The Effects of Morphological Awareness on L2 Vocabulary Knowledge of Thai EFL Young Learners

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Received: December 8, 2022 Accepted: January 10, 2023 Online Published: January 13, 2023

doi:10.5430/wjel.v13n2p51 URL: https://doi.org/10.5430/wjel.v13n2p51

Abstract

Morphological awareness (MA) is the ability to recognize words, identify the association between lexically attached parts of a word and create new lexical forms. Morphological instruction mediates the acquisition of new words and is, therefore, crucial for developing morphological awareness and vocabulary knowledge. Currently, the receptive-productive continuum of MA remains unclear, especially in an EFL context. This quasi-experimental study investigates how MA instruction affects the acquisition of morphologically complicated words and its impact on vocabulary knowledge among young Thai EFL learners. Six receptive and productive MA measures and four vocabulary knowledge measures were administered to 221 EFL young learners. While participants in the control group did not get this instruction, participants in the experimental group received explicit teaching on morphological awareness. A repeated measures ANOVA (with scores on several aspects of affixes as the dependent variable) with experimental and control cohorts and a repeated measure (time point) was conducted to probe Thai young EFL learners' morphological awareness and vocabulary knowledge. The findings demonstrated an encouraging effect of MA teaching in English language classrooms. Specifically, the participants in the experimental group showed improved performance in both receptive and productive MA. This suggests that the explicit instruction of morphologies may benefit English learners in understanding words and ease vocabulary acquisition. Other implications of these findings are debated, considering current pedagogical practice and theory.

Keywords: morphological awareness, vocabulary knowledge, morphological awareness instruction, word families, Thai EFL young learners

1. Introduction

The importance of morphological awareness for vocabulary development has long been documented in the field of English as a second language (L2) (Bubchaiya & Sukying, 2022; Iwaizumi & Webb, 2021; Laufer, 2017; Nation, 2013; Sasao & Webb, 2017; Schmitt & Zimmerman, 2002; Sukying, 2017, 2020, 2022; Sukying & Matwangsaeng, 2022; Thorndike, 1941; Ward & Chuenjundaeng, 2009). Morphological awareness (henceforth, MA), often known as word part knowledge (Sasao & Webb, 2017), is the proficiency to identify a morphologically complex word's internal structure and generate and use these items in a genuine context (Carlisle, 2003; Kuo & Anderson, 2006; Lieber, 2010). This awareness can be applied to comprehend information regarding the meanings of words and other members within a word family. Previous studies have shown MA allows learners to recognize the form-meaning links between word forms and meanings, identify the words according to their syntactic structure, and create new words (Hayashi & Murphy, 2011; Schmitt & Meara, 1997; Sukying, 2018a, 2020, 2022; Sukying & Matwangsaeng, 2022). From a pedagogical perspective, morphological instruction eases the acquisition of new words (Sukying, 2020), indicating that this instruction is crucial for developing both morphological awareness and vocabulary knowledge. However, to date, the number of investigations has concentrated on MA in L2 university students and native English learners (e.g., Danilović, Savić, & Dimitrijević, 2013; Hayashi & Murphy, 2011; Mochizuki & Aizawa, 2000; Sukying, 2018b; Ward & Chuenjundaeng, 2009). Indeed, few studies have examined MA in young learners, specifically in an English as a foreign (EFL) setting. Thus, research is needed to examine MA acquisition and the role of MA in vocabulary growth in young schoolchildren in an EFL context.

2. Literature Review

2.1 The Conceptual Framework of Morphological Awareness

Broadly defined, morphological awareness (MA) is the ability to consciously recognize and discern the lexical structure of a word in a language (Carlisle, 2000; Lieber, 2010; McBride-Chang, Wagner, Muse, Chow, & Shu, 2005; Sukying, 2017, 2018b, 2020, 2022; Sukying & Matwangsaeng, 2022). A word typically comprises different morphemes, the smallest meaningful unit. The morpheme consists of form and meaning and usually carries semantic senses. The form represents the structure of the morpheme: free and bound. Free morphemes (i.e., *walk, eat, swim*) can stand independently, while bound morphemes (i.e., *-er, -ist, -ive*) cannot. Instead, bound morphemes must be attached to a word in order to function appropriately in a language. The form of morphemes also carries linguistic functions, indicating the syntactic characteristics of a word. A word may have one morpheme (i.e., *speak, study*) or multiple morphemes (i.e., *speakers, studies*).

Together, MA can be conceptualized as the learner's ability to understand the internal structure of a morphologically complex word and the ability to recall and retrieve its form and meaning and use it in contexts for language communication purposes.

In language, MA involves an awareness of inflectional and derivational affixes, which play different roles in vocabulary acquisition. Inflections typically mark the vocabulary's grammatical properties and include numerals and noun grammatical components, tenses, persons, and numbers in verbs. Inflections do not reflect word formation and do not regulate the grammatical property of words where they are accompanying (Claravall, 2016; Sukying, 2022). For instance, English verbs may be designated by inflections for tense (e.g., *learn-ed, they learn, she learn-s*). Numbers can be utilized to inflectionally mark nouns, such as *one table* or *two table*s. This inflection is freely added to novel lexical items in this inflected system to produce new word forms. This formulation of inflections designates a rule-based procedure.

By contrast, English derivational affixes are viewed as either prefixes or suffixes. Derivational prefixes, like the adjectives *complete* and *in-complete*, can change a word's meaning but cannot change its grammatical property. Several derivational suffixes can change the part of speech of a word, such as the words *read* (verb) and *read-er* (noun), with some exceptions (e.g., both *child* and *child-hood* are nouns). Compounding combines two or more base words to form new words, such as *house-wife*. Derivational affixes emphasize different features, including syntactic, relational, and distributional knowledge (Claravall, 2016; Nation, 2013; Sukying, 2017; 2018a; 2020; 2022; Tyler & Nagy, 1989). Derivational affixes, including prefixes and suffixes, also designate syntactic and semantic relations within a word. Derivational forms across syntactic groups generate forms of a base item in different grammatical categories. Additionally, the addition of derivational affixes can change both the syntactic categories and connotations of a base item (e.g., *create* + *-ion*), resulting in forms that vary considerably in the predictability of their senses (e.g., *depart* + *-ment*) (Ford, Davis, & Marslen-Wilson, 2010). Therefore, derivational affixes involve understanding an affix's form, meaning, and use.

2.2 MA in Vocabulary Learning and Development

MA influences the capability to identify and manipulate the internal structure of a morphologically complex word (Lieber, 2010; Sukying, 2022). Morphological awareness has long been acknowledged as an effective method for accelerating vocabulary learning (e.g., Nagy, Carlisle, & Goodwin, 2014; Sasao & Webb, 2017; Sukying, 2018a; Wei, 2015; Wei & Nation, 2013). This knowledge subsidizes a learner's appreciation of the meaning of oblivious words by deconstructing affixations into more minor meaningful lexical constituents in language reception and production. Indeed, MA can increase awareness that several words can be parsed into lexical constituents (e.g., Nagy et al., 2014; Sukying, 2017, 2018b, 2020). This awareness can be used to grasp information concerning the meaning senses of lexical items and other word family members. Word families contain a lexical base and all derivatives and inflections that English language students could identify without studying individual forms alone (Bauer & Nation, 1993). Thus, a student may realize that *enjoy, enjoys*, *enjoyed*, and *enjoying* are, to some extent, related to one another. Furthermore, the denotation of *unpredictable* can be inferred merely from the appreciation of the lexical item *predict* when learners identify the connection between affixed constituents.

MA assists learners in inferencing from a grammatical class of newly attached words based on a suffixed derivative or creating novel derivatives to meet the demand for English language communication (Kieliszek, 2015; Nagy et al., 2014; Sukying, 2018b, 2020, 2022). To illustrate, adding *-al* to a noun will designate an adjective (*nation- national*), while adding *-ly* to an adjective creates an adverb (*national-nationally*). MA is plausible to be conscious of the lexical constituents and the capability to diagnose and implement the lexical members of a multipart word (Lieber, 2010). Research indicated that one's affix knowledge base directly facilitates the size of vocabulary knowledge (or 'lexicon') (Nation, 2013; Sukying, 2017, 2022). Nation (2013) noted that approximately 34.7% of all words in English school texts include inflections and derivations, and about one-fifth, 21.9%, of these words are inflectional affixes, and one-eighth, 12.8%, are derivational affixes. In a native-speaking context, English affixes are used to facilitate understanding, and this contributes significantly to vocabulary growth, adding approximately 1,000 words a year from elementary through to high school (Nagy & Anderson, 1984; Nagy, Diakidoy, & Anderson, 1993). Other studies also indicate that affix knowledge can enable learners to infer from the new grammatical classes of multipart words to meet the demand for language use (e.g., Laufer, 2017; Wei & Nation, 2013; Sukying, 2020).

In the field of vocabulary knowledge, MA is also considered a practical approach to learning new words and expanding vocabulary knowledge, even in native-speaking students (Carlisle & Katz, 2006; Kieliszek, 2015; Sukying, 2018b, 2020, 2022; Sukying & Matwangsaeng, 2022; Ward & Chuenjundaeng, 2009). MA can also enrich learning novel grammatical and meaning assets of lexical items to meet the demands of language use (Laufer, 2017; Wei & Nation, 2013). However, while several studies have investigated children's acquisition of knowledge of morphology (Freyd & Baron, 1982; Tyler & Nagy, 1989), these studies do not provide an evidence-based approach concerning instructional practices (Nagy et al., 1993).

The importance of teaching MA has long been highlighted in the literature (Bauer & Nation, 1993; Nation, 1990, 2013), and, according to some empirical findings, MA instruction may benefit L2 learning (e.g., Akbulut, 2017; Iwaizumi & Webb, 2021; Sukying, 2020; Wugud, 2017). To elaborate, after a year of teaching, their participants had increased their suffix knowledge by 4–5% on average, while their vocabulary had risen by 8.5 % (330 words) (Schmitt & Meara (1997). According to their findings, "the participants as a group showed a relatively limited knowledge of derivative suffixes and their use". Schmitt and Zimmerman (2002) demonstrated that learners might not automatically gain useful knowledge of derivative word forms by exposure, emphasizing the importance of paying explicit attention to derivative word forms. Likewise, Carlisle (2010) also found that "students do become more able to infer the meanings of unfamiliar words after receiving instruction in morphological analysis" (p. 466), and Zhang and Zou (2020) found that MA as a pedagogical

intervention improved morphological knowledge and the ability to infer word meaning.

Overall, these studies indicate that explicit teaching of morphology enhances students' MA and vocabulary knowledge. Indeed, word family knowledge can help students see the meaning sense of a word and the association between the lexical item and its inflections and derivatives (Sukying, 2020; 2022). Furthermore, affix knowledge increases English language knowledge (e.g., reading, writing, and grammar). These findings support former arguments that knowledge of affixations nurtures vocabulary learning (e.g., Hayashi & Murphy, 2011; Mochizuki & Aizawa, 2000). Studies have also demonstrated that explicit instruction on English affixes influences vocabulary learning (Carlisle & Katz, 2006; Schmitt & Meara, 1997; Schmitt & Zimmerman, 2002; Sukying, 2018b, 2020). Thus, the current study aimed to examine the roles of MA instruction in receptive and productive vocabulary acquisition and growth among young EFL learners in a Thai context. This study also examined the relative contributions of MA aspects to vocabulary acquisition and development, both receptively and productively.

RQ1: To what extent does morphological awareness instruction affect Thai EFL young learners' receptive and productive vocabulary knowledge?

RQ2: What is the relationship between Thai EFL young learners' MA and vocabulary knowledge receptively and productively?

3. Methodology

3.1 Participants

The participants consisted of 221 fourth to sixth graders (10-12 years old), who were recruited using the purposive sampling technique from a local primary school under government administration in northeastern Thailand. All participants were Thai native speakers who had not studied in a native environment. During the study, participants had taken English courses as a required subject for about seven to nine years. For these participants, English exposure had begun in kindergarten, which included physically singing and dancing to fundamental learning activities. Regarding participants' English experience, there were four 60-minute English lessons a week. More precisely, the participants had three English lessons with Thai instructors and the other with a non-Thai instructor. The number of students in each class varied from 35-40 students.

3.2 Research Instruments

The current study employed six receptive and productive MA tasks and four receptive and productive vocabulary knowledge measures. The six tasks of MA were developed and validated by the researchers. The two newly developed vocabulary tests were also created by the researchers. Before the study, the reliability of all measures was performed, indicating high degrees of consistency (α 0.8) (Mackey & Gass, 2005). The content of these measures (all items scored >0.5) was also validated by five specialists. Apart from these, two existing vocabulary tests were adopted to garner the data. The two existing vocabulary knowledge tests were adopted because they were widely executed by a number of researchers (Nation & Beglar, 2007; Laufer & Nation, 1995, 1999). Other descriptions of the measures are provided below.

3.2.1 Receptive Morphological Form (RMF) Task

The RMF task was used to determine the receptive MA form aspect and was developed based on Hayashi and Murphy (2011). It aimed to tap into participants' knowledge of individual affixes of both inflections and derivatives. The task contained four grammatical classes: adjectives, adverbs, nouns, and verbs. Based on the underlying morphological structure of the word, the lexical items had varying numbers of affixes. For instance, *incomplete* has one prefix (*in- +complete*), while *incompletely* has two affixes (one prefix and the other suffix) (*in- + complete + -ly*).

3.2.2 Receptive Morphological Meaning (RMM) Task

The RMM task is implemented as an L2-to-L1 translation format and a multiple-choice test to measure receptive knowledge of the meaning sense (Sasao & Webb, 2017). All student participants were given four Thai definitions and were requested to choose the response with the most appropriate meaning as a target affix, as follows:

1. ***inter-*** (interaction; intergroup) 2. ***in-*** (incomplete; incorrect)

(1) ราบเรียบ (2) ระหว่าง (1) เป็นจริง (2) ถูกต้อง

(3) เหนือชั้น (4) เข้าใจ (3) การ (4) ไม่

3.2.3 Receptive Morphological Use (RMU) task

The RMU task was constructed from a format used by Sasao and Webb (2017). It was organized as a four-choice examination to measure the participants' recognition of morphological use. Each item was presented without any further context, and the target affix was given by two instances of words with the lexical affix marked for identification. The student participants were enquired to select the word class of the affixed prompt characterized in the two examples below. There was a predetermined set of alternatives for each item: Verb, Noun, Adjective, and Adverb. A test sample is shown below:

1. ***-able*** (likeable) 2. ***-er*** (writer)

(1) Noun (2) Verb (1) Noun (2) Verb

(3) Adjective (4) Adverb (3) Adjective (4) Adverb

3.2.4 Productive Morphological Form (PMF) Task

Following Ishii and Schmitt's (2009) and Zhong's (2014) studies, the PMF task was designed and arranged as a fill-in-the-table task. It was implemented to assess participants' productive knowledge of morphological constituents. All participants were required to provide a correct derivative with its syntactic class of the word, including nouns, verbs, adjectives, and adverbs. The PMF task also required participants to deliberate whether a syntactic class of the target lexical item exists. The test illustration is shown below:

Target word	**Noun**	**Verb**	**Adjective**	**Adverb**
learn	*learnability*	*learn*	*learned*	*learnedly*

3.2.5 Productive Morphological Meaning (PMM) Task

Following the studies of Laufer and Goldstein (2004) and Webb (2005, 2009), the PMM task was developed to capture the participant's faculty to recall the meaning sense of the prompt word. It was formatted as an L1-to-L2 translation with one line for each prompt word. The participants were asked to recall the meaning of each prompt word. The test takers were given a list of Thai words and instructed to consider the English definition of each lexical item by dealing with the specified initial letter, as follows:

1. นักเขียน = Wri*ter*
2. การเติบโต = Gro*wth*
3. เป็นประโยชน์ = Hel*pful*

3.2.6 Productive Morphological Use (PMU) Task

The PMU task was designed in accordance with Nation (2013) and Sukying (2017). The main goal of this test was to assess students' understanding of how to use grammar effectively. The student participants had to produce the necessary affixes for each prompt word and an acceptable word for each blank. The target words were used to categorize the acceptable affixes. The participants' responses were compared to all eligible correct answers for each word family (Nation, 2013). For example, items from the PMU were:

1. My kid wants to be a ***scientist.*** *science*
2. Her teacher is very ***helpful*** to students. *help*
3. This is my ***personal*** idea to share with you. *person*

3.2.7 The Vocabulary Size Test (VST)

The VST (Bilingual Thai version; Nation & Beglar, 2007) was used to measure learners' receptive vocabulary size. The VST assessed knowledge of the form-meaning link without testing productive ability. Specifically, the student participants had to select the accurate response from four alternatives and were given items from the first to the second 1,000 most frequent words only as follows:

1. see: They **saw** it.
   a. ตัด
   b. รอ
   c. ดู/ มอง
   d. เริ่มต้น
   e. ไม่ทราบคำตอบ
2. time: They have a lot of **time**.
   a. เงิน
   b. อาหาร
   c. ชั่วโมง
   d. เพื่อน
   e. ไม่ทราบคำตอบ

3.2.8 Vocabulary Size-Thai Test (VSTT)

The VSTT developed by Schmitt, Schmitt, and Clapham (2001) assessed students' ability to recall words based on their meanings. The student participants were required to pair the most appropriate word to each Thai definition and write the word's number next to the meaning sense. The test sample is illustrated below:

1 birth
2 dust ____5_____ เกม
3 operation ____6_____ ชัยชนะ
4 row ____1_____ การเกิด
5 sport
6 victory

3.2.9 Productive Vocabulary Levels Test (PVLT)

The PVLT was used to assess controlled productive vocabulary (Laufer & Nation, 1995, 1999). The test model comprised 18 sentences; a blank space was provided for participants to complete the sentence. The PVLT (Version C) in the current study covered 1,000-2,000 levels. The test required student participants to produce predetermined target words when given a sentence context or a definition with a clue of

the initial letters of the target words. For example, an item from 2000-word level PVLT was: *The pirates buried the* ***trea*****_____** *on a desert island.* Or *Her beauty and* ***cha*****_____** *had a powerful effect on men.*

3.2.10 Vocabulary Production Test (VPT)

The VPT, developed by Laufer and Nation (1999), measured productive knowledge. A form with 20 sentences and a blank space for each level was used for the cloze test. The VPT was designed as fill-in tasks in sentences and covered the 1,000-word level. The test takers were inquired to produce predetermined target words when given a sentence or a definition with a clue of the initial letters of the target words. Some example items from the VPT were:

1. I feel sad when I have to ***s*****_____** goodbye to my friend. (*say*)
2. He likes to stay home and ***re*****_____** books on weekends. (*read*)
3. She tried to ***lis*****_____** to him carefully. (*listen*)

3.3 Explicit Instruction on Morphological Awareness

While the control group classes continued with typical instruction, the experimental classes participated in 60-min lessons each week taught by the first author, who has been teaching English as a Foreign Language for ten years, to learn English affixes and their meaning senses as well as their base words (Nation, 2013). Instruction took place in the regular classroom over 16 weeks, with the teacher participating in the sessions. PowerPoint slides, handouts, and worksheets were explicitly used to teach English affixes and word families. The denotations of the target affixes and the prompt words were offered during the class. The steps were:

1. presenting a lexical item and its meaning sense (e.g., *rewrite*): the definition of the lexical item is explicitly instructed in print and elucidated by the teacher by presenting the participants' definitions and giving samples of contexts where the word is applied;

2. introducing the inflected and derived forms (e.g., *-es, un-*);

3. adding the inflected and derived forms to the base word (e.g., *un + happy = unhappy, long + er = longer*);

4. providing the denotation of each word studying the combining of the base and inflections and derivations;

5. explaining the category of each word based on inflections and derivations (e.g., words ending in *ness/ness* are nouns);

All MA tasks involved inflected forms and derivatives were selected from Bauer and Nation's (1993) levels of a word family (See Table 1).

Table 1. Summary of the affixes used in the current study

Level	Affixes
2	-s, -es, -ed, -ing, -er, -est
3	-able, -er, -less, -ness, -ly, -th, un-, non-
4	-al, -ess, -ful, -ist, -ous, -ment, in-
5	-ally, -dom, -en, -en, -hood, -ian, -ship, mis-, mid-, inter-, sub-, un-

The 33 affixes, comprising 6 inflected and 27 derived forms, are presented in Table 1. Levels 2 to 5 were considered because they correspond to the order in which English affixes are learned. Notably, Level 1 (each form is a new word) was removed since learners are likely to consider different forms as morphologically related or relating to the same word family, such as books (Bauer & Nation, 1993).

3.4 Word Selection

The Bureau of Academic Affairs and Educational Standards, Ministry of Education, approved 120 textbooks for English language classrooms nationwide, from which the study's target words were selected and used in primary schools in Thailand. Specifically, words were selected from frequency-based word lists (BNC/COCA) and primary school textbooks, as these words had to be used productively, which enhanced learning opportunities. Finally, in order of frequency of occurrence, the first 1,000-word level words were pondered, and words that occurred less than 100 times were detached from the study.

3.5 Procedures

Participation in the study was voluntary, and parental consent was required. The participants were divided into two groups the experimental group and the control group. The 110 participants (three intact classes) in the experimental group were given explicit teaching on MA using Bauer and Nation's (1993) 5 levels of word families. In contrast, the 111 participants (three intact classes) in the control group received regular English classes without being instructed on any affixes. The current study presented the pen-and-paper test format, and the different parts (i.e., each test) were numbered and unique. Ten different tests were administered to all participants at two different time points: pretest (i.e., before the treatment; T1) and posttest (two weeks after the treatment; T2). Only participants who completed all tests were included in the data analysis. Participants who did not engage in the examinations by giving patterned answers to multiple choices, submitting blank tests or over 50% missing data, or writing answers irrelevant to the questions were excluded from the data analysis.

The measures of vocabulary knowledge (i.e., VST, VSTT, PVLT, and VPT) were given during the first week and were administered

within the same day for all participants. The productive vocabulary knowledge tasks were administered first to decrease the probability that participants would connect their spellings on the productive tests to choices in the receptive vocabulary knowledge tests. The receptive and productive MA tasks were given to participants during the second week. Like vocabulary test administration, all participants had to complete all the MA measures within the same day. Likewise, productive MA tasks were also administered before the receptive MA tasks in order to prevent any interference from the participants' potential acquisition of metalinguistic knowledge from the written forms of the affixes that were present on the productive tasks. In addition, a 20-minute interval between each test was allotted to minimize participant fatigue. All participants were provided test instructions, explanations, and examples in Thai, their mother tongue.

3.6 Data Analysis

SPSS software was applied to analyze the findings of the study. All MA results of the tests were converted into a percentage from their raw test scores. A repeated measures ANOVA (with scores on the several morphological aspects as the dependent variable) with two factors (experimental and control) and a repeated measure (time point) was performed to investigate how much morphological instruction could improve Thai young EFL schoolchildren's knowledge of affixations and vocabulary knowledge. As a follow-up analysis, multiple pairwise comparisons using independent *t*-tests between groups were carried out. Furthermore, a correlational analysis was performed to determine if an association occurred between primary school participants' vocabulary knowledge measured by four tests and different MA knowledge aspects measured by six MA tasks. Lastly, the influence of MA tasks to clarify receptive and productive vocabulary knowledge was inspected using multiple regression.

4. Results

4.1 The Effects of Morphological Awareness Instruction on Thai EFL Young Learners

Reliability analysis was conducted on the items in the MA tasks. All six different MA measures illustrated that the item quality ranged between 0.30 to 0.70 in both difficulty and discrimination index. The Cronbach Alpha coefficient revealed that the items on these tasks had high internal consistency levels, ranging from 0.890 to 0.940. The raw scores on all tasks were converted into percentages to compare vocabulary knowledge scores between T1 and T2. Descriptive statistics of minimum and maximum scores, mean, standard deviation, skewness, and kurtosis were calculated to determine whether the results were consistent with the normal distribution assumption (Table 2).

Table 2. Descriptive statistics of overall performance on MA tasks

	Experimental group (n = 110)				Control group (n = 111)			
Time 1	Mean	SD	Skewness	Kurtosis	Mean	SD	Skewness	Kurtosis
RMF	46.77	14.85	-0.422	0.641	46.30	13.12	-0.022	-0.667
RMM	43.33	14.78	0.368	-0.198	42.80	19.13	0.442	-0.448
RMU	34.60	13.21	0.629	0.080	34.37	13.78	1.262	1.964
PMF	17.76	9.78	0.616	-0.346	17.59	13.80	1.258	0.939
PMM	15.67	7.61	0.632	0.400	17.39	6.23	0.838	0.669
PMU	13.11	11.18	1.192	0.198	13.07	9.93	1.328	1.661
Time 2	Mean	SD	Skewness	Kurtosis	Mean	SD	Skewness	Kurtosis
RMF	64.71	15.10	0.168	-1.300	48.10	18.86	0.278	-0.855
RMM	51.21	13.70	0.429	-0.327	43.92	16.48	0.136	-0.914
RMU	43.82	9.46	0.210	-0.787	35.95	12.29	0.320	-1.025
PMF	37.68	9.81	-0.192	-0.622	21.66	8.01	0.807	0.436
PMM	33.33	10.51	0.358	-0.298	21.02	7.36	1.129	1.003
PMU	25.37	8.06	0.762	1.322	16.29	9.55	1.142	0.999

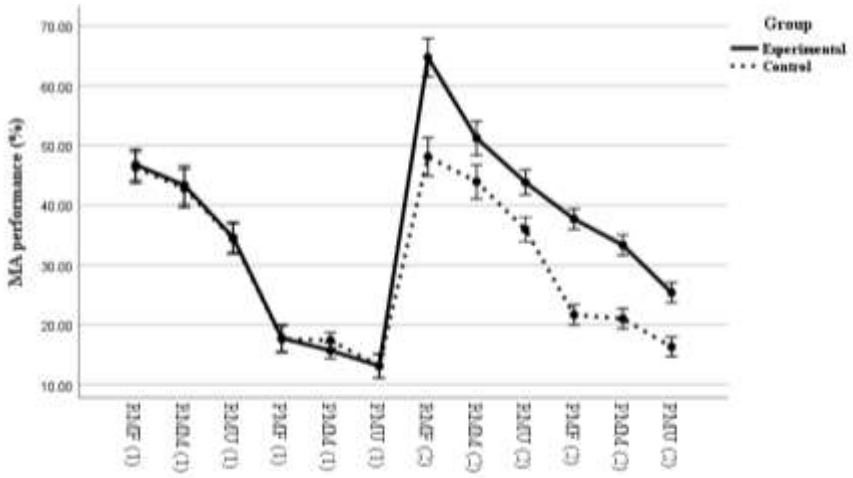
Note: N = 221

Table 2 summarizes the descriptive statistics for Thai EFL young learners' overall performance in the experimental and the control groups on the six morphological knowledge tasks, i.e., RMF, PMF, RMM, PMM, RMU and PMU at T1 and T2. The results revealed that participants in both groups achieved the highest mean performance of receptive knowledge on the RMF task, followed by the RMM and RMU tasks. In contrast, the highest mean score of productive knowledge was on the PMF, followed by the PMM and the PMU at T1 and T2. For the overall morphological awareness tests, the skewness and kurtosis scores were within the statistical norms of two standard deviations of normality. However, among these six measures, there was a higher frequency of students reaching a score range that was higher or lower than the bell curve with a normally distributed distribution. The results also indicate both groups achieved higher scores on receptive morphological awareness tasks than productive morphological awareness tasks are presented in Table 3.

Table 3. Descriptive statistics of receptive and productive knowledge on MA performance

Time 1	Experimental		Control	
	Mean	SD	Mean	SD
Receptive MA	41.57	15.15	41.15	16.32
Productive MA	15.51	9.79	16.02	10.63
Time 2	Mean	SD	Mean	SD
Receptive MA	53.25	15.57	42.66	16.83
Productive MA	32.13	10.77	19.66	8.67

Note: Experimental (n=110), Control (n=111); MA = Morphological awareness



Note: (1) = Time 1, (2) = Time 2

Figure 1. Mean percentage of correct responses on the MA tasks at T1 versus T2

A repeated-measures ANOVA was used to analyze the data from the MA tasks with one between-subjects variable (experimental versus control groups). Figure 1 summarizes Thai young EFL participants' overall performance on MA tests. The control and experimental participants' performance were not significantly different between the MA tasks at Time 1(T1). The results showed a main effect for Morphological Awareness ($F(4.095, 896.701) = 363.419$, $p < .001$), but no main effect for Groups ($F(1, 219) = 0.002$, $p = .963$) or Group x Morphological Awareness interaction ($F(4.095, 896.701) = 0.298$, $p = .883$). However, at T2, there was a significant main effect for Morphological Awareness ($F(4.01, 878.068) = 298.02$, $p < .001$) and for Groups ($F(1, 219) = 209.663$, $p < .001$). Moreover, there was a significant Group x Morphological Awareness interaction ($F(4.01, 878.068) = 6.890$, $p < .001$).

Table 4. Descriptive statistics for MA performance

	Experimental group		Control group			
	Mean	SD	Mean	SD	*t*-value	Effect size
Time 1	28.54	18.23	28.59	18.23	-0.045	-0.002
Time 2	42.69	17.05	31.16	17.65	12.096	0.664
t-value	21.435		3.754			
p-value	.00*		.00*			

Note: Experimental (n=110), Control (n=111); *Significant at the 0.05 level (p<0.05)

Follow-up comparisons of the performance between the groups using independent-sample *t*-tests indicated that the experimental versus the control groups' performance was not significantly different between the MA tasks at T1 ($t(1324) = -0.045$, $p = .964$). In contrast, the experimental group performed significantly better on all MA tasks than the control group at T2 ($t(1324) = 12.095$, $p < .001$). As shown in Table 4, despite the insignificant difference between the two groups at T1, there was a significant between-subjects difference in the mean performance at T2. These findings suggest that deliberate MA instruction improved performance on English affix tests in young Thai EFL learners.

Table 5. Correlations between different aspects of MA at Time 2

Group	Tests	RMF	RMM	RMU	PMF	PMM	PMU
Experimental	RMF	1	.702**	.410**	.301**	.123	.008
	RMM	.702**	1	.523**	.313**	.273**	.203*
	RMU	.410**	.523**	1	.340**	.127	.040
	PMF	.301**	.313**	.340**	1	.162	.200*
	PMM	.123	.273**	.127	.162	1	.467**
	PMU	.008	.203*	.040	.200*	.467**	1
Control	RMF	1	.314**	.031	.006	-.057	.025
	RMM	.314**	1	.024	-.125	.060	-.053
	RMU	.031	.024	1	-.104	.076	.021
	PMF	.006	-.125	-.104	1	.131	-.017
	PMM	-.057	.060	.076	.131	1	.091
	PMU	.025	-.053	.021	-.017	.091	1

Notes: * Correlation is significant at the 0.05 level (two-tailed)

** Correlation is significant at the 0.01 level (two-tailed)

Pearson correlations were conducted to determine if a relationship exists between the different aspects of morphology in the experimental and control groups at T2. Table 5 illustrates that some of the predictor variables were largely positively correlated with the morphological awareness variables for the experimental (0.10 to 0.70) and moderately correlated in the control (0.10 to 0.31) groups (Cohen, 1988).

4.2 The Effects of MA Instruction on Vocabulary Knowledge in Thai EFL Young Learners

The participants' performance for the means and standard deviations of standardized vocabulary knowledge measures (VST, VSTT, PVLT and VPT) scores are presented in Table 6. The raw scores on all tasks were converted into percentages to compare vocabulary knowledge scores between T1 and T2. At T1, the experimental participants scored 36.09% (*SD* = 14.29) on the VST, 35.24% (*SD* = 11.13) on the VSTT, 28.45% (*SD* = 15.85) on the VPT, and 26.36% (*SD* = 17.76) on the PVLT, whereas the scores for the control participants were 36.39% (*SD* = 9.91) on the VST, 34.95% (*SD* = 9.19) on the VSTT, 28.28% (*SD* = 9.03) on the VPT, and 25.97% (*SD* = 9.47) on the PVLT.

At T2, the experimental participants obtained scores of 62.00% (SD = 17.29) on the VST, 42.87% (SD = 10.78) on the VSTT, 41.81% (SD = 16.01) on the VPT, and 39.64% (SD = 15.79) on the PVLT. In contrast, the control participants scored 37.11% (SD = 16.11) on the VST, 35.40% (SD = 15.13) on the VSTT, 29.63% (SD = 14.45) on the VPT, and 27.37% (SD = 10.58) on the PVLT. These scores suggest that the experimental participants scored higher on receptive MA knowledge tests than on productive MA knowledge tests.

Table 6. Descriptive statistics of vocabulary knowledge performance

		Experimental		Control	
	Tasks	Mean	SD	Mean	SD
Time 1	VST	36.09	14.29	36.39	9.91
	VSTT	35.24	11.13	34.95	9.19
	VPT	28.45	15.85	28.28	9.03
	PVLT	26.36	17.76	25.97	9.47
Time 2	VST	62.00	17.29	37.11	16.11
	VSTT	42.87	10.78	35.40	15.13
	VPT	41.81	16.01	29.63	14.45
	PVLT	39.64	15.79	27.37	10.58

Note: Experimental (n=110), Control (n=111)

Pearson correlations were performed to examine the relationship between MA and vocabulary knowledge across the experimental and control participants at T2. The correlations between MA and vocabulary knowledge for the experimental group ranged from 0.10 to 0.28, indicating a small effect size (Cohen, 1988), and from 0.10 to 0.15 for the control group, which also indicates small effect sizes. According to the findings from previous studies, some of the correlation coefficients between MA and vocabulary knowledge were positive (e.g., Hayashi & Murphy, 2011; Sukying, 2018a, 2020, 2022). Table 7 illustrates the findings of the correlational analysis on all morphological and vocabulary knowledge components.

Table 7. Correlations between vocabulary knowledge and MA at Time 2

Group	Tests	RMF	RMM	RMU	PMF	PMM	PMU
Experimental	VST	.048	.107	.081	.132	.023	.009
	VSTT	.281*	.233*	.212*	.087	.284**	.227*
	PVLT	.222*	.207*	.032	.171	.238*	.243*
	VPT	.093	.147	.075	.032	.205*	.198*
Control	VST	-.125	.017	-.137	.072	.090	-.299**
	VSTT	-.016	-.140	-.097	.141	-.042	.076
	PVLT	-.077	-.204*	-.062	.105	.022	-.024
	VPT	-.139	-.090	.036	.159	.134	-.078

Note: *$p < 0.05$ level (two-tailed). **$p < 0.01$ level (two-tailed).

The extent to which MA aspects could account for vocabulary knowledge was also investigated using multiple regressions. Table 8 illuminates the predictive account of the variance of MA in vocabulary. The MA predictors explained 3.40% of the variance in experimental students' vocabulary knowledge at T1 and accounted for a marginally significant 5.20% variance in vocabulary knowledge at T2. These findings indicated that the variance of MA contributed to experimental participants' vocabulary knowledge after the treatment. These results suggest that vocabulary and MA are correlated together at the same time. However, the predictive account of the variance of MA specified that the experimental participants' vocabulary knowledge at both time points is likely deficient for comprehending unfamiliar words in L2 vocabulary acquisition.

As shown in Table 9, receptive vocabulary knowledge at T1 was accounted for by 13.3% by the six MA measures and 12.9% of the variance in productive vocabulary knowledge for the control participants at T2. According to these findings, vocabulary knowledge is likely deficient for attacking morphologically complicated terms in L2 acquisition. Notably, the predictive explanation of the variance of MA in vocabulary was slightly decreased over time, whereas the experimental participants' variance was increased after the treatment. Therefore, the results

indicate that MA instruction affects the predictive explanation of the variance of MA in vocabulary knowledge.

Table 8. Regression analysis explaining MA with vocabulary knowledge for the experimental group

Time 1	*β*	*t-value*	R^2
Predicting VK			.034***
RMF	-.10	-.80	
RMM	.12	.80	
RMU	-.06	-.52	
PMF	-.19	-1.22	
PMM	.04	.17	
PMU	-.07	-.50	
Time 2	*β*	*t-value*	R^2
Predicting VK			.052***
RMF	.01	.04	
RMM	.11	.87	
RMU	.12	.64	
PMF	.22	1.28	
PMM	.25	1.46	
PMU	-.29	-1.29	

Notes: $F(6, 109) = 0.606$, $p = 0.725$ for predicting VK at T1; $F(6, 109) = 0.934$, $p = 0.474$ for predicting VK at T2; VK = vocabulary knowledge

Table 9. Regression analysis accounting for MA with vocabulary knowledge for the control group

Time 1	*β*	*t-value*	R^2
Predicting VK			.133***
RMF	.01	.20	
RMM	-.21	-.39	
RMU	-.12	-1.66	
PMF	.12	1.85	
PMM	.53	3.34	
PMU	-.03	-.40	
Time 2	*β*	*t-value*	R^2
Predicting VK			.129***
RMF	-.10	-1.23	
RMM	.06	.65	
RMU	-.16	-1.35	
PMF	.13	.72	
PMM	-.23	-.98	
PMU	-.38	-2.14	

Notes: $F(6, 110) = 2.663$, $p = 0.019$ for predicting VK at T1; $F(6, 110) = 2.569$, $p = 0.023$ for predicting VK at T2; VK = vocabulary knowledge

Overall, the current study emphasized the influence of MA instruction on receptive and productive vocabulary knowledge among primary school learners in a Thai EFL context. The results of the present study also suggest that deliberate MA instruction improves English affix knowledge in young Thai EFL learners.

5. Discussion

The results of the current study highlighted the importance of explicit MA instruction in increasing young Thai EFL learners' receptive and productive vocabulary knowledge. Specifically, the experimental group achieved higher scores on both MA and vocabulary knowledge tests after their instruction, whereas the control participants, who received traditional instruction, did not. Explicit instruction on English affixes helps students recognize how words are formed and how they can be broken into smaller segments. Indeed, it is easier for learners to parse and reconstruct words if they know that words can be divided into more minor constituents and consist of inflectional forms and derivatives. This method differs from, and is more effective than, memorization of word definitions because, after learning how to derive and break down complex affixed words, students can come up with new affixations (even meaningless ones) and give them meanings.

The current results show that EFL students can succeed when taught rule-based methods of understanding the English language system. That is, students' awareness was enhanced when the morphological principles of English words were explicitly explained to them. The current results align with other research showing that vocabulary development is impacted by explicit instruction in English affixes (Bauer & Nation, 1993; Carlisle & Katz, 2006; Schmitt & Meara, 1997; Schmitt & Zimmerman, 2002; Sukying, 2020). The results also indicate both groups achieved higher performance on receptive morphological awareness tasks than productive morphological awareness measures. This is likely because young Thai EFL learners recognize, at least to some extent, the relationships between word family members in receptive dimensions of word knowledge. This finding also suggests young Thai EFL students are likely to recognize an affix and its meaning before they can remember and use it in a sentence. These findings are in line with prior claims showing that some

features of English affixes are learned before others (e.g., Bubchaiya & Sukying, 2022; Sukying, 2020; Sukying & Matwangsaeng, 2022).

Mastering English affixes, such as word families, can function as a scaffold for vocabulary learning. That is, Thai EFL primary school learners can make significant progress in vocabulary learning when morphological instruction is an essential module of the English language curriculum. This research underlines the relatedness between word knowledge and morphological awareness and illustrates the role morphological awareness that substantially plays in an EFL learning context. The results also showed that vocabulary knowledge is positively impacted by explicit morphology instruction and that deliberate teaching of affixes adds to L2 vocabulary learning. English affixes ease learners' word knowledge as well as their English skills, including reading, writing, and grammar. MA instruction in English language classrooms is, therefore, beneficial to vocabulary learning and teaching. It is important to note that learners in the control group may have learned the morphological structure of a word implicitly. Nevertheless, the results of this study suggest that even if implicit learning of a word's morphological structure does occur, explicit learning of morphological concepts and the internal structure of words is far more effective than the implicit method.

Overall, the correlational analysis showed that MA and vocabulary knowledge were positively associated with the experimental participants in both reception and production. The present result is in line with preceding investigations (e.g., Bubchaiya & Sukying, 2022; Danilović et al., 2013; Mochizuki & Aizawa, 2000; Sukying, 2018b, 2020; Sukying & Matwangsaeng, 2022). The different MA tests that were employed in each study may be the cause of these discrepant findings. In essence, parsing a complicated word into simpler segments was the main objective of Hayashi and Murphy's (2011) receptive MA task. However, the tests used in the present study assessed the participant's faculty to know and recall the structure, meaning senses, and use of affixations. The present research suggests that as participants' receptive and productive vocabulary knowledge increases, so does the association between various components of MA and those abilities in Thai EFL participants.

The regression analysis also demonstrated that, for the experimental participants, the six MA measures explained 3.40% of the variation in vocabulary knowledge at T1 and 5.20% of the variation in vocabulary knowledge at T2. These findings indicate that MA contributed to experimental participants' vocabulary knowledge after the treatment. In other words, MA serves as a facilitator for the depth and speed of vocabulary learning. However, the extent to which MA facilitates vocabulary knowledge is prone to be insufficient for morphologically complicated words, at least for young learners (e.g., Hayashi & Murphy, 2011; Sukying, 2017, 2022).

Altogether, the present study proves that, in Thai EFL young learners, MA instruction facilitates the improvement of receptive and productive knowledge of affixations or word parts. These results are consistent with previous claims that morphological awareness can predict the ability to recognize words and the level of vocabulary knowledge (McBride-Chang et al., 2005) and can help students understand and recognize new words when reading and writing (Zhang & Koda, 2013).

6. Conclusion

The current results show that young Thai EFL participants' morphological knowledge occurs on a developmental continuum. Indeed, the appreciation of individual affixes is attained before production. The results also suggest that explicit instruction of affixed words in a regular English language classroom in an EFL context is a valuable learning mechanism. Indeed, explicit instructions of English affixes facilitated the acquisition of vocabulary knowledge (e.g., meaning and linguistics). Furthermore, it seems that young Thai EFL participants' morphological awareness increases in line with their vocabulary level and follows a predictable progression, indicating which prefixes and suffixes should be introduced first. In conclusion, MA knowledge is an essential, sublexical constituent of vocabulary knowledge that facilitates vocabulary learning, and explicit MA instruction can stimulate the acquisition of word knowledge.

7. Pedagogical Implications

Recent research on English language learning theories and teaching techniques suggests that explicit MA instruction in second-language classrooms may be beneficial, especially in EFL settings. Affix understanding may also help advanced EFL language learners to develop their metalinguistic awareness by considering the language and examining their English learning process. Overall, the current study demonstrates the considerable, beneficial instructional effects of affixations trained explicitly and new affixations derived from affixed items taught in relation to inflected morphemes and derivatives. This study provides an excellent example of the value of drilling common English affixes and incorporating their usage and/or meaning into stems and bases. In addition, teachers may apply morphological awareness to facilitate their vocabulary teaching in the English language classroom. MA is also a crucial tool for language learners to study independently**.**

The current research demonstrates that various assessment methods may be required to fully comprehend students' morphological knowledge and its contribution to vocabulary development. In this context, longitudinal studies would be precious. Studying English affixes in different situations and levels of English language skills would also be especially beneficial. Additional affix learning studies (e.g., individually, grouping) would significantly contribute to the theoretical and practical frameworks for vocabulary development.

8. Limitations and Further Research

Further research may determine the effects of this instruction on different learning skills, such as receptive and productive skills, as there appears to be little evidence of the benefits of affix instruction on these skills in EFL learners. Furthermore, because young Thai EFL students were used in this study, it is feasible that the findings cannot be generalized to other age groups or proficiency levels. Notably, it might be interesting to examine how L2 learners with different proficiency levels and backgrounds would perform or deal with affixations

when receiving such training. Future research should incorporate learners from different backgrounds, ages and proficiency ranges. In addition, additional research may scrutinize whether and how these enlargements can be enhanced. Studying the effect of teaching on L2 learners with a different L1 background would also be useful. Finally, a future inquiry may differentiate the length and amount of intervention to determine the various impacts of these individual variables.

Acknowledgements

The research project was financially supported by Faculty of Humanities and Social Sciences, Mahasarakham University.

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