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The Effects of Differentiated Pronunciation Instruction via a Virtual Learning Environment on Primary-School Thai EFL Teachers

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Article information	
Abstract	Thai EFL teachers need English training, especially in pronunciation, which is essential for efficient communication. This mixed-methods study investigated the effects of differentiated pronunciation instruction via a virtual learning environment (DPV) on 28 primary-school Thai EFL teachers from different regions of Thailand. They voluntarily joined the 12-session pronunciation virtual training which aimed to equip participants with basic knowledge and application of spoken language components at segmental and suprasegmental levels. Incorporating differentiated instruction, the training analyzed participants' needs to design learning and teaching tasks corresponding to their readiness levels, learning styles, and interests. Based on a communicative framework for English pronunciation teaching, the DPV included description and analysis, listening discrimination, controlled practice, guided practice, and communicative practice. A virtual learning environment allowed participants to learn at their own pace anywhere and anytime. Participants actively engaged in the content and exercises related to spoken English components

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	and pedagogy during the intervention. As for assessment, participants chose the alternative format relevant to them. Data from the pretest and posttest, as well as semi-structured interviews, revealed significant improvements in English pronunciation and positive attitudes toward the training. This study demonstrates the potential for DPV to enhance pronunciation, which is crucial for English proficiency and has the potential to promote professional development of Thai EFL teachers.
Keywords	differentiated instruction, pronunciation training, teacher training, virtual learning environments, EFL teachers
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1. Introduction

English has emerged as the lingua franca in the rapidly changing global landscape, essential for accessing new technologies and knowledge. This significance is especially pronounced in a VUCA (volatile, uncertain, complex, and ambiguous) world, where proficiency in English can determine one's ability to succeed. In Thailand, EFL (English as a foreign language) teachers need to equip themselves and their students with the necessary language skills. However, a report by the Office of the Permanent Secretary, Ministry of Education (2021) revealed that 77% of Thai English teachers fall below the B1 level on the CEFR (Common European Framework of Reference for Languages). This deficiency highlights the urgent need for improved English language instruction, particularly in pronunciation, which is foundational for effective communication.

Teaching pronunciation is essential for developing communicative competence among language learners. It enhances not only intelligibility but also the effectiveness of communication across various contexts. As communicative

language teaching has evolved, pronunciation has shifted from focusing solely on accuracy toward intelligibility and communicative competence (Levis, 1999). Integrating segmental and suprasegmental features, such as stress and intonation, within a communicative and task-based approach has proven effective. Furthermore, utilizing technology and contextualized pronunciation practices addresses learners' needs, fostering adaptability and confidence in real-life interactions (Pennington & Rogerson-Revell, 2018).

Prior research highlights several challenges and needs for pronunciation instruction in Thailand. To begin with, Poonpon (2021) identified speaking, listening, and pronunciation as top priorities for professional development among Thai teachers. This aligns with Yordming's (2017) assertion that students' poor language abilities stem from a lack of suitable models in oral English skills. Studies have indicated the influence of the Thai language on English pronunciation, necessitating improved pedagogical strategies (Khamkhien, 2010; Likitrattanaporn, 2014; Makamthong & Hesmatantya, 2022; Ruengwatthakee, 2021; Wei & Zhou, 2002; Wongsuriya, 2020) and highlighting the lack of resources (Amir & Asmara, 2021; Moxon, 2021). Specific pronunciation challenges faced by Thai students include consonants, vowels (Moxon, 2024; Wei & Zhou, 2002), final sounds (Ruengkul, 2020), word stress (Khamkhien, 2010), and intonation influenced by their mother tongue (Wei & Zhou, 2002). These segmental and suprasegmental features are essential for achieving English pronunciation (Levis, 2018) and may predict phonological skills and reading acquisition in young learners (Lonigan et al., 1998; Snowling & Hulme, 1994).

Despite the fact that challenges have been recognized, there is still a gap in the effective implementation of differentiated pronunciation instruction tailored to the unique needs of Thai EFL learners. Differentiated instruction, which modifies teaching methods to suit individual learners' needs and abilities, has been extensively studied (Smith & Throne, 2009). However, its application in pronunciation instruction for Thai learners requires further exploration. Existing

studies emphasize the necessity for language teachers to enhance their knowledge of phonology and pedagogy (Chien, 2019) and the importance of incorporating new technologies into teaching methods (Sriudomkij & Sopirak, 2013).

Many studies have investigated the use of virtual learning environments (VLEs) in language education, emphasizing their potential to enhance motivation and communicative competence (Peterson, 2008). The design of VLE platforms is crucial in meeting the distinct needs of language learners (Peterson, 1998) and facilitates differentiated instruction through personalized, self-paced learning and multimodal interaction. Research by Harrington (2010) and Uzunboylu et al. (2011) underscores their positive impact on learning efficiency and self-efficacy, especially when combined with interactive and collaborative online tools. The use of videoconferencing has also been shown to support multimodal interaction and promote communicative competence (Hampel & Stickler, 2012; Shih & Yang, 2008).

VLEs play a crucial role in pronunciation instruction, as they provide personalized feedback and opportunities for practice, which are essential for developing accurate pronunciation (Pennington & Rogerson-Revell, 2018; Yan & Lin, 2019). They also offer significant benefits for tailored pronunciation training, particularly for Thai EFL learners. Research has indicated that technological tools can assist students in enhancing their pronunciation of English diphthongs (Behr, 2022). YouTube videos have also been shown to be effective in teaching pronunciation to Thai students, making the learning process more engaging and enjoyable (Amir & Asmara, 2021).

However, the study of differentiated pronunciation instruction via VLEs remains underexplored, particularly in the EFL context. To address this research gap, this study explored differentiated pronunciation instruction via a virtual learning environment (DPV), aiming to 1) investigate the effects of DPV on

primary-school Thai EFL teachers' English pronunciation and 2) explore their opinions about DPV. The research questions were as follows: 1) To what extent does DVP improve the English pronunciation of primary-school Thai EFL teachers in Thailand? and 2) What are the opinions of primary-school Thai EFL teachers about the DPV?

This research can be significant for several reasons. First, it may address a critical need for improved pronunciation instruction in Thailand, which is essential for enhancing overall English proficiency. By focusing on differentiated instruction, the study aimed to provide tailored solutions that better meet the diverse needs of learners. Additionally, the integration of technology into pronunciation instruction holds promise for making learning more engaging and effective. The findings of this study could inform policy and practice, contributing to the professional development of Thai EFL teachers and ultimately improving their students' learning outcomes. In a broader context, this research emphasized the importance of equipping learners with strong English language skills to navigate and succeed in an increasingly interconnected and complex world.

2. Literature Review

Integrating differentiated instruction, pronunciation instruction, and virtual learning environments (VLEs) can offer an innovative method for enhancing pronunciation instruction for Thai EFL learners. Differentiated instruction responds to learners' diverse linguistic backgrounds, proficiency levels, and preferences, creating a basis for focused and inclusive teaching strategies. Pronunciation training, vital for addressing specific phonological difficulties encountered by Thai learners, greatly benefits from the personalized and interactive opportunities provided by VLEs. Collectively, these components may deliver a tailored, engaging, and feedback-oriented learning framework, improving the quality and effectiveness of English pronunciation instruction in Thailand.

The following review includes the concepts, related studies, and the conceptual framework of DPV, which integrates differentiated instruction, pronunciation instruction, and a virtual learning environment.

2.1 Differentiated Instruction

Differentiated instruction (DI) is a pedagogical approach that tailors teaching methods to meet the unique needs, abilities, and interests of individual learners. It has gained substantial attention in educational research. Tomlinson and Cooper (2006) propose that students' readiness levels, learning profiles, and interests are crucial factors to consider when designing the content, learning processes, and products of differentiated instruction, based on the belief that "one size doesn't fit all." Therefore, teachers should vary their instructional methods rather than expect students to conform to a fixed curriculum. Corley (2005) defines readiness levels as the knowledge, understanding, and skills shaped by students' cognitive abilities. Before instruction begins, teachers should assess their students' readiness levels and motivate them to enhance their skills. Lev Vygotsky (1978) calls this the "zone of proximal development" (ZPD), the ideal space for learning. Learning profiles encompass learning styles, intelligence preferences, cultures, and genders (Tomlinson, 2017). This concept is grounded in the belief that teachers should leverage students' strengths while helping to address their weaknesses in these areas (Gardner, 1983). Interest refers to topics that captivate students' learning. Tomlinson (2017) stresses that differentiated instruction is not solely about varying content; rather, it is a holistic strategy that addresses diverse learning styles and paces. Engaging students in activities that resonate with their interests and learning styles is believed to promote higher motivation and positive outcomes. Once teachers have evaluated students' readiness levels, learning profiles, and interests, they can differentiate the content, process, and assessment of students' outcomes or products.

There are several ways to differentiate content, process, and product. Teachers can provide various resources at different difficulty levels, utilize diverse

texts and materials, conduct mini-lessons, or present content in multiple formats, such as audio, visuals, narratives, models, or hands-on activities. To differentiate the process, teachers may modify their activities, implement tiered tasks, adjust the time allowed for completing assignments, or give students the option to work individually or in groups. For product differentiation, students can choose their preferred products and modes of presentation. Teachers might also adjust criteria or rubrics to fit each student. For example, when using the same rubric, intermediate students might use a scale of 1-3, while advanced students could utilize a range from 1 to 5. Differentiating content, process, and product can significantly support students, as this instructional design aligns with their needs, learning profiles, and interests.

2.2 Challenges of Pronunciation Instruction in Thailand

Pronunciation is a fundamental aspect of language proficiency, influencing both intelligibility and comprehensibility in communication. Levis (2018) emphasizes the significance of segmental and suprasegmental elements, including vowel and consonant sounds, word stress, intonation, and rhythm, in achieving intelligibility in second-language pronunciation. Prior studies have also found that phonological sensitivity is a reliable indicator of later reading potential (Lonigan et al., 1998; Snowling & Hulme, 1994). This underscores the need for teachers to establish effective English pronunciation, as it indirectly influences their students' early reading acquisition.

Research conducted by Poonpon (2021) and Yodming (2017) in Thailand has identified pronunciation as a top priority for improvement among teachers and students. Thai EFL learners encounter unique challenges in pronunciation, such as difficulties with specific consonants and vowels (Wei & Zhou, 2002), final sounds (Ruengkul, 2020), word stress (Khamkhien, 2010), intonation and accent, influenced by their native language (Ambele & Boonsuk, 2021; Wei & Zhou, 2002). Such challenges require a robust instructional approach to effectively address these phonological issues.

Khamkhien (2010), Makamthong and Hesmatantya (2022), and Wei and Zhou (2002) indicate that language transfer from Thai to English significantly affects learners' pronunciation. Furthermore, the lack of effective pedagogical strategies (Likitrattanaporn, 2014; Ruengwatthakee, 2021; Wongsuriya, 2020) and restricted resources (Amir & Asmara, 2021; Moxon, 2021) worsen these challenges. Therefore, enhancing pronunciation instruction necessitates addressing these linguistic challenges and improving teachers' pedagogical skills. Sriudomkij and Sopirak (2013) highlight the importance of integrating innovative teaching methods and new technologies to advance pronunciation instruction.

2.3 Communicative Framework of Pronunciation Instruction

The primary goal of traditional pronunciation instruction in EFL classrooms is to pursue either native-like proficiency or intelligibility. Setter and Makino (2021) emphasize that the importance of phonetics in pronunciation should be highlighted in both its descriptive and instructional roles.

Over time, pronunciation teaching methods have evolved from detailed phonetic descriptions to broader phonemic approaches. However, interest in pronunciation teaching declined in the mid-20th century before experiencing a resurgence in the 1980s with the introduction of Communicative Language Teaching (CLT), which reinvigorated the field and introduced new pedagogical strategies.

Critical issues in pronunciation teaching include the selection of accents and models, the focus on specific phonetic aspects, and the necessity of adequate teacher education. Traditional approaches have often prioritized prestigious accents, such as Received Pronunciation for British English and General American for American English. However, alternatives like Jenkins' (2000) Lingua Franca Core (LFC) emphasize the importance of understanding phonetic and phonological differences between languages while promoting communicative competence.

Celce-Murcia et al.'s (2010) communicative framework for teaching English pronunciation has gained widespread recognition. This framework comprises five stages: description and analysis, listening discrimination, controlled practice, guided practice, and communicative practice. During the description and analysis stage, teachers might utilize various materials, such as lip diagrams, sagittal diagrams, or consonant charts. In the controlled practice stage, activities might include minimal pairs, focused sentence practice, tongue twisters, paired dialogues, and jazz chants. The guided practice stage allows for practice at the suprasegmental level of spoken English, employing information gaps, cued dialogues, Bingo, scrambled mini dialogues, and strip stories. Finally, in the communicative practice stage, activities may involve collaborative storytelling, authentic materials, and role play. By following these five steps, learners can improve their fluency, intelligibility, and communicative competence.

2.4 Virtual Learning Environments (VLEs)

Virtual learning environments (VLEs) in language education have shown considerable benefits in enhancing student-centeredness, motivation, communicative competency, and intercultural understanding (Peterson, 2008). A VLE offers a platform for differentiated instruction by providing personalized, self-paced learning opportunities and facilitating multimodal interaction. Harrington (2010) and Uzunboylu et al. (2011) found that VLEs positively impact learning efficiency and self-efficacy, especially when incorporating online tools that support interactive and collaborative learning.

VLEs can play a salient role in pronunciation instruction. Pennington and Rogerson-Revell (2018) and Yan and Lin (2019) highlight the value of technology in providing individualized feedback and practice, which are essential for mastering pronunciation. However, Neri et al. (2002) warn against overemphasizing technological innovations at the expense of pedagogical effectiveness. They advocate for a balanced approach that improves both comprehensibility and intelligibility.

The characteristics of VLEs, including accessibility, interactivity, mass training, and instructor support across cultures and languages, are essential in determining their effectiveness (Liu et al., 2009; Misra, 2014; Stonebraker & Hazeltine, 2004). VLEs can also facilitate large-scale teacher training (Kennedy & Laurillard, 2019). Issues remain regarding online professional development (Butler et al., 2017) and teacher participation (Hertz & Engelhardt, 2021). Personalized assistance, study groups, and co-design techniques can enhance training through VLEs (Hertz & Engelhardt, 2021). Online resources can make training more relevant and adaptable (Misra, 2014). Furthermore, training through VLEs can scale education and provide access to higher education (Moloney & Oakley, 2019).

2.5 Differentiated Pronunciation Instruction via a Virtual Learning Environment (DPV)

The intersection of differentiated instruction, pronunciation instruction, and virtual learning environments offers a promising path for improving pronunciation instruction in Thailand. Differentiated instruction (DI) is relevant in language teaching, especially for English pronunciation, where learners' linguistic backgrounds, proficiency levels, and learning preferences can vary greatly. This approach provides a framework for meeting the diverse needs of learners, while pronunciation instruction targets the specific phonological challenges faced by Thai EFL learners. Combining differentiated instruction and pronunciation instruction with virtual learning environments creates a solution that delivers personalized, interactive, and engaging learning experiences, facilitating tailored practice and feedback. Chien (2019) emphasizes the necessity for language teachers to develop a deeper understanding of phonology and effective teaching strategies. This highlights the significance of professional development in English pronunciation for Thai teachers.

Implementing DI through VLEs in the EFL context presents several challenges. Teachers/trainers face difficulties in organizing and delivering DI, including material selection, time constraints, and large class sizes (Rifqi, 2024).

Technological, pedagogical, and personal issues prominently affect virtual EFL classes (Badklang, 2023). Although DI offers opportunities to enhance student learning and motivation (Mardhatillah & Suharyadi, 2023; Mirawati et al., 2022), it can also be time-consuming and induce pressure for teachers/trainers (Mardhatillah & Suharyadi, 2023). Planning, resource limitations, and a lack of administrative support are common challenges in implementing DI (Megableh & Abdullah, 2020).

However, DI through VLEs can positively influence learners' learning processes as well as their motivation, participation, and personalized learning experiences (Magableh & Abdullah, 2020; Vargas-Parra et al., 2018). Despite challenges, teachers/trainers typically maintain a positive attitude toward DI and acknowledge its potential to meet diverse learner needs (Ahmed, 2022). DI through VLEs enables teachers and trainers to explore varied learning activities, integrate technology, and participate in professional development (Rifqi, 2024). Overall, DI via VLEs can be a valuable approach for enhancing EFL learning outcomes when properly implemented.

By integrating the strengths of differentiated instruction, pronunciation instruction, and virtual learning environments, the DPV framework emphasizes a learner-centered approach that begins with *Learner Analyses*, considering readiness levels, learning profiles, and individual interests to tailor instruction to diverse learner needs (Corley, 2005). This is followed by *Content Analyses* that target critical pronunciation features such as consonants, vowels, word stress, sentence stress, and intonation—elements that directly impact intelligibility and communicative competence. The *Differentiated Process* incorporates progressive instructional strategies for pronunciation, including description and analysis, listening discrimination, controlled practice, guided practice, and communicative practice (Celce-Murcia et al., 2010). These processes ensure a scaffolded learning experience that promotes gradual skill acquisition. Finally, the *Differentiated Products* stage offers learners multiple ways to demonstrate their learning through

alternative formats, timelines, and audiences, along with varied assessment methods, including formative, summative, self-, peer-, and teacher evaluations (Tomlinson & Cooper, 2006; Tomlinson, 2017). Integrating a *Virtual Learning Environment* facilitates ubiquitous access, personalized learning pathways, and multimodal engagement, enhancing teacher/trainer efficiency and learner autonomy (Liu et al., 2009). This framework not only addresses individual phonological challenges but also fosters meaningful engagement, leading to effective English pronunciation**.** The DPV framework provides a comprehensive, flexible, and impactful approach to pronunciation instruction across diverse educational contexts by aligning pedagogical strategies with technology-enhanced tools.

3. Methodology

3.1 Sampling Methods

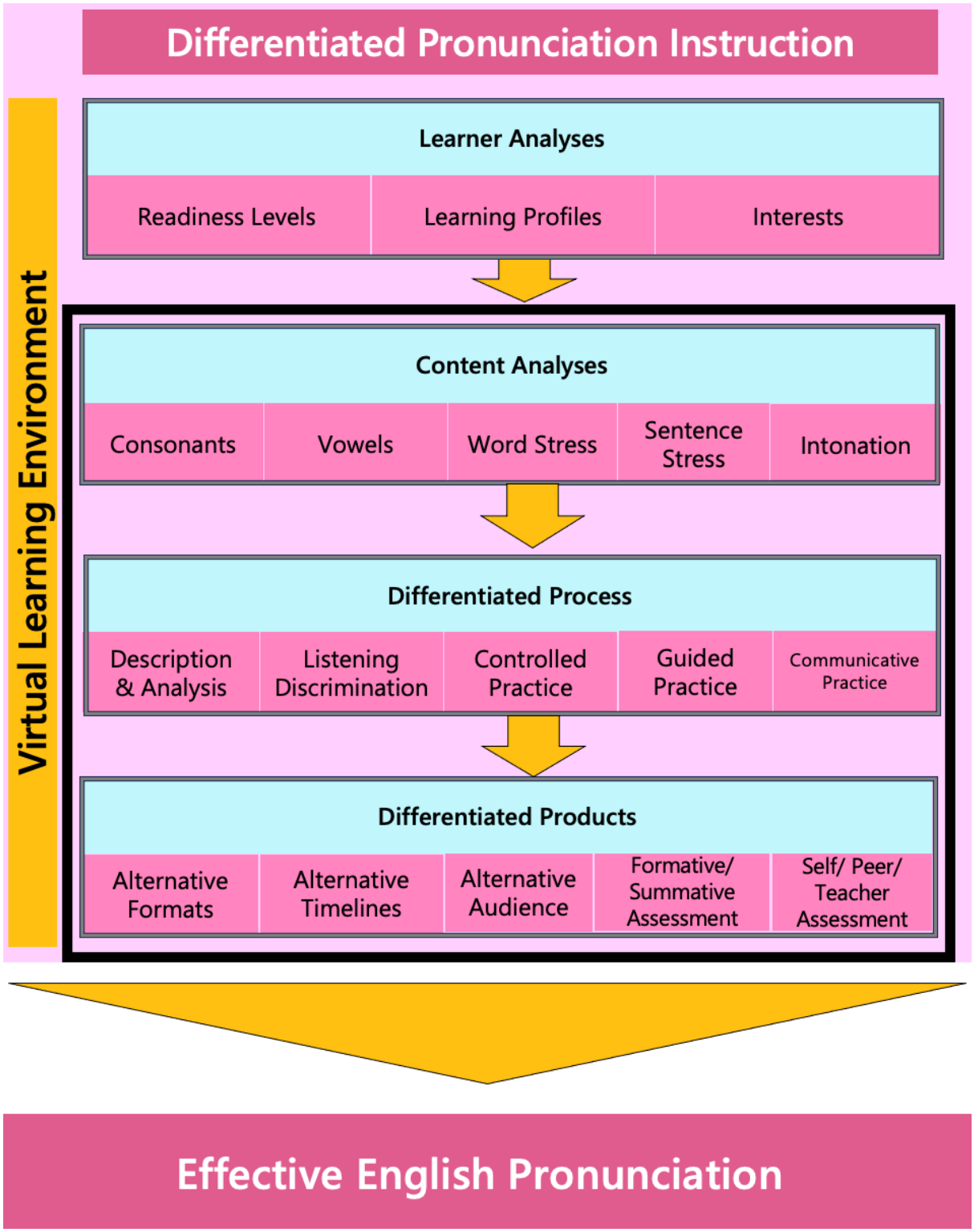
This mixed-methods study had a one-group pretest and posttest design. Purposive sampling was employed to select participants. At the beginning, 30 primary-school Thai EFL teachers voluntarily applied for pronunciation training. Recruitment criteria included an age range of 24 to 45, a minimum of two years of teaching experience at a government school in any region of Thailand, and a bachelor's degree in English. The qualified applicants were notified and invited to join a 12-session pronunciation training program. Two participants left the experiment at an early stage, resulting in 28 participants throughout the DPV. Among the remaining 28 participants, aged between 20 – 45 years, 25 were female, and three were male. The regional representation included 13 teachers from the South, seven from the Northeast, five from the North, and three from the Central region of Thailand. The teaching experience among participants ranged from one to five years (eight participants), six to ten years (ten participants), and over ten years (ten participants). This diverse demographic profile provided a comprehensive representation of primary-school Thai EFL teachers across various regions and experience levels.

3.2 The DPV Instructional Design

This study explored the impact of differentiated pronunciation instruction via a virtual learning environment (DPV), a 12-session virtual training program for EFL teachers in Thailand. The training aimed to equip participants with foundational knowledge and practical applications of spoken language components at both the segmental and suprasegmental levels: consonant sounds, vowel sounds, word stress, sentence stress, and intonation. It also included pedagogical implications to assist participants in enhancing their students' English pronunciation through differentiated instruction and a communicative pronunciation teaching framework. The virtual learning environment (VLE) utilized in this study was Google Classroom, a learning management platform that offers online applications and tools for lessons, discussions, and assignments. These resources enable teachers and trainers to act as facilitators who guide students toward their learning objectives. Additionally, the Zoom application for online conferences was integrated into the weekly training for both teachers and students, as it allows for synchronous online communication. The conceptual framework of DPV is illustrated in Figure 1 below.

Figure 1

The DPV Instructional Processes



3.3 The Instructional Processes

3.3.1 Learner Analyses

Based on the differentiated instruction framework, learners' needs were identified using a self-reported 5-point Likert-scale Learning Style and Interest Questionnaire. The 30-item questionnaire was designed to explore participants' learning styles and interests. The items on the questionnaire were translated into Thai to facilitate participants' comprehension. The back-translation technique was employed to assess the quality of the translation (Hulin et al., 1983). Three experts reviewed the questionnaire based on the learning styles framework (Cohen et al., 2002). In addition to the questionnaire, five open-ended questions about interests elicited participants' favorite activities during leisure time. The results indicated that participants were visual and auditory learners, aligning with their interview responses, which revealed that listening to music and watching movies and programs broadcast online were their favorite activities. The topics that interested them the most included learning activities for kids, know-how, and storytelling. Participants' readiness levels were diagnosed using a pretest, which served as the research instrument for this study. The results were utilized for diagnostic and proficiency purposes.

3.3.2 Content Analyses

The content of spoken English language components was designed to include consonant sounds, vowel sounds, word stress, sentence stress, and intonation, each with varying degrees of difficulty. At this stage, the trainer gathered and selected materials from diverse sources to ensure ample resources for a variety of teaching activities that correspond to the learners' needs identified in the first stage, Learner Analyses. Table 1 outlines the duration and content covered in each session of pronunciation training in the DPV.

Table 1

The DPV Sessions and Contents

Sessions	Contents
Module 1: Pronunciation for English Teachers (30 Hours)	
1	Consonant Sounds (1)
2	Consonant Sounds (2)
3	Vowel Sounds (1)
4	Vowel Sounds (2)
5	Word Stress (1)
6	Word Stress (2)
7	Sentence Stress (1)
8	Sentence Stress (2)
9	Intonation (1)
10	Intonation (2)
Module 2: Communicative Framework for Pronunciation Teaching (6 Hours)	
11	Workshop & Feedback (1)
12	Workshop & Feedback (2)

3.3.3 Differentiated Process

This study adopted the five steps of Celce-Murcia et al.'s (2010) Communicative Framework for Pronunciation Instruction as the instructional method, as it has gained attention in recent years for being an effective approach to teaching English pronunciation. The framework typically consists of five steps: description and analysis, listening discrimination, controlled practice, guided practice, and communicative practice. Research indicates that this approach can significantly enhance learners' pronunciation (McGregor & Reed, 2018). The framework aims to integrate form and meaning in pronunciation teaching (Isaacs, 2009) and stresses the importance of repetitive practice within a communicative

context (Elliott, 1997; Elmaksoud, 2013). This study applied the five steps of the Communicative Framework for Pronunciation Instruction across all 12 pronunciation training sessions. Each session lasted three hours, totaling 36 hours over three months.

3.3.4 Differentiated Products

At this stage, participants created a product (a video teaching material) with multiple formats, with different timelines, and for different audiences. Participants, along with their peers and teachers, conducted formative and summative assessments of the products.

To summarize, the DPV was designed to enhance primary-school EFL teachers' English pronunciation. The course included segmental and suprasegmental features of spoken English. The class contents, processes, and products of the DPV were designed in response to learners' needs, learning styles, and interests to help them improve their pronunciation.

3.4 Research Tools

This study used two research instruments: the DPV pretest and posttest and the semi-structured interview. The DPV pretest and posttest were used to investigate the effects of the DPV intervention on the pronunciation of primary-school English teachers in Thailand. The semi-structured interview was conducted to explore the participants' opinions about the DPV.

3.4.1 The DPV Pretest and Posttest

The DPV pretest and posttest were parallel diagnostic tests designed to evaluate participants' English pronunciation and speaking proficiency before and after the DPV intervention. For this purpose, the TOEIC (Test of English for International Communication) Speaking Practice Test, developed by the Educational Testing Service (ETS), was adopted to this study due to its strong reliability, with a reported reliability coefficient of .82

(Powers et al., 2009). This test is widely recognized for its ability to assess spoken English proficiency across various dimensions, including pronunciation, intonation, stress, grammar, vocabulary, and cohesion, through relevant general and workplace tasks that do not require specialized business knowledge. This comprehensive approach aligns well with the goals of the current study and emphasizes the enhancement of communicative effectiveness. Building on the communicative approach to pronunciation teaching (Celce-Murcia et al., 2010) to the DPV Pretest and Posttest, the researcher adjusted the TOEIC Speaking Practice Test by including additional tasks designed for primary-school English teachers, such as self-introduction, describing context clues, and explaining a lesson. In addition to segmental features (e.g., /f/, /v/, /θ/, /ð/, /ʃ/, /ʒ/, /tʃ/, /dʒ/), the test highlighted suprasegmental elements, including sentence stress, word stress, and intonation, which are crucial for fluency. The similar form of the test was previously applied by Pinweha and Chinwonno (2011) in Thai educational settings, further enhanced confidence in its validity and relevance to the study's objectives. During the test, participants were guided through Zoom to complete the tasks, with each test lasting approximately 30 minutes. Responses were recorded for data analysis, and feedback was not given during testing.

To ensure a reliable assessment, the pronunciation and oral production assessment rubric (Appendix A), modified from Pinweha and Chinwonno (2011), served as an analytic scoring tool with a total score of 20 points. It assessed five tasks: reading words aloud, reading a text aloud, self-introduction, describing a picture, and explaining a lesson, concentrating on pronunciation, fluency, intonation and stress, structure, and vocabulary. Two experienced English instructors at the tertiary level independently rated participants' responses, achieving moderate inter-rater reliability (ICC = 0.73).

3.4.2 The semi-structured interview

The semi-structured interview aimed to allow participants to elaborate on their reflections, feedback, and experiences regarding the DPV. Nine interview questions about the DPV were translated into Thai and approved by three experts in the field using the item objective congruence (IOC) method. Each test taker had 30 minutes for an interview with the researcher via the Zoom application. The interview was recorded for transcription and data analysis. The semi-structured interview questions included the following:

1. Before the training, what did you think about your English pronunciation in general?
2. When you came across some pronunciation challenges, what would you do?
3. What are the accomplishments that you think resulted from the training?
4. How do you apply/make use of what you have learned from the training in your class?
5. What else have you learned from the program?
6. How do you like the classroom atmosphere that incorporates DPV?
7. What are the three words (adjectives) you would use to describe this program?
8. Please give some suggestions to help improve this training.
9. What are the advantages and disadvantages of virtual training?

3.5 Data Collection

The pretest was administered via Zoom prior to the training, following the approval of the Research Ethics Review. The posttest took place during the final session of the training. Subsequently, a semi-structured interview was conducted with all participants. The researcher scheduled appointments with the interviewees based on their convenience and availability.

3.6 Data Analysis

To investigate the effectiveness of the DPV intervention, the pretest and posttest were compared using a dependent samples t-test. The effect size of these two mean scores was calibrated using Cohen's d. Two weeks after the intervention ended, the semi-structured interviews were administered and video-recorded via Zoom. The data were transcribed and categorized by the researcher.

4. Results

Research Question 1: To what extent does the DPV improve the English pronunciation of primary-school Thai EFL teachers?

Table 2

The Comparison of Pretest and Posttest Scores

	n	***M***	***SD***	***t***	**Sig. (2-tailed)**	**Mean difference**	**Effect size *(d)***
Pretest	28	9.92	2.54	18.95	<.001*	7.13	1.99
Posttest	28	17.05	1.79				

*p <.05

The pretest and posttest were utilized to address Research Question 1. Paired-sample *t*-tests were performed to compare the pretest and posttest scores. Table 2 shows the results of these two tests, which were administered to a sample of 28 participants. The mean score for the pretest was 9.92 out of 20, with a standard deviation of 2.54. The mean score for the posttest was 17.05, with a standard deviation of 1.79. The *t*-value for the test was 18.95. The significance level was below .001, indicating a statistically significant difference between the pretest and posttest scores. The mean difference between the pretest and posttest scores was 7.13, and the effect size was calculated to be 1.99, suggesting a substantial effect.

Table 3

The Pretest and the Posttest Scores in Five Elements

	Pretest		Posttest		*df*	*t*	*p**	Effect size *(d)*
	M	***SD***	***M***	***SD***				
Pronunciation	2.52	0.50	3.34	0.58	27	9.14	<.001	1.73
Intonation	2.48	0.60	3.46	0.47	27	10.81	<.001	2.04
Fluency	2.48	0.62	3.45	0.46	27	10.86	<.001	2.05
Structure	2.43	0.52	3.30	0.53	27	10.97	<.001	2.07
Vocabulary	2.30	0.48	3.30	0.50	27	11.13	<.001	2.12

*p <.05

The results in Table 3 reveal statistically significant improvements across all five assessed language elements following the DPV intervention. Pronunciation scores improved from a mean of 2.52 out of 4 to 3.34, while intonation and stress increased from 2.48 to 3.46, fluency from 2.48 to 3.45, structure from 2.43 to 3.30, and vocabulary from 2.30 to 3.30. Among these, intonation and fluency exhibited the highest gains**,** with mean scores rising by 0.98 and 0.97 points, respectively. These improvements were supported by high *t*-values, ranging from 9.14 to 11.13, all with *p*-values less than .001, indicating strong statistical significance. Effect sizes (Cohen's *d*) ranged from 1.73 to 2.12, demonstrating large practical effects (Field, 2009). These findings supported the robustness of the improvements and underscored the efficacy of the DPV instructional model. They suggested that targeted pronunciation instruction via virtual environments not only enhanced critical pronunciation features but also significantly contributed to broader language skills, such as intonation, fluency, and vocabulary development. The pronounced gains in intonation and fluency highlighted the importance of suprasegmental instruction, consistent with Celce-Murcia et al. (2010), which prioritizes these features for enhanced communicative fluency.

Research Question 2: What are the opinions about the DPV of primary-school Thai EFL teachers?

After the intervention, a semi-structured interview was administered to all participants. Their reflections, feedback, and experiences on the DPV are as follows.

4.1 Lack of Confidence and Inhibition

Before the training, many participants held negative attitudes toward their English pronunciation, typified by such statements as “Pronunciation is poison.” They lacked confidence and needed proper training. In fact, poor pronunciation can inhibit teaching pronunciation. Initially, participants relied on watching movies, occasionally conversing with foreign teachers, and using dictionaries to improve their pronunciation.

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> *“English phonology feels like poison to me. While I was pursuing my BA, I found English pronunciation to be complicated, and ‘A’ doesn’t represent the /a/ sound. I checked with the dictionary. I know I’m not good at English and fear making mistakes.”*

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> *“When I pursued my degree in ELT, I was too shy to speak English. I lacked confidence in my speaking skills and didn’t understand why my teacher said things like that. I’ve learned here and gained a better understanding that it’s the standard I must achieve. The training has made me more confident.”*

4.2 Self-Awareness and Inspiration for Classroom Research

After the DPV intervention, participants reported significant achievements. They noted improvements in suprasegmental features, including word and sentence stress as well as intonation. The training inspired classroom research and provided practical tools and materials that could be accessed at any time.

Participants planned to incorporate various class activities, such as minimal pairs, chants, nursery songs, rhymes, and storytelling. Importantly, the training fostered self-awareness and understanding of students' challenges, particularly those from indigenous language backgrounds, motivating participants to serve as effective pronunciation models.

DPV 5

"I knew I needed to be a good role model for my students. I don't want them to learn the wrong things from me, as I did when I was a student. It would be a sin if students learned the wrong thing from me for their entire lives."

DPV 20

"I am the only English teacher at my school, and every day I host a radio program called "English Today," where students learn new words. I'm very strict about English pronunciation and strive to be a correct role model for my students. It's like cultivating the correct pronunciation for them when they are very young."

DPV 23

"It is important to share pronunciation techniques with my students who speak indigenous languages. They face more challenges than other Thai students. If I understand the rules, such as stress, it will help them significantly."

DPV 13

"I teach grades 1-2, introducing students to songs and rhymes, but I never imagined I could teach sounds and combine them with songs and TPR (Total Physical Response). I want to conduct some classroom research on this."

4.3 Virtual Learning Environment and Differentiated Supports

The DPV atmosphere was characterized as convenient, fun, and stimulating. Participants valued peer support, individual and immediate feedback, and using breakout rooms for sharing.

DPV 21

> *"The virtual learning environment is very flexible—we can learn whenever and wherever we want, and we can return to watch the replay later. The content is just right! I am aware of my weaknesses and can go back to view and share nursery songs and rhymes with my students. I see my classmates' progress and enjoy learning alongside them. There are still many teachers who need this training."*

DPV 25

> *"Virtual classrooms offer numerous benefits. Collaborating via Zoom and using breakout rooms is very helpful. I appreciate how teachers from different provinces can meet one another. I also value the private sessions tailored for each participant. It could be exhausting to stare at a monitor for days and nights. Private sessions allow for greater focus on our learning and reduce stress. We receive individual feedback, and it can be very direct, so I understand what I need to improve."*

However, challenges were also noted. These included limited human interaction and physical movement, distractions from the home environment, insufficient practice time, and a preference for on-site training and feedback, as excerpted below.

4.4 Limited Human Interaction and Physical Movement

DPV 7

"The limitation of online training is the lack of physical movement. We don't really know if the other person would understand us clearly. Online communication may cause some misunderstandings because of the lack of interaction."

4.5 Distractions from the Home Environment

DPV 21

"While I'm training, my mom is taking care of my baby and sharing some comments about the training. My niece is also sitting beside me, learning."

DPV 19

"I am currently having the training in my bedroom because a plumber is repairing my bathroom downstairs."

4.6 Insufficient practice time

DPV 10

"I would like to focus on the training, but I need to multitask because of the workload. I have limited time to practice, and I'm too busy to do so. However, the class recording helps me review the lesson afterward."

4.7 Preference for Onsite Training and Feedback

DPV 3

> *"The limited Internet connection can be a problem, and it can be challenging if the microphone and camera don't work properly. I prefer on-site training. It would be more effective because we would enjoy learning with friends and doing activities on site."*

Overall, the post-training interviews offered valuable insights into primary-school Thai EFL teachers' opinions on the DPV. They shed light on the benefits and challenges of the DPV, as well as on its impact on teacher development and classroom practices.

5. Discussion

The findings of this study on the DVP for primary-school Thai EFL teachers indicated a significant improvement in pronunciation skills. Participants also reflected on their attitudes toward the intervention. The following sections will discuss the benefits and pedagogical implications of the DPV.

6. Implications for Curriculum and Pedagogical Practices

The notable improvement in pronunciation skills following the DPV intervention highlights the importance of incorporating this instructional approach into the language learning curriculum. The findings aligned with Levis (1999, 2018) who emphasizes the critical role of segmental and suprasegmental features, such as vowel and consonant sounds, word stress, intonation, and rhythm, in achieving intelligibility in second-language pronunciation. The reported significant progress in suprasegmental features, including intonation and fluency, further supported the effectiveness of the DPV in enhancing learner proficiency and confidence in pronunciation instruction.

The transition from participants initially viewing pronunciation as “poison” to exhibiting positive attitudes and increased confidence after the intervention highlighted the transformative potential of the DPV. This change was consistent with Chien (2019), who emphasizes the necessity for language teachers to enhance their understanding of phonology and effective teaching strategies that can meet the diverse needs of their students. Consequently, policymakers should consider expanding the DPV approach on a broader scale and offering nationwide training to equip teachers with the essential skills to implement differentiated pronunciation instruction effectively.

6.1 The Role of Differentiated Instruction in Pronunciation Teaching

Differentiated instruction, especially in explicit pronunciation teaching, is vital due to learners’ diverse linguistic backgrounds, proficiency levels, and learning preferences. The application of DPV in this study showcased its potential to meet these varied needs by providing tailored interventions for specific phonological challenges via VLEs, along with different forms of assessment and personalized feedback. This finding supported the argument that differentiated pronunciation instruction can enhance language skills and improve learners’ overall communicative effectiveness (Levis, 1999, 2018). This enhancement may influence students’ later reading abilities. Previous studies indicate that phonological sensitivity in preschool can predict later reading skills, underscoring the importance of developing phonological skills for early reading acquisition (Lonigan et al., 1998; Snowling & Hulme, 1994). By improving the English pronunciation of the teachers who participated in this study, the DPV intervention may indirectly contribute to better reading outcomes among primary-school students. This finding is especially significant in the Thai context, where developing phonological skills is essential for enhancing both language proficiency and literacy outcomes.

6.2 Technological Enhancements and Virtual Learning Environments

Using a VLE was crucial in facilitating differentiated instruction and fostering a student-centered approach to learning in this study. The VLE served as a platform for teachers and trainers to organize and streamline differentiated teaching resources, improving their ability to offer targeted pronunciation instruction. Learners' positive perceptions of the VLE, combined with an increase in their self-awareness and understanding of pronunciation challenges, underscore the potential of technology-enhanced pronunciation instruction to boost their competence and confidence (Purwanto, 2019; Yan & Lin, 2019).

7. Limitations and Recommendations for Further Studies

The findings revealed three limitations regarding sample size, technological integration via VLE, and the limited training duration. These suggest potential avenues for further study.

The DPV provides promising solutions for scaling teacher professional development and addressing challenges in diverse contexts. Previous studies indicate that VLEs can enhance accessibility, facilitate widespread training, and support teachers' needs across different cultures and languages (Misra, 2014). They also demonstrate the potential for large-scale teacher professional development (Kennedy & Laurillard, 2019). This research aimed to ensure both internal and external validity, though it faced limitations. The small sample size in the classroom setting and the pretest/posttest quasi-experimental design limited the random selection of participants. Expanding the research scope to include larger, more diverse samples would improve generalizability. However, ensuring student/trainee participation may pose challenges. Strategies to enhance the effectiveness of the DPV in a larger group could include personalized support, study groups (Hertz & Engelhardt, 2021), and co-design methodologies (Kennedy & Laurillard, 2019). Integrating online resources can increase the relevance and adaptability of training (Misra, 2014). Nevertheless, careful consideration of

pedagogical design, development issues, and deployment concerns is essential (Mullen et al., 2019; Vivian et al., 2014).

Secondly, policymakers and instructors must consider the challenges of the DPV related to technological integration via VLEs. Issues such as reduced physical interaction are aligned with previous studies (Baum & McPherson, 2019; Ferri et al., 2020). Home distractions and inadequate learning environments also created difficulties. Technical problems, such as unreliable Internet connections and a lack of necessary devices, further hindered online learning. As for policymakers, DPV challenges may include insufficient teacher preparation, limited technological infrastructure, and difficulty engaging students or trainees. Instructors adopting the DPV should also consider the transition to VLE platforms, time management, and adapting their teaching styles. To overcome such obstacles, institutions should offer professional development on the DPV, pre-sessional technological training, and ongoing technical support for instructors. It is also recommended that a balanced approach be adopted, incorporating both virtual and face-to-face elements to enhance learning outcomes. Also, future research could explore hybrid instructional models that combine the benefits of online learning with the advantages of face-to-face interaction.

Additionally, the 12-session DPV training may have been insufficient to ensure significant effects on learners. While the findings showed notable improvement, maintaining participants' effective English pronunciation may require further exploration. Previous research on pronunciation training has shown positive outcomes across various methods and durations. Short-term high-variability phonetic training can enhance learners' perception and production of target sounds (Cebrian & Carlet, 2014; Thomson, 2016). Pronunciation training that includes visual feedback has proven effective in teaching pitch and duration contrasts (Hirata, 2004). Direct instruction on specific forms can lead to meaningful improvements, even for advanced learners (Couper, 2006). According to Thomson (2016), training in one phonetic context might not transfer to others.

These studies indicate that targeted pronunciation instruction can significantly enhance learners' perception and production of L2 sounds, even in short sessions. However, additional research is needed to assess the long-term retention of pronunciation skills among participants undergoing the DPV. Longitudinal studies could provide insights into the lasting impact of DPV interventions, and future investigations should explore the effects of the DPV on classroom practices and student outcomes.

8. Conclusion

This study investigated the effects of differentiated pronunciation instruction via a virtual learning environment (DPV) on primary-school EFL teachers in Thailand. Twenty-eight teachers participated in a 12-session training program emphasizing spoken language components at various levels. The training aimed to tailor instruction based on participants' readiness levels, learning styles, and interests. The study found significant improvements in English pronunciation and positive attitudes toward the training. The findings supported the integration of differentiated instruction methodologies in teacher training programs, promoting inclusive and effective language learning environments.

Additionally, the study provided insights into the nature of DPV instruction. It may address a research gap in implementing the DPV with primary-school English teachers in the EFL context. The substantial improvements demonstrate DPV's potential to significantly influence teacher proficiency and student learning outcomes. As the global focus shifts toward intelligibility-based pronunciation teaching, these findings suggest integrating differentiated instruction methodologies into teacher training programs to encourage inclusive and effective language learning environments. Further research is recommended to explore the long-term benefits and practical applications of the DPV in various educational settings.

9. About the Author

Sumanee Pinweha holds a doctorate in English as an International Language from Chulalongkorn University and is currently a lecturer at Chulalongkorn University Language Institute. For over 25 years, she has provided language training to pre-service and in-service teachers, as well as personnel from the private and government sectors. Her areas of interest include professional development, differentiated instruction, computer-mediated communication, project-based learning, and a communicative approach to pronunciation teaching.

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12. Appendix

Pronunciation and Oral Production Assessment Rubric

Components	4	3	2	1
Pronunciation	Pronunciation is highly intelligible, though the production may include minor lapses and/or other language influences.	Pronunciation is generally intelligible, though it includes some lapses and/or other language influences.	Pronunciation may be intelligible at times, but significant other language influence interferes with the appropriate delivery of the text.	Speech Is often unintelligible.
Fluency	Speaker's speech is fluent with only rare repetition or self-correction; any hesitation is content-related rather than to find words or grammar.	No noticeable effort or loss of coherence. There is some hesitation, repetition or self-correct.	There are long pauses. Speaker's limited ability to link simple sentences and to convey basic message is obvious.	There is little communication possible.
Intonation and Stress	Speaker's use of emphases, pauses, and rising and falling pitch is appropriate to the text.	Speaker's use of emphases, pauses and rising and falling pitch is generally appropriate to the text, though the response includes some lapses	Speaker's use of emphases, pauses, and rising and falling pitch is often not appropriate.	Speaker's wrong use of stress, emphases, pauses, and rising and falling pitch.

Components	4	3	2	1
		and/or moderate other language influence.		
Structure	Speaker's use of structures allows coherent expression of ideas.	Speaker's use of structures may be limited and may interfere with overall comprehensibility.	Speaker's use of structures significantly interferes with comprehensibility.	Speaker cannot produce basic sentence forms.
Vocabulary	Speaker's vocabulary is appropriate to the question and word choice is accurate.	Speaker's vocabulary may be limited or somewhat inaccurate, although overall meaning is clear.	Speaker's vocabulary is inaccurate, or relies on repetition of the prompt.	Speaker only produces isolated words.