimodal teaching at a very high level. In conclusion, this study suggests the positive outcomes of implementing multimodal teaching in improving EFL secondary learners' pronunciation. Finally, pedagogical implications and recommendations for future research are provided.

**Keywords:** multimodal teaching, pronunciation; audiovisual media, gestures, explicit phonetic training, multimedia learning theory, EFL secondary learners

## 1. Introduction

Pronunciation is crucial for effective communication, as it directly impacts how well listeners understand the speaker's message. Learners with accurate English pronunciation are generally better understood, whereas those with poor pronunciation may face misunderstandings and negative perceptions, such as being seen as incompetent or lacking education (Morley, 1994; Fraser, 2000). Consequently, many EFL learners find pronunciation challenging and often require explicit guidance from teachers to improve.

Over the years, pronunciation has been defined by scholars in various ways. Cook (1996) defined pronunciation as the production of English sounds which involves repeating sounds and making corrections. Yates (2002) stated that pronunciation is the production of sounds that is used for making meaning. In addition, Paulston and Burder (1976) mentioned that pronunciation is the production of a sound system that does not interfere with communication either from the speakers' or the listeners' viewpoint. Pronunciation is the way of uttering a word in an accepted manner (Otlowski, 1998). Furthermore, Richard and Schmidt (2002) defined pronunciation as the method of producing certain sounds.

Some English teachers neglect pronunciation instruction due to their perceived challenges and beliefs. These challenges include their insufficient knowledge about pronunciation teaching (Breitkreutz et al., 2002; Fraser, 2000a; Macdonald, 2002), past unsuccessful attempts (Fraser, 2000a), and the view that pronunciation is merely a motor skill with limited impact on communicative competence (Brown, 1987; Morley, 1991). Some even question its relevance to learner identity and respect (Porter, 1999). In contrast, scholars like Celce-Murcia et al. (1996), Derwing and Munro (2005), and Jenkins (2000) advocate for teaching pronunciation, emphasizing its role in enhancing communicative competence and preventing communication breakdowns (Deterding, 2013; Thir, 2016; Hismanoglu, 2006). Fraser (2000a) posits that pronunciation is a learnable cognitive skill crucial for effective oral communication.

In Thai EFL secondary education, pronunciation plays a crucial role in the curriculum, emphasizing language appropriateness and social etiquette similar to native speakers. However, students often struggle with English

pronunciation, particularly with final sounds such as /t/, /d/, and /id/ in regular verbs like “stopped,” “called,” and “wanted.” Differences in syllable structure and final consonant clusters between Thai and English pose additional challenges. Mispronunciations can obscure intended words, impacting both academic and social interactions, including mastery of verb tenses, grammar, and clarity in speech and writing. These difficulties also affect confidence and motivation in language learning. Targeted interventions like pronunciation drills and personalized feedback can mitigate these challenges, aiming to enhance communication clarity, academic engagement, and overall language learning outcomes for Thai EFL learners.

Explicit phonetic instruction is crucial for addressing pronunciation challenges in second language (L2) learning, particularly for Thai EFL learners. It involves studying human speech production and perception to help learners distinguish between their native language (L1) and L2 phonological systems. Phonetics focuses on phonemic inventories, articulation, grapheme-phoneme correspondences, and phonological processes, using visual aids like vocal tract diagrams and spectrograms to illustrate sound production. Unlike phonology, which deals with language-specific phonemes, phonetics examines physical sound production and perception by listeners. Mastery of phonetics is essential for effective language instruction and oral communication, contributing significantly to learners’ ability to accurately produce and perceive L2 sounds and improving overall language proficiency and communication skills.

Phonetic training has proven effective in improving second language learners’ pronunciation, as shown in studies by Chung (2008), Lord (2005), and Saito (2013). These studies highlight that explicit instruction enhances learners’ ability to notice and practice accurate segmental, syllabic, and prosodic features of language. Various methods like auditory, visual feedback and multimodal approaches contribute to pronunciation improvement by integrating meaning through different sensory modes. Multimodal teaching, emphasizing visual cues and diverse semiotic resources, aids both hearing and auditory-impaired learners in language acquisition, enhancing overall language proficiency and communication skills (Jewitt, 2008; Fort & Sebastian-Gallés, 2018).

Phonetic training has evolved with multimodal approaches to enhance pronunciation, moving beyond traditional phoneme-focused methods to integrate visual, auditory, and kinesthetic elements. Supported by Zhu (2008), this approach engages multiple senses, boosting learner motivation and focus. Ganapathy and Seetharam (2016) demonstrate its effectiveness in improving pronunciation through sensory engagement. Visual aids, as highlighted by Gick and Derrick (2009), play a crucial role in clarifying articulatory techniques. Celce-Murcia et al. (2010) underscore the importance of integrating the International Phonetic Alphabet (IPA) for phonetic awareness. These advancements signify a shift towards interactive, personalized phonetic training methods that meet modern learning needs and enhance learners’ ability to produce accurate speech sounds.

Multimodal teaching has been extensively studied in ELT contexts with positive findings. Kozłowska (2015) demonstrated that holistic multimodal approaches, integrating articulatory, auditory, cognitive, and multisensory activities, are more effective than traditional methods for phonetic training among Polish learners of English. In Iran, Xodabande (2017) utilized Telegram to enhance EFL learners’ pronunciation, proving its utility in classroom settings. Namaziandost et al. (2018) showed that authentic videos improve prosodic abilities including pause, juncture, intonation, and stress. Benitez-Correa (2020) used Audacity in multimodal teaching to enhance past-tense pronunciation. Jingpei (2021) found that multimodal teaching increases undergraduate interest and self-directed learning in phonetics. Lingzhu (2022) concluded that multimodal teaching enhances teacher quality and students’ oral English proficiency in senior high schools. These studies collectively support multimodal teaching’s effectiveness in enhancing pronunciation and overall English proficiency.

This study focuses on using multimodal teaching to enhance English pronunciation among Thai secondary school students, an area where research is currently limited. Multimodal teaching, integrating audio, visual, and gesture-based elements, has been successfully employed in diverse educational contexts, including vocabulary learning and English reading skill development in Thailand. However, there is a notable gap in applying these methods specifically to pronunciation improvement at the secondary school level. Employing the principles of multimodal teaching, this study aims to gauge effectiveness and gather students’ perceptions of this teaching method. This research is expected to offer valuable insights into enhancing pronunciation teaching practices in EFL settings. The research questions formulated to guide this study are as follows:

- (1) To what extent does multimodal teaching affect the pronunciation of English sounds among EFL secondary school learners?
- (2) What are the students’ perceptions of multimodal teaching in their English classroom?

## **2. Method**

### *2.1 Research Design*

Using a mixed-methods design, this study aimed to investigate the effect of multimodal teaching on the

pronunciation of Thai secondary learners. A mixed-method design was usually understood as a research strategy that combined qualitative and quantitative analytical procedures in a single study or research project, with respect to data collection and data analysis (Creswell, 2014). This study investigated the effect of multimodal teaching on the pronunciation of Thai EFL secondary school learners. Additionally, the study explored the students' perceptions regarding the implementation of multimodal teaching in their English classroom. Data collection involved administering pronunciation pre-test and post-test to the students and a perception questionnaire to obtain quantitative data. Additionally, qualitative data was obtained through a semi-structured interview, ensuring a more profound insight into the topic. This combination of testing, questionnaires and interviews ensured a thorough comprehension of the topic under investigation.

## 2.2 Population and Samples

The participants of this study were twenty Thai EFL secondary school learners. They were male (N = 10) and female (N = 10) and aged between 14 and 15. They were students of an intact class at an educational opportunity expansion school located in the northeastern part of Thailand. The participants received an instruction through multimodal teaching. Their overall English proficiency level was at beginner level as indicated by their English proficiency test score from the previous semester. All participants were Thai native speakers who had learned English as a foreign language (EFL) for eight years. They had studied English for 3 hours a week in the Fundamental English class which the researcher was teaching in the second semester of the academic year 2023. In this subject, the students were expected to be able to compare and explain similarities and differences between pronunciation of a variety of sentences and words. However, the students still encountered many pronunciation problems of the English sounds. For example, they found it difficult to pronounce "ed" at the end of English regular verbs for example: *called*, *stopped*, *needed*. Thus, this research set out in order to improve their pronunciation of these problematic sounds through multimodal teaching.

## 2.3 Research Instruments

This study utilized three instruments for data collection: a pronunciation pretest and posttest, a perception questionnaire, and a semi-structured interview.

### 2.3.1 Pronunciation Pretest and Posttest

Two sets of pretest and posttest assessments were created to evaluate the participants' pronunciation of the -ed ending in English regular verbs (/t/, /d/, /id/). Each test included thirty-six regular verbs in their past tense forms, drawn from the students' textbook. The tests comprised two tasks focused on English regular verbs with the "ed" ending: the first task involved twenty-one real words with 13 voiced and 8 voiceless consonant sounds, excluding /ð/, /θ/, and /ʒ/; the second task consisted of fifteen nonsense words, divided into three groups of five each (/t/, /d/, and /id/), aimed at prompting students to distinguish real words and practice reading words containing the learned sounds. After developing the two comparable tests, content validity and construct validity were assessed to ensure reliability and validity of the tests. Then, the tests were piloted with other thirty students whose characteristics were similar to the participants in the main stage to ensure clarity. Next, the tests were revised for the actual use in the main stage. Test 1 was used as a pronunciation pretest whereas Test 2 was used as a pronunciation posttest.

#### Example of pronunciation /ed/ ending test

words	correct	incorrect	point
1. <u>wanted</u>			
2. <u>stopped</u>			
3. <u>rubbed</u>			

### 2.3.2 Perception Questionnaires

Using a 5-point Likert scale, a perception questionnaire with fifteen items was developed to investigate the participants' perception of multimodal teaching. A 5-point Likert scale is a psychometric response method where respondents can easily answer questions and state their level of agreement in five points. The 5-point Likert scale consisted of the below points – (1) Strongly Disagree; (2) Disagree; (3) Neither Agree nor Disagree; (4) Agree; (5) Strongly Agree. The questionnaire consisted of fifteen questions which asked the participants in the experimental group about their perception toward multimodal teaching in their English classroom. The questionnaire was in Thai and translated into English to avoid language barrier issues in answering. Three experts in English Language Teaching were invited to determine IOC of the questionnaires. Table 2 indicates the range of scores developed by Sözen (2019) which was used to determine the levels of the participants' perception toward multimodal teaching

incorporated in their classroom.

### 2.3.3 Semi Structured Interviews

A ten-minute semi-structured interview was conducted in the post-stage of the study with six students selected based on high and mid scores on the pronunciation post-test. The interview was conducted in Thai to reduce the language barriers and facilitate students' understanding. The interview was recorded and transcribed for analysis. The interview questions were as follows:

- 1) Please describe your English pronunciation before taking this course.
- 2) Please describe your English pronunciation after taking this course.
- 3) What do you think about the phonetic training?
- 4) What do you think about the audio input the teacher employed in this course?
- 5) What do you think about the visual input the teacher employed in this course?
- 6) What do you think about the hand gesture the teacher employed in this course?

### 2.3.4 Perception Questionnaire

A perception questionnaire using a 5-point Likert scale was created to assess participants' views on multimodal teaching. The scale ranged from "Strongly Disagree" to "Strongly Agree," with fifteen items addressing the participants' perceptions regarding multimodal teaching in their English classroom. To ensure clarity across languages, the questionnaire was translated from Thai to English. Three experts in English Language Teaching reviewed the questionnaire for its clarity and effectiveness. The study employed scoring ranges defined by Sözen (2019) to interpret participants' perceptions of multimodal teaching.

## 2.4. Data Collection Procedure

- 1) The participants were given an orientation about the research project. They were informed about the purposes of the study and types of participation. Moreover, they were given a consent form.
- 2) The participants were administered a pronunciation pretest to determine their pronunciation regarding the regular verbs in isolation. Each word took 30 seconds and if the students did not know the word they could skip and read the next word. Their pronunciation was recorded. This stage demonstrated their previous knowledge about the rules for pronouncing the -ed sounds of those verbs.
- 3) During the regular class within 8 weeks, the teacher as the researcher in this study taught by using multimodal teaching via audiovisual media and hand gestures for three hours per week.
- 4) At the end of week 7, the participants were administered a pronunciation posttest.
- 5) The participants completed a perception questionnaire about the implementation of multimodal teaching in their English class.
- 6) Finally, in week 8 the researcher interviewed six students randomly selected from the experimental group to gain their in-depth perception of the implementation of multimodal teaching in their English class.

## 2.5 Data Analysis

The study employed both quantitative and qualitative data analysis methods tailored to the nature of the data collected. Quantitative data from the pronunciation pretest and posttest and perception questionnaire were analyzed using descriptive statistics such as mean, standard deviation (S.D.) and percentages. Inferential statistics including t-tests were applied to assess the statistical significance of the pretest and posttest scores. Qualitative data from the interviews exploring participants' perceptions of multimodal teaching's impact on their pronunciation were analyzed through thematic analysis. This method involved transcribing the interviews and identifying recurring words, themes, and concepts to derive meaningful themes from the interview data. The findings were then synthesized into a coherent narrative supported by the analyzed data, forming the basis of the study's conclusions.

## 2.6 Ethical Considerations

In this study, ensuring the safety of all participants was paramount throughout the data collection process. The researcher maintained rigorous standards of privacy and confidentiality, providing detailed study descriptions to all participants beforehand. Confidentiality protocols were strictly followed, with participant identities kept anonymous by using coded numbers instead of names in all documents and data collection activities. Additionally, all questionnaire and interview data were securely stored to protect participant confidentiality.

### 3. Results

#### 3.1 The Effect of Multimodal Teaching on the Pronunciation of Thai EFL Secondary Learners

As shown in Table 1, illustrates a summary of descriptive statistics concerning the performance of Thai EFL secondary school learners on a pronunciation test for /ed/ ending in regular verbs. The results indicate higher scores on post-test assessments compared to pre-test scores. Specifically, prior to receiving multimodal teaching, the participants achieved a mean score of 4.60 (12.77%, SD = 3.78) on the pretest. Following the multimodal teaching, the participants demonstrated significant improvement, achieving a mean score of 31.00 (86.11%, SD = 4.44) on the posttest. These findings suggest that multimodal teaching had a positive impact on the pronunciation of words ending in /ed/ among Thai EFL secondary learners.

Table 1. A summary of descriptive statistics of pronunciation ed ending test

Group	Time	M	(%)	SD	Skewness	Kurtosis
(N = 20)	Pre-test	4.60	12.77%	3.78	0.38	-1.03
	Post-test	31.00	86.11%	4.44	-1.25	0.62

The distribution of scores was also examined for normality. Skewness and kurtosis were found to be normal across two times of tests. As illustrated in Table 1, approximately 95% of case values lie within two standard deviations from the mean. Therefore, there appears to be no violation of the statistical assumption of normal distribution (Larson-Hall, 2016). Additionally, a paired sample t-test analysis was also conducted to determine whether there was any significant difference between the pronunciation of ed ending pre-test and post-test before and after receiving multimodal teaching within the same group of participants. Effect size (d) was further calculated for the strength of multimodal teaching. As shown in Table 2, based on the scores of the participants, the two times of (pre-test and the post-test) the pronunciation ed ending test were significantly different, indicating a large effect size ( $t = 34.32$ ,  $p < 0.001$ ,  $d = 3.44$ ).

Table 2. Comparisons between pre-test and post-test within group

Group	test	t-value	p-value	Effect size (d)
(N = 20)	Pretest vs Posttest	34.32	<.001	3.44

Note.  $N = 20$ .

In conclusion, the participant demonstrated a significant increase in scores from pretest to posttest, with a large effect size ( $t = 34.32$ ,  $p < 0.001$ ,  $d = 3.44$ ). These findings suggest a significant improvement of the ed pronunciation test before and after multimodal teaching.

3.2 Thai EFL Secondary Learners' Perception About Multimodal Teaching in Improving Their Pronunciation

3.2.1 Quantitative Results of the Students' Perception Towards Multimodal Teaching in Improving P Pronunciation

Table 3. Questionnaire analysis regarding the participants' perception about multimodal teaching

No.	Items	Mean	%	S.D.	Meaning
1	I enjoy learning phonetic (IPA) through multimodal teaching	4.70	94%	0.47	Very high
2	I think the multimodal teaching assist me in pronouncing	4.45	89%	0.51	Very high
3	I think the multimodal teaching guide me to pronounce English sound	4.55	91%	0.51	Very high
4	Using multimodal teaching does not help me improve pronunciation better.	4.55	91%	0.51	Very high
5	I think multimodal teaching is a good instruction in learning pronunciation	4.60	92%	0.50	Very high
6	I feel motivated when I study through multimodal teaching to pronouncing	4.40	88%	0.75	Very high
7	I feel much better when I learn pronunciation by using multimodal teaching	4.75	95%	0.44	Very high
8	I enjoy learning pronunciation through multimodal teaching from audiovisual media	4.50	90%	0.51	Very high
9	I think the pictures from multimodal teaching assist me to pronounce English sound	4.85	97%	0.37	Very high
10	I think multimodal teaching facilitate me in becoming familiar with pronouncing English sounds.	4.30	86%	0.57	Very high
11	I feel that learning English sounds by using hand gesture would help me recognize English sounds faster easily	4.75	95%	0.44	Very high
12	The multimodal teaching is appropriate for learning pronunciation at my level.	4.45	89%	0.76	Very high
13	I feel comfortable when I learn pronunciation through the multimodal teaching.	4.30	86%	0.80	Very high
14	The multimodal teaching helps me to improve my pronunciation and recall of English sounds.	4.65	93%	0.49	Very high
15	The multimodal teaching allows me to improving English sounds	4.60	92%	0.50	Very high
<b>Total</b>		<b>4.56</b>	<b>91%</b>	<b>0.54</b>	<b>Very high</b>

As indicated in Table 3, fifteen statements received high mean scores ranging from 4.30 to 4.85. Excluding Item 4, participants generally agreed with the remaining statements. Initially, a negative comment about Item 4 was retracted before calculating the overall mean score of the surveys. Item 4 underscored that many participants agreed that multimodal teaching significantly contributed to their pronunciation improvement. The findings demonstrate that Thai EFL secondary learners perceived multimodal teaching as highly beneficial for improving their pronunciation. There was a notable consensus among Thai secondary school participants regarding the effectiveness of multimodal teaching in this regard. These findings support the viewpoint that multimodal teaching is advantageous for teaching and enhancing English pronunciation.

3.2.2 Qualitative Results of the Participants' Perceptions Toward Multimodal Teaching in Improving Their Pronunciation

The qualitative analysis of the data gathered from semi-structured interviews with six participants revealed key themes that reflected participants' perspectives, such as learning environment, advantages, and instructional methods. Table 4 summarizes these themes, providing a structured summary of the qualitative insights derived from participants' viewpoints.

Table 4. The themes based on qualitative data analysis

Themes	Sub-themes	Salient characteristics
Learning atmosphere	enjoyment	fun, encouraging, joyful, happy
Benefits	engagement	participate, engage, peer activity, exchange
	emotional benefit	excited, interested, confident, concentrate, attractive, proud, want to learn more
Instruction	functional benefit	improve, develop, enhance, increase knowledge, understand,
	advantage	useful, help, applicable, easy to follow, essential,

The theme of learning atmosphere examined through the participants' perceptions of their engagement in learning activities indicates that the participants generally hold positive perceptions towards learning pronunciation skills via multimodal Teaching. The highly positive responses from participants underscore the considerable influence

of multimodal teaching in establishing a learning environment that fosters effective learning. Table 5 provides detailed insights into the participants' perspectives on the enjoyment atmosphere for learning.

Table 5. Participants' perception regarding the theme about 'learning atmosphere'

Participants	Statement or responses
S1	<i>Engaging in pronunciation classes and activities with friends brought me joy, and I found that it really enhanced my pronunciation skills.</i>
S2	<i>This kind of teaching enhanced my English pronunciation. I was happy with it.</i>
S3	<i>The class was fun, and I was happy to learn more about pronunciation using audio visuals and hand gestures.</i>
S4	<i>This kind of teaching included very interesting materials, and they helped me improve my pronunciation. It was really fun.</i>
S5	<i>I enjoyed learning about IPA combined with hand gestures. I was very excited when the teacher allowed me and my friends to demonstrate in front of the classroom. I really liked it.</i>
S6	<i>The teacher always encouraged me when I couldn't pronounce. She helped me to learn how to pronounce the words. She always supported all students.</i>

The theme of 'benefits' focuses on students' perceptions of the advantages of incorporating multimodal teaching in pronunciation classes. Detailed insights into participants' perspectives on the positive learning atmosphere is illustrated in Table 6.

Table 6. Participants' perception regarding the theme about 'benefits'

Participants	Statement or responses
S1	<i>I felt more confident when I practiced with my partner and sometimes with the teacher.</i>
S2	<i>I understood the rules of the ed ending and could easily recognize them through the teacher's teaching technique. However, I needed to learn and practice more.</i>
S3	<i>I was interested in learning more about IPA and would like to increase my knowledge in this area because there were many sounds that I could not pronounce correctly.</i>
S4	<i>I think this kind of teaching included very interesting teaching materials and they really helped me improve my pronunciation. It was really fun.</i>
S5	<i>After the pronunciation class, I could distinguish between voiced and voiceless sounds by using hand gestures to check. I feel a little proud of myself.</i>
S6	<i>The class was very exciting because I got a chance to learn about pronunciation through IPA and various teaching techniques. Before this class, I had never known how to pronounce voiced and voiceless sounds.</i>

Regarding the theme of 'instructional challenges', the participants' perceptions of the difficulties encountered during multimodal teaching are explored.

Table 7. Participants' perception with regard to the theme of 'instructional advantage'

Participants	Statement or responses
S1	<i>Multimodal Teaching helped me learn and improve my English pronunciation. I'm happy with it.</i>
S2	<i>This teaching method improved my pronunciation. It was an essential method. I heard the sound and tried to imitate.</i>
S3	<i>I had a lot of fun and was happy to learn pronunciation through this teaching technique. I was able to apply it to the pronunciation of other problematic sounds.</i>
S4	<i>It was very helpful for me to see how to pronounce each alphabet on the screen, and I could sound out better. There were examples on the screen, with mouth pictures, and I heard each sound.</i>
S5	<i>I found the teacher's teaching style to be modern and very helpful in improving my pronunciation. The materials were colorful, bright, and attractive to me.</i>
S6	<i>I was excited when I studied IPA through various teaching materials. I hadn't known about voiced and voiceless sounds in the English language. By using my hand, I could correctly pronounce and differentiate these sounds.</i>

## 4. Discussion

### 4.1 The Effect of Multimodal Teaching in Improving Thai EFL Secondary Learners' Pronunciation

This study examined the effect of multimodal teaching on English pronunciation skills among Thai secondary school students. Explicit instruction in the IPA, coupled with multimodal teaching following an analytic-linguistic approach, demonstrated significant improvement in consonant and vowel production. Measures to evaluate students' pronunciation of the -ed ending in regular verbs were created and validated. Results indicate a notable positive effect on pronunciation skills, particularly in the group, aligning with previous research by Celce-Murcia et al. (2010), Saz et al. (2016), and Jingpeiyi (2021). The positive effect of multimodal teaching on pronunciation skills of Thai EFL primary learners could be due these reasons.

In this recent study, audio materials played a crucial role in improving pronunciation skills, particularly concerning the ed ending sound in regular verbs. Firstly, these materials offered authentic models of pronunciation, allowing learners to hear native speakers produce the language naturally, which aided in familiarizing them with

pronunciation nuances, including voicing. Moreover, through active listening practice facilitated by audio resources, learners could discern individual phonemes and phonetic patterns within spoken language, enhancing their ability to distinguish between similar-sounding words and accurately reproduce sounds. Additionally, interactive features like playback control and repetition exercises enabled learners to practice pronunciation in a self-paced manner, reinforcing correct pronunciation patterns. Through regular engagement with audio resources, learners can refine their pronunciation skills, build confidence in oral communication, and ultimately achieve greater proficiency in the target language. This approach aligns with principles of multimedia learning theory, which emphasize the effectiveness of integrating auditory and interactive elements to enhance language acquisition, as highlighted by Sidgi and Shaari (2017), Namaziandost, Esfahani, and Hashemifarnia (2018), Carmen Benitez-Correa (2020), and Wardani (2021).

Secondly, visual media utilized in this study comprised videos, mouth shapes, texts, and interactive multimedia presentations. They played a crucial role in improving pronunciation, especially concerning the ed ending in regular verbs. These media provided learners with visual cues that complemented auditory input, aiding in understanding and reproducing sound patterns. By observing native speakers' mouth movements and facial expressions in visual media, learners gained insight into the articulatory process involved in producing the ed ending sound, enabling more accurate mimicry. Additionally, visual representations of IPA symbols associated with the ed ending reinforced the connection between sound and symbol, facilitating learners' association of correct pronunciation with linguistic representation. This integration of auditory and visual stimuli aligned with multimedia learning theory, emphasizing their combined effectiveness in enhancing comprehension and retention. By utilizing visual media alongside auditory input, learners could develop a more comprehensive understanding of pronunciation, leading to improved proficiency in the target language. This is supported by a student's statement regarding the benefit of the visual input:

"I found it incredibly helpful to learn how to pronounce each alphabet by watching the screen. Seeing the mouth picture on the screen, for instance, showed me the proper positioning of my lips and teeth for each sound, which significantly improved my pronunciation."

Thirdly, hand gestures in this study helped the participants distinguish between voiced and voiceless sounds by covering an ear with a hand. This is supported by Nakatsukasa (2019), Hoetjes et al. (2019), Xi et al. (2020), and Xi (2024) who confirmed that learners could use hand gestures to represent the closure of the vocal tract for voiceless sounds (/t/) or the vibration of the vocal cords for voiced sounds (/d/). These gestures helped learners associate physical actions with the production of speech sounds, improving their ability to accurately reproduce them. Moreover, gestures could aid in understanding and remembering the IPA symbols by visually representing the articulatory features associated with each sound. Learners could use gestures to demonstrate aspects such as place of articulation, manner of articulation, and voicing, helping them internalize the characteristics of different phonetic symbols. For instance, a learner might use a specific hand movement to represent the placement of the tongue for a certain consonant sound or the position of the lips for a vowel sound. This is supported by a student's statement regarding the benefit of hand gestures:

"After the pronunciation class, I was able to distinguish between voiced and voiceless sounds by using hand gestures to confirm my understanding of each sound system. This practice boosted my confidence, leading to improved pronunciation."

Finally, this research demonstrated a positive impact of the explicit teaching of the International Phonetic Alphabet (IPA) on the pronunciation of Thai EFL secondary school students. Teaching the International Phonetic Alphabet (IPA) explicitly, as recommended by the analytic-linguistic approach, provided empirical evidence of learners' improved production of regular verbs ending in ed. The findings of this experimental study were consistent with those of Saito (2007), indicating that learners who used the IPA system for pronunciation significantly enhanced their pronunciation skills. The results indicated that learners derived numerous benefits from the intervention, including heightened awareness of sound features (Atkielski, 2019), rectification of common errors through increased awareness of linguistic elements, and the development of conceptual representations of sounds through phonetic symbols (Mompean, 2015). This is supported by a student's statement regarding the benefit of IPA training:

"I was very excited when learning about the IPA intervention. I never knew there was such a thing to help me pronounce voiced and voiceless sounds in English." (S3)

#### *4.2 Thai EFL Secondary Learners' Perception About Multimodal Teaching in Improving Pronunciation*

In response to Research Question 2, quantitative data were gathered through a perception questionnaire administered to the participants to gauge their perceptions of using multimodal teaching to enhance pronunciation skills. The study employed a five-point Likert scale in the questionnaires, revealing that, on average, secondary school students expressed their perception of multimodal teaching and pronunciation improvement at very high



level. The findings indicated positive perceptions towards deliberate pronunciation learning through multimodal methods, attributed to features such as communication effectiveness, diverse techniques, and adaptability to different contexts. Multimodal teaching offers semi-contextualization, enhancing effectiveness within a short timeframe and enabling pronunciation skill retrieval through lesson reviews, activities, or assignments. Moreover, the qualitative data from the semi-structure interviewed also brought significant findings. Firstly, the advantages of learning the IPA via multimodal teaching enhanced their pronunciation skill. The claim is supported by the following excerpt from participants' statements:

"I found it very helpful to watch how each alphabet was pronounced on the screen; it helped me sound out better. There was an example displayed on the screen, showing the mouth picture and allowing me to hear each sound clearly." (S1)

Secondly, the learning environment was characterized by enjoyment and engagement. Multimodal teaching played a key role in creating a supportive and positive atmosphere. By encouraging interactive learning, it facilitated active participation and collaboration among students, fostering a relaxed and comfortable ambiance. For the sub-theme enjoyment as the claim is supported by the following excerpts from participants' statements:

"Multimodal teaching greatly assisted me in learning and improving my English pronunciation. I'm genuinely pleased with its effectiveness." (S2)

"I enjoyed learning about IPA combined with hand gestures. I was very excited when the teacher allowed my friend and me to demonstrate in front of the classroom. I really liked it." (S5)

On the other hand, within the engagement aspect, participants conveyed that multimodal teaching sparked their interest in English class and inspired them to actively participate in learning. This assertion finds backing in the following quotations from participants' responses:

"Engaging in pronunciation classes and activities with friends brought me joy, and I found that it greatly enhanced my pronunciation skills." (S1)

"I participated in all activities and responded when the teacher asked questions. When I made mistakes, I found that I could remember them well." (S3)

In addition, the theme of 'benefits' delved into how students viewed the advantages of integrating multimodal teaching into pronunciation classes, uncovering two sub-themes: emotional benefits and functional benefits. Under the emotional benefits sub-theme, students emphasized the positive influence of multimodal teaching on their motivation to learn English, as well as on their heightened feelings of inspiration, confidence, and pride as claimed by students:

"I understood the rules of the 'ed' ending and found them easy to recognize with the teacher's technique. I just need to learn and practice more." (S2)

"I am interested in learning more about IPA and would like to increase my knowledge in this area. There are many sounds that I can pronounce correctly." (S3)

Finally, functional benefits were observed, showcasing significant improvements in students' language proficiency, particularly in pronunciation. Engaging with multimodal teaching actively enabled them to gain confidence in expressing themselves and participating in diverse activities. The structured approach of this instruction provided a conducive environment for practical, interactive language skill development. The claim is supported by the following excerpts from participants' statements:

"My pronunciation has improved, and I've learned new techniques that will help me remember more easily. Now, I can apply this knowledge to the pronunciation classroom, and I feel more confident." (S1)

"I knew how to pronounce each alphabet, specifically voice and voiceless sounds. This teaching approach helped me a lot to improve my pronunciation skill." (S2)

These findings align with prior research indicating that multimodal teaching aid learners in focusing on specific aspects, such as the pronunciation of ed ending in regular verbs. The benefits of multimodal teaching in facilitating deliberate pronunciation learning among Thai secondary school students stem from its usefulness, versatility, and entertainment value. Incorporating visual images and audio sounds can motivate students to learn pronunciation effectively. Additionally, multimodal teaching aids in recognition and pronunciation. In conclusion, the current findings contribute to existing literature by affirming that multimodal teaching is an effective tool for deliberate pronunciation learning (Syzpyra-Kozłowska, 2015; Zhu, 2008; Ganapathy & Seetharam, 2016). This study also highlights the potential contributions of teaching the IPA to the improvement of Thai EFL secondary learners. In this study, explicit instruction in the IPA has been shown to enhance participants' ability to pronounce English consonants and distinguish between voiced and voiceless sounds more effectively.

## 5. Conclusion of the Study

The current study offers valuable insights into the learning and enhancement of pronunciation, particularly emphasizing the effectiveness of multimodal teaching among Thai EFL secondary school students. It highlights the utilization of diverse teaching resources to aid in pronunciation development among these learners. Furthermore, the study demonstrates that Thai secondary school students hold a favorable view regarding the use of multimodal teaching methods, perceiving them as engaging and beneficial for improving pronunciation. Similarly, Thai secondary school students also exhibit a positive perception towards multimodal teaching, acknowledging its engagement and benefits in enhancing pronunciation skills. In summary, the research emphasizes the efficacy of multimodal teaching in improving pronunciation and its capacity to actively involve students in the learning process.

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### Authors contributions

Wipavee Panyathikul, Dr. Somkiet Poopatwiboon, and Dr. Pilanut Phusawisot were responsible for designing the study and analyzing the data. Wipavee Panyathikul led the literature review and data collection efforts. Dr. Somkiet Poopatwiboon and Dr. Pilanut Phusawisot provided continuous guidance and consultation throughout the research. All authors collaborated on data analysis, interpretation, and discussion of the findings. Wipavee Panyathikul drafted the manuscript, which was then revised by Dr. Somkiet Poopatwiboon and Dr. Pilanut Phusawisot. All authors reviewed and approved the final manuscript. The three authors contributed equally to the study.

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### Competing interests

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### Informed consent

Obtained.

### Ethics approval

The Publication Ethics Committee of the Canadian Center of Science and Education.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

### Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

### Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

### Data sharing statement

No additional data are available.

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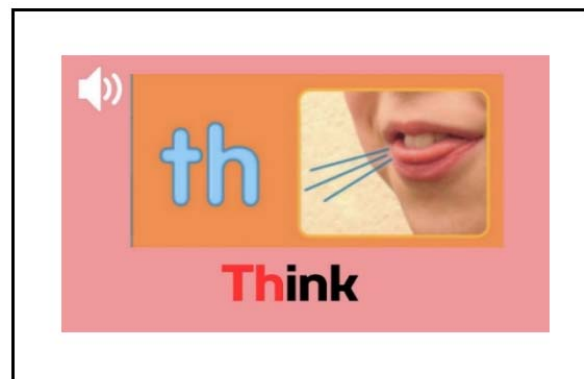
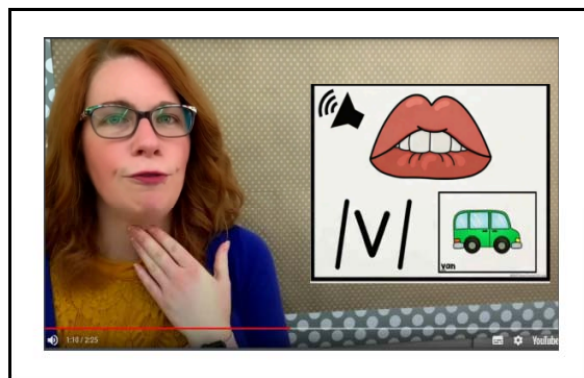
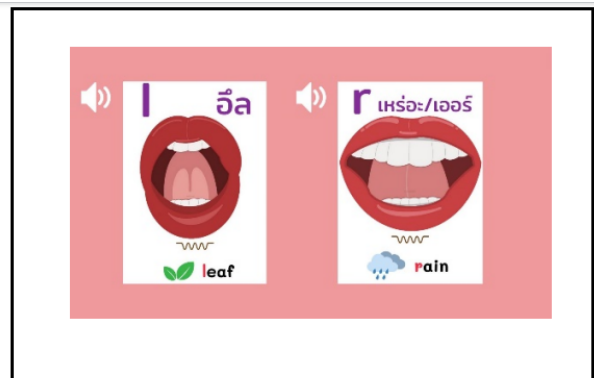
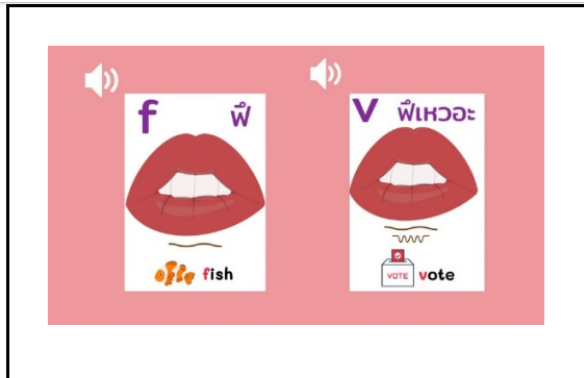
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**Appendix A**

**An example of design Multimodal Teaching**



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