

The Effect of Morphological Awareness Training on L2 Postgraduates' Productive Vocabulary Knowledge and Academic Writing

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Abstract

Postgraduates who use English as a second language (L2) have been found in previous studies (e.g. Abdulkareem, 2013; Al-Khasawneh, 2010) to experience vocabulary deficiencies and difficulty with academic writing. Training in morphological awareness (MA) has contributed to developing learners' phonological awareness, word reading abilities, reading, spelling, and receptive vocabulary. However, research on its role and effect on productive vocabulary knowledge and academic writing is lacking. The current study examines the effect of MA training on productive vocabulary knowledge and academic writing. Two groups of postgraduates participated in the quasi-experimental study. The data were analyzed using SPSS version 26 and two writing scoring criteria (IELTS and ESL Composition Profile). The results reveal that MA training is effective and significantly improves L2 postgraduates' academic writing with a large effect size. Furthermore, the results show that the experiment significantly assists the students in enhancing their vocabulary production. The results demonstrate that MA training emerged to significantly affect the participants in becoming better writers and improving their vocabulary production.

Keywords: Morphological awareness training, academic writing, postgraduates, productive vocabulary knowledge

1. Introduction

Postgraduates' ability to communicate effectively in English and excel in academic disciplines relies on academic writing (Al Badi, 2015). However, researchers (Abdulkareem, 2013; Al-Khasawneh, 2010; Al Badi, 2015; Almatarnah et al., 2018) have revealed that academic writing is a difficult skill to master in terms of insufficient vocabulary, weak morphological awareness, complexity of sentences, and synthesis of texts, particularly for second language (henceforth L2) learners. Writing is a challenging cognitive task and mental production that requires L2 learners to be more careful and concentrate on producing a high-quality outcome (Grami, 2010). A writer must choose appropriate words to convey the intended message to produce a text. Choosing appropriate words to construct written sentences requires knowing and understanding those words' exact meanings. Morphology provides information about the structural and semantic properties of words and thus has a crucial role in understanding their meaning and, accordingly, plays a role in choosing the appropriate words needed to generate sentences in writing (Carlisle & Fleming, 2003).

Postgraduate students encounter such a difficulty due to a lack of academic writing experience and insufficient English language proficiency (Al Badi, 2015). Complicated morphological vocabulary is needed (Nagy & Townsend, 2012). At each level of study, students encounter new text, and in more advanced levels, new, more difficult vocabulary is introduced (Northey et al., 2016). More advanced and sophisticated vocabulary is needed to articulate ideas, and for that, students require a deeper knowledge of complex strategy and tool vocabulary. One of these strategies is to recognize word structure patterns. Memorization of individual English words (e.g. Enhance, Enhanced, Enhancing, Enhances, Enhancement, Enhancer, Enhanceive, Enhanceively, and Unenhanced) is unnecessary for students in order to be successful learners (Carlisle & Fleming, 2003). If they can discern patterns among word parts, they are more likely to become successful learners of writing. A writer can convey a text properly to deliver an intended message. This requires proper word selection that builds sentences coherently and meaningfully and is relevant to the content. Morphology provides information about word parts, both in structure and meaning, to assist with word selection.

Therefore, morphology is significant in exploring the meanings that the words have and, consequently, how selecting the pertinent words that need to be used to compose sentences in one's writing (Carlisle, 2016). Consciousness to morphology enables a writer to understand the right shape of a word depending on the required grammatical class and use of a word in a sentence, e.g., the suffix -ly is added to verbs to form adverbs. Morphology, once recognized by students, enables them to vary word forms in their writing (Carlisle, 2016; Green et al., 2003; Nagy et al., 2014).

Morphology awareness could assist writers in reducing lexical errors in their writing (e.g. Asaad & Shabdin, 2020; Ririn, 2010) and in creating complex sentence structures utilizing different word forms. Academic writing is also distinguished by including morphologically complex words (Nagy & Townsend, 2012). Therefore, students need to develop their vocabulary with various levels of complexity

through tools and strategies. One of these tools is the ability to recognize word structure patterns. English language learners do not need to memorize individual words (e.g., *create*, *creation*, *creativity*, *creator*, *creative*, *creativity*, and *recreate*) since they can recognize the patterns of these words.

Awareness of morphology can help a writer realize the correct formation of a word on the basis of its grammatical category and its appropriate usage in a sentence, such as using the suffix *-ly* to be added to adjectives to produce adverbs. When students are aware of morphology, it allows them to make various word forms in their writings (Nagy et al., 2014). Teaching morphology may impact writing skills because it leads to correct word formation and sentences within texts. Readers can understand the author's message when the morphemes of words are structured.

As writers' abilities to identify individual vocabularies and facilitate vocabulary access differ, those with high skills can access vocabularies more quickly than those with low skills (Jung, 2020; McCutchen et al., 1994). According to Chenoweth and Hayes (2001), Texts of higher quality are generated through fluent language generation processes. Altering the internal structure of a word, like turning it into a noun, can enhance writing by creating smoother sentences that are easier to process and demand less cognitive effort (McCutchen, 2000). Using various syntactic patterns is an important quality of high-quality writing (Myhill, 2008). Writing can demonstrate syntactic flexibility through the transformation or modification of a word's form, for example, by transforming the verb *create* into the adjective *creative* (Wolter & Green, 2013), and a good writer is likely to have a high level of syntactic flexibility (McCutchen & Stull, 2015). Thus, writing in English requires knowing the rules of morphology and derivation to manipulate the forms of words and to effectively revise the syntax of sentences (McCutchen & Stull, 2015).

2. Literature Review

2.1 Challenges in Academic Writing

Previous research has revealed that postgraduates faced challenges in their writing concerning limited vocabulary, inability to express their ideas accurately and freely, and making morphological errors. For instance, Al-Khasawneh (2010) investigated academic writing problems among postgraduates studying at a Malaysian University. This study was qualitative, as the researcher used semi-structured interviews to collect the study's data. Ten Arab students were interviewed face-to-face. The study revealed that the postgraduates had problems in academic writing. The major problem was the lack of vocabulary among the postgraduate Arab students. The students also had problems with grammar, spelling, organization of ideas, and referencing.

A study conducted by Abdulkareem (2013) aimed to examine the academic writing challenges faced by postgraduates whose first language was Arabic. The study sampling was taken from the postgraduates at Universiti Teknologi Malaysia (UTM). Eighty five postgraduate students were determined by using the snowballing technique; 80 students were chosen to respond to a 17-question questionnaire given to them to show their perspectives towards the causes of the challenges faced in academic writing, and five students were asked to write a writing task to find out what kind of mistakes the five students made in academic writing. The data collected from both instruments (questionnaire and writing task) were analyzed using the SPSS software. The study revealed that postgraduates had challenges with vocabulary, expressing ideas, and sentence structure in academic writing. The researcher suggested that other researchers investigate the causes of academic writing problems.

Ashrafzadeh and Nimehchisalem (2015) investigated the difficulties that tertiary students in Malaysia face in writing summaries for business students. Sixty nine tertiary students of business were the sample of this study. They were asked to summarize a business report from the internet or a newspaper. The *ESL Composition Profile* was used to score the samples. Two raters were scoring the written summaries. The study's results revealed that the students had an inadequate vocabulary, as indicated in the scores obtained. The researcher recommended establishing urgent remedial courses to assist them improve vocabulary and organization in ESL writing.

Almatarnah et al. (2018) investigated Jordanian postgraduates' academic writing problems at a Malaysian University. The instruments for this study included 90 of 182 online questionnaires received, in addition to interviewing 17 respondents. The findings of this study showed many academic writing problems among Jordanian postgraduates, such as limited vocabulary, many errors in spelling and grammar, and difficulties in organizing sentences and expressing ideas. Rababah (2003) also indicated that students had problems using English for communication and lacked the vocabulary necessary for engaging in authentic communication, such as writing. Consequently, the postgraduates could not express their ideas accurately or freely because of the inadequacy of their vocabulary.

2.2 Significance of Morphological Awareness to Writing

Studies have shown that MA encompasses various cognitive and linguistic capacities, including recognition, online processing, segmentation, structural sensitivity, and explicit knowledge. One general cognitive processing ability is MA, which involves abstracting lexicosemantic information from words with complicated morphology. It is noteworthy that morphological decomposition emphasizes the abstraction of word form and partial meaning in implicit processing and explicit awareness modules (Zhang, 2021; Zhang & Lin, 2021). Deacon and Kirby (2004) and Nagy et al. (2006) asserted that morpheme form sensitivity helped students spell and decode English words by enabling them to act according to predetermined patterns.

The capacity to formulate intricate words and an enhanced awareness of their morphological and orthographic representations are significant indicators of advancement in writing. Writers must utilize word-level and text-level inference to infer unfamiliar meanings to select appropriate vocabulary in semantic and textual contexts (Zhang, 2021). The capacity to spell or dictate is a crucial foundational

writing skill that greatly influences learners' effective generation of written language. Morphological sensitivity in print enhances students' comprehension of how orthography reflects words with intricate morphological traits and word formation or deconstruction processes. MA facilitates students in generating precise grapho-morphological segments within complex words.

Moreover, MA enhances the cultivation of sophisticated text generation abilities, encompassing essay and passage composition, while also supporting the production of phonemes and graphemes (Berninger et al., 2011; Guan et al., 2014; Guan et al., 2019; McCutchen et al., 2014). MA in written composition can be beneficial, as it can promote the development of writing skills and vocabulary. Proficiency in the application of morphological transformations is essential for academic literacy and language abilities, as the complexity of word structure and the use of nominalization are distinguishing features of academic genres (Lawrence et al., 2010; Nagy & Townsend, 2012; Zhang, 2021).

2.3 Morphological Awareness Training and Vocabulary Knowledge

Previous research has also shown the impact of MA training on receptive vocabulary knowledge (e.g. Alsaeedi, 2017; Lin, 2017; Varatharajoo, 2016). Alsaeedi (2017) conducted an experimental study for six weeks, examining the influence of training in morphology on Saudi learners' morphological and receptive vocabulary knowledge. The findings revealed that the training enhanced the students' morphological and receptive vocabulary knowledge. A study conducted by Lin (2017) included six sessions in which six affixes were instructed and taught. The study investigated the impact of the training on the learners' morphological knowledge and vocabulary development. Two groups of Chinese seventh-grade students (20 students in each group) were involved in six-affixes training. Morphological identification test, vocabulary translation test, and questionnaire were used. The study concluded that affixes training significantly influenced receptive affixes learning and vocabulary growth and that learners had a positive perception of the training.

Varatharajoo (2016) examined the impact of three MA dimensions (inflectional, derivational, and compounding) on secondary school students' receptive vocabulary development. She aimed to examine the influence of the instructions on the three dimensions of MA in improving and developing learners' vocabulary. The researcher hypothesized that MA instructions would significantly improve the learners' receptive vocabulary development. The study's results showed the significant influence of the MA instructions on the learners' knowledge in the three aspects. It was also found that the inflectional morpheme instruction significantly affected learners' MA. Additionally, the study showed that the learners' inflections had the highest influence on their receptive vocabulary. The researcher recommended including the morphemic analysis instructional strategy in vocabulary lessons to facilitate the receptive vocabulary development among low-proficiency learners.

A study conducted by Lin (2017) included six MA instruction sessions in which six affixes were instructed and taught. The study examined the influence of the six-affixes instructions on the learners' MA and receptive vocabulary development. Two groups of Chinese seventh-grade students (20 students in each group) were involved in six-affixes training. The morphological identification test, vocabulary translation test, and questionnaire were used in the study. The outcomes showed a significant effect of affixes training on the receptive learning of affixes and vocabulary growth, and showed the positive perception of the learners towards the training. Akbulut (2017) investigated the influence of morphological instructions on ESL learners' MA tasks. It also aimed to explore the connection of MA with the learners' receptive vocabulary size. The study involved 52 undergraduate students in experimental and control groups. The test included only three vocabulary frequency levels: 2k, 3k, and 5k. Each frequency level included ten items. The learners' MA was measured by using two tasks. By writing *Yes* or *No*, the learners were required to acknowledge whether they understood the meaning of the words given to them. The second task was to identify the parts of the words given. The findings showed a significant difference in learners' receptive vocabulary size. Additionally, it was found that MA was correlated with receptive vocabulary size.

2.4 Effect of Morphological Awareness Training on Other Language Aspects

Several studies have been conducted to determine the influence of MA instructions on reading comprehension or word reading (e.g. Apel & Diehm, 2014; D'áz Contreras, 2018; Li & Chen, 2016). D'áz Contreras (2018) tested the influence of training on learners' reading comprehension and receptive vocabulary acquisition. After administering the pretests of vocabulary and reading comprehension, the researcher trained the learners about morphology in four sessions (each session lasted two hours). The study concluded that there was an improvement in the learners' vocabulary acquisition and reading comprehension. Apel and Diehm (2014) examined the influence of instructions in morphology on morphological knowledge and reading skills. One hundred fifty-one first and second graders were involved in the MA experiment. The findings revealed the effectiveness of instructions in morphology in improving the learners' morphological skills. Next, the influence of morphological analysis instructions on enhancing adolescents' morphological analysis ability was investigated by Crosson et al. (2018). The researchers anticipated that instructions in analyzing words morphologically by recognizing the roots of words and strengthening the words' semantic representation would enhance the learners' morphological analysis ability. The study involved eighty four students in two groups. Participants in both groups received morphological analysis instruction; the experimental group received instructions with roots, while the control group received instructions without them. The study's results showed the significant impact of the instructions on understanding the meaning of unknown words.

Li and Chen (2016) conducted a study to determine the influence of phonological and morphological knowledge on word reading among Taiwanese 5th and 6th graders by involving 60 students in an experiment in which 20 and 19 participants were assigned to be trained about morphological knowledge and phonological awareness, respectively. The students underwent an experiment in which 20 students were assigned to be involved in MA training and 19 students in phonological awareness training, while 20 students were studying the

regular study curriculum in a control group. The training included 12 sessions (40 minutes for each session). The results showed an influence of the training programs; however, the phonological awareness training was more effective than the MA training for Taiwanese children.

Other research has focused on the effect of instructions in morphology on learners' morphological knowledge (e.g. Amirjalili & Jabbari, 2018; Friedline, 2011). For example, a study by Friedline (2011) aimed to investigate the participants' derivational morphological knowledge and compare the derivational morphological knowledge of the two study groups. It also aimed to look into the effect of derivational morphological instructions on students' morphological knowledge. It finally examined the influence of the first language on the learners' morphological knowledge. Eighty one students participated in Friedline's (2011) research (23 native speakers of English and 58 second language students with different English language proficiency who took an intensive English course during the spring of 2010). The study revealed the existence of poor knowledge of derivational morphology among the L2 participants.

Amirjalili and Jabbari (2018) also investigated the effect of morphological training on the three dimensions of MA (relational, syntactic, and distributional). It also aimed to examine its influence on intermediate students' reading comprehension. The results revealed the outperformance of the experimental groups over the control group in all MA tasks, testing the learners' reading comprehension and the three dimensions of MA. Crosson et al. (2018) explored the influence of morphological analysis instruction on enhancing EL adolescents' morphological analysis ability. The researchers anticipated that instructions in analyzing words morphologically by recognizing the roots of words and strengthening the words' semantic representation would enhance the learners' morphological analysis ability. The study involved eighty four students in two groups. Participants in both groups received morphological analysis instruction; the experimental group received instructions with roots, while the conditional group received instructions without roots. The findings showed the significant effect of morphological analysis instructions on understanding the meaning of unknown words. Apel and Diehm (2014) examined the influence of MA training on MA and reading skills among kindergarten students in the first and second grades. 151 children were involved in the intervention. The results confirmed the hypothesis partially and were supported by the findings of Bowers et al. (2010) and Apel et al. (2013). The results showed the effectiveness of the training in improving the learners' MA skills. Table 1 summarizes previous MA training with details, such as the focus of the studies, design, the time spent in teaching, and the type of learners.

The focus of Table 1 is to synthesize previous empirical studies on morphological instruction. For each empirical study on morphological instruction, the authors analyzed the study's particular research framework, focus of instruction, characteristics of the learners, and duration of instruction. The table facilitates integration of the literature across multiple dimensions and the integration of literature on experimental and quasi-experimental studies, different levels of learners, different types of instruction (integrated vs. isolated), different levels of education, and others, which, in turn, track dominant patterns of research and identify research areas that are underrepresented. Most importantly, this comparative overview serves not only as a summary but also as a tool to analyze how studies have defined the instruction of morphology, and which outcomes of learning have been given attention.

Table 1. Literature of Morphological Awareness Training

No	Reference	Design	Sessions Minutes	(Language	NO ('Treat)	Grade	Focus	Type Learner	Integrated Isolated	Delivery
1	Apel and Dieh (2014)	Q	32(800)	L1	151 (75)	1 st , 2 nd KG	MA + RC	LLS	Iso	Rs
2	Baumann et al. (2002)	E	33 (1125)	L1	157 (78)	5 th	RC	TpL	Int	Tr
3	Bowers and Kirby (2010)	Q	20 (1000)	L1	81 (38)	4 th 5 th	M+ S	TpL	Iso	Rs
4	Bowers (2013)	Q	20 (50)	L1	81 (38)	4 th + 5 th	M	TpL	Iso	Rs
5	Carlisle (2016)	E	10 (500)	L1	27 (13)	2 nd 3 rd	S	LLS	Iso	Rs
6	D áz Contreras (2018)	Q	4 (480)	EFL	(35)	IS	RC	TpL	Iso	Rs
7	Kirk and Gillon (2009)	E	16-22 (870)	L1	16 (8)	3 rd + 5 th	MA+S	PS	Int	Rs
8	Lesaux et al. (2010)	Q	18 weeks	L1+L2	476(296)	6 th	RC	LML+NL	Int	Tr
9	Kieffer and Lesaux(2012)	Q	18 weeks	L1+L2	482(299)	6 th	M	LML+NL	Iso	Tr
10	Li and Chen (2016)	Q	12 (480)	EFL	60 (39)	5 th + 6 th	VR	TpL	Int	Tr
11	Varatharajoo (2016)	Q	7(280)	L2	140(105)	SS	M	TpL	Iso	Tr
12	Yucel-Koc, M. (2015)	Q	16 (600)	ESL	35 (17)	PrP	M+ RC	TpL	Iso	Rs

NOTE: VR= Vocabulary Reading, S = Spelling; Rs = Researcher; RC= Reading Comprehension; E =Experimental; Q = Quasi-Experimental; Tr= Teacher; TpL = Typical Learners; LML = Language Minority Learners; NL = Native Learners ; PS = Poor Speller; Int= Integrated; Iso = Isolated; M= Morphology; SS= Secondary School; LLS= Low Literacy Students; L1= First Language; L2= Second Language; EFL= English as a Foreign Language; KG= Kindergarten; IS= Intermediate Students; PrP= Preparatory Student

As summarised in Table 1, a number of the studies have the same focus. There are a number of studies focused on morphology, and they also mentioned that the focus of instruction for morphology was to enhance vocabulary, reading comprehension, or spelling. The studies

also have a focus on different learners such as typical learners, learners with a different primary or secondary language, and learners that are in kindergarten, preparatory, or secondary education. The duration of instruction is also mentioned in the studies, and they mention that it is relatively short.

Notwithstanding this investigative multiplicity, the table also points out some salient omissions. Most importantly, productive outcomes, especially academic writing and the employment of productive lexicon, have seldom been researched as dependent variables. Also, there is a paucity of research on the intermediate or higher levels of learners, students with low literacy, or the transfer of morphological knowledge to productive writing discourse. These omissions indicate that although the teaching of morphology is firmly entrenched in literature as a vehicle for increasing students' receptive skills, its contribution to productive academic skills, more particularly writing, has not been thoroughly researched. The proposed research attempts to address this gap by considering the association between knowledge of morphology and the achievement of writing in academic discourse.

Two research questions are aimed at being examined in the current study in light of the literature review and address research gaps:

1. What is the effect of morphological awareness training on L2 postgraduates' writing performance?
2. What is the effect of morphological awareness training on L2 postgraduates' productive vocabulary knowledge?

3. Materials and Methods

3.1 Participants

The current study employed a cluster sampling design. The clusters of the current study were selected and assigned. The individuals of a cluster should be as heterogeneous as possible (i.e. individuals of different ethnicities, languages, sexes, cultural backgrounds, or ages) (Wiersma & Jur, 2005); however, the clusters have to be homogeneous (i.e. similar in characteristics of their individuals) (Crano & Brewer, 2008; Crano et al., 2014). Therefore, the individuals in each cluster (group) of the study were heterogeneous, including native language, gender, age, and level of study.

Regarding the homogeneity of the two clusters, based on the demographic variables shown in Table 2, there are no significant differences between the two groups (native language, gender, age, and level of study). A T-test was conducted to assess if there were any significant differences between the two groups. The significance level for each variable was much larger than .05, which indicated that all the demographic variables were not different between the two groups.

Table 2. Summary of the Respondents' Distribution Based on their Demographic Information (N=15 in Each Group)

Category		Experimental Group		Control Group	
		N	Percentage	N	Percentage
Native Language	Arabic	7	46.7	9	60
	Indonesian	3	20	2	13.3
	Chinese	3	20	3	20
	Somali	2	13.3	1	6.7
Gender	Male	7	46.7	10	66.7
	Female	8	53.3	5	33.3
Age	20-30	9	60	10	66.7
	31-35	3	20	2	13.3
	36 and Above	3	20	3	20
Level of Study	PhD	4	26.7	7	46.7
	Master	11	73.3	8	53.3

According to Creswell (2012), 15 participants are sufficient to be included in experimental research. Therefore, two groups (experimental and control) of L2 postgraduates enrolling in an Intensive English Course at a Malaysian university were selected and assigned randomly to the groups of the experiment. The experiment involved all the L2 postgraduates enrolled in these two groups. Fifteen participants were involved in each group (30 participants in both groups).

3.2 Assessments and Measures

3.2.1 Vocabulary Test

An adapted version of Laufer and Nation (1995)'s vocabulary test was given to the respondents of the current study. The test evaluates the productive vocabulary at five different frequency levels, which are 2k, 3k, 5k, University Word List, and 10k. However, the pilot study indicated that a majority of the items at the highest frequency level, 10k, were answered incorrectly or not answered at all. As a result, that frequency level was excluded, and the other four were the ones that were tested (2k, 3k, 5k, and University Word List). The test includes 20 items, five items for each level. In the present study, the L2 postgraduates were asked to recall and produce specific words as the students were provided with a cue to those specific words by giving the initial letters, taking advantage of the context of sentences in the test, so that the students would not get confused and produce the required words in the missing blanks.

3.2.2 Writing Test

The participants were tasked with composing a piece on one of the two given academic writing subjects related to cause and effect: "In some countries, the average weight of people is increasing, and their levels of health and fitness are decreasing. What do you think are the causes

of these problems and what measures could be taken to solve them?” and “In many countries, the amount of crime is increasing. What do you think are the causes of crime? How can we deal with those causes?”

The assessment was carried out by two evaluators who each have over three years of experience teaching writing at the university level. The *ESL Composition Profile rubric* was used in the evaluation. The *ESL Composition Profile* is an embedded, comprehensive, context-independent measure. Since it was developed by Jacobs (1981), the *ESL Composition Profile* has been very popular and widely used in the assessment of compositions (Gonzalez, 2013; Llach, 2007; Nordin et al., 2018); in many previous studies, such as Ashrafzadeh and Nimehchisalem (2015), Gonzalez (2013), Linuwih (2013), Llach (2011), Mukundan et al. (2013), and Putra (2009).

3.3 Data Collection

A letter of permission to conduct the training was submitted to the college’s administrators for approval. After receiving the approval for conducting the training, the training started, and the experimental group received eleven training sessions in morphology to raise the experimental group’s morphological awareness and examine the effect of training on L2 postgraduates’ writing and productive vocabulary. The control group received the writing instructions from the subject’s regular instructor. The Intensive English Course involved teaching L2 postgraduates’ language skills (Writing, Reading, Listening, Grammar, and Speaking) in separate sessions. The experimental group received training in MA in the writing skill class time only, as the researcher was interested in investigating the effect of the training on writing.

There were two instructors scheduled for the intensive English course. The instructors taught the L2 postgraduates about the kinds of academic writing and the process of writing paragraphs by following a syllabus called “Great Writing: From Great Paragraphs to Great Essays” (third edition). The two groups were taught the same thing during the intensive course, except that the researcher was allowed to teach the experimental group for the last 40 minutes of each class time. The experimental and control groups took a pretest in the first week of the training to identify any differences between them. Training commenced in the subsequent week, during which L2 postgraduate students in the experimental group received instruction on morphology, covering its rules and meanings. They learned to identify word morphemes, understand affixes, analyze morphological words, combine morphemes, and structure words with an awareness of morphemes and the associated rules. The researcher was allowed to conduct the training for 40 minutes per session. The training involved eleven training sessions. The posttests were delivered immediately the week after conducting the training sessions. The posttests were administered on two subsequent days. The academic writing posttest was administered in one day, and the posttest of the Vocabulary Knowledge Test was administered the next day.

The researcher taught the experimental group about morphology, while the control group took regular writing classes in the intensive English course by another instructor. The Pretests were conducted to assess the students’ initial vocabulary knowledge and academic writing level before the training. The students were taking posttests to examine the effect of the training on the students’ productive vocabulary knowledge and academic writing at the end of the training. The experiment participants sat for the Vocabulary Test and the Academic Writing Test during the pretest and posttest sessions. Each test was administered on a separate day to minimize the groups’ anxiety and fatigue and retrieve their true feedback. The tests were administered in the same intensive English course classroom and monitored by the researcher. The time limit for each test was 45 minutes, which was considered suitable by the language experts and in line with the time given in previous research (Aini, 2016; Al Farsi, 2008; Friedline, 2011).

Each training session began with an explanation of the training’s purpose and significance, aimed at motivating participants to engage actively and grasp the rationale behind the training. The session always opened with the example presented in Figure 1. After reiterating the training’s goals, the researcher introduced the meaning and role of certain affixes, aligning the lesson with its title. Students were provided with examples and encouraged to contribute more if they were familiar. Following this, they were given a text to analyze and identify words containing roots and affixes.

Morphology

Morphology: Making words from word parts.

Word: govern (verb)

Meaning: to control and direct the public business of a country, city, or group of people

Examples:

govern: The president governs the country.

Figure 1. Introduction to the Training Sessions

There were seven levels of affixes determined by Bauer and Nation (1993) (see Appendix B). Three levels of affixes were beyond the scope of this current study. According to the classification of Bauer and Nation (1993), the first level was “Each form is a different word”.

This level was excluded from the current study as it went against the definition of vocabulary in the current study, as vocabulary refers to a word form including its derived forms (Laufer & Nation, 1995). Therefore, the word and its derived forms are counted as one word, which was beyond the scope of the present study. The second level of affixes includes all inflectional suffixes, which were beyond the scope of the current study because it focused only on derivational affixes. The seventh level was also excluded because of the difficulty of its affixes as it includes classical roots and affixes. The current study included the levels of affixes from Level 3 to Level 6

The training texts were taken from Friedline's (2011) study and the intensive English course reading textbook. Then, the participants were given exercises of filling in blanks and writing the right form of words to complete sentences. The researcher ended the lessons by asking the students to write a short essay or story using the affixes taught in the training. The instructional procedures used in the training of the current study were in line with the procedures followed by Varatharajoo (2016), in which the activities were conducted in five stages: preparation, presentation, practice, evaluation, and expansion (as shown in Appendix A). In the preparation stage, the researcher prepared the students for every session by reminding them about the goal of the training and reviewing the students' previous knowledge of affixes. The presentation was the second stage in which the researcher presented the affixes of every session, including examples for each affix, using either the PowerPoint slides or the whiteboard. Thirdly, the researcher provided opportunities for students to practice the new affixes taught in the session by making the students work in small groups, pairs, or individually.

Meanwhile, the researcher circulated the classroom, checking on the students during the activities and providing assistance whenever requested. The fourth stage was evaluation, in which students evaluate themselves and how well they did the activities. Finally, the researcher provided opportunities for the students to practice outside the classroom by providing more tasks to be done as homework assignments.

4. Results

4.1 Findings of Research Question One

This research question investigated whether MA training affected L2 postgraduate students' academic writing. The scores for academic writing among L2 postgraduate students on the pretest and posttest (based on both IELTS and ESL Composition Profile scoring criteria) were compared. To find out whether MA training affected L2 postgraduate students' academic writing, an independent sample t-test was conducted to ensure that the students' academic writing performance in the pretest for the two groups was not significantly different.

Table 3 shows the statistical results of the academic writing pretest based on the IELTS (International English Language Testing System) and the ESL Composition Profile. It can be seen from Table 3 that the groups of the study were almost similar and not significantly different from each other ($P = 0.597$ and 0.645 in IELTS and ESL Composition Profile, respectively). The P value was much larger than $.05$ in both scales, which shows the gratitude of similarity between the two groups of the MA experiment. The similarity between the groups was also seen in the mean values of the experimental and control groups.

Table 3. Statistical results

Test	Group	Mean	SD	Sig(2-tailed)
IELTS	Experimental Group	4.21	1.369	.597
	Control Group	4.50	1.454	.597
ESL	Experimental Group	53.86	12.673	.645
	Control Group	51.64	12.488	.645

Two raters were involved in evaluating the L2 postgraduate students' academic writing performance. The raters rated the essays analytically by following the rating scale (ESL Composition Profile), which included five subscales: content, language use, vocabulary, organization, and mechanics. Each subscale carried a different weight, ranging from content with the highest mark at 30% to mechanics with only 5%. Language use, vocabulary, and organization carried a moderate weight (25%, 20%, and 20%, respectively). Additionally, the raters rated the essays holistically by following the International English Language Testing System (IELTS) rating system. After comparing the two groups of the current study in the pretest of IELTS and ESL Composition Profile, another comparison was made in the subscales of the ESL Composition Profile. Table 4 shows the results of the independent sample t-test for these subscales.

Both the ESL Writing Test and the IELTS Writing Test underwent inter-rater reliability analyses. Two raters were trained and independently scored all the essays, following the standardized rating criteria. Rater reliability was measured with the intraclass correlation coefficient (ICC) using a two-way random effects model with absolute agreement. The results were excellent for the ESL writing scores ($ICC = .84$) and for the IELTS writing scores were good to excellent ($ICC = .79$) The results show a significant amount of consistency between the scores given by the raters and support the use of the writing assessment scores for the analyses to follow.

Table 4 illustrates the average scores, standard deviations, and significance levels for the subscales of the ESL Composition Profile among L2 postgraduate students in the academic writing pretest. The findings indicate that the two experimental groups were nearly identical, as the significance level ($P > .05$) suggests no statistically significant difference between them. This similarity is also reflected in the average scores across all subscales of the ESL Composition Profile. A paired-samples t-test was employed to compare the academic writing outcomes between the pretest and posttest for both the experimental and control groups, aiming to determine whether there were any significant differences following the MA training received by the experimental group.

Table 4. Independent Sample T-Test

Group	Variable	Mean	SD	Sig. (2-tailed)
E	Content	17.79	3.886	0.341
C		16.50	3.082	
E	Organization	10.79	2.833	0.844
C		10.57	2.875	
E	Language Use	12.50	3.632	0.809
C		12.14	4.092	
E	Vocabulary	9.71	2.054	0.872
C		9.57	2.563	
E	Mechanics	3.07	0.917	0.530
C		2.86	0.864	

NOTE: E= Experimental, C= Control

Table 5 displays the findings from the paired-samples t-test for the academic writing scales, specifically the IELTS and ESL Composition Profile, including its subscales. The P and t values indicate a significant difference in the experimental group's performance from the pretest to the posttest across all writing scales and subscales ($P = 0.000$), except for the mechanics' subscale, which did not show a statistically significant difference ($P = 0.068$). However, the significance level for mechanics was close to .05. Additionally, an independent sample t-test was performed to analyze only the posttest results, reinforcing the outcomes of the paired sample t-test. Table 6 demonstrated a significant difference in the academic writing performance of L2 postgraduate students in the posttest and within the subscales of the ESL Composition Profile.

Table 5. Paired Sample T-Test for Academic Writing Tests and Subscales of ESL Composition Profile

Group	Pair (Posttest – Pretest)	t value	Sig. (2-tailed)
Experimental	IELTS	6.062	0.000
	ESL C.P	9.542	0.000
	Content	5.734	0.000
	Organization	7.878	0.000
	Language Use	4.900	0.000
	Vocabulary	8.105	0.000
Control	Mechanics	2.007	0.068
	IELTS	-0.898	0.387
	ESL C.P	-0.291	0.776
	Content	1.000	0.337
	Organization	-1.075	0.303
	Language Use	-0.674	0.513
	Vocabulary	-0.617	0.549
	Mechanics	0.693	0.502

Note: ESL C.P= ESL Composition Profile

Table 6. Independent Sample T-Test for Academic Writing Posttests and Subscales of ESL Composition Profile

Group	Variable	Mean	SD	Sig. (2-tailed)
E	IELTS	5.69	1.251	0.014
C		4.23	1.536	
E	ESL C.P	66.85	11.957	0.003
C		51.15	12.185	
E	Content	20.38	3.686	0.016
C		16.92	3.068	
E	Organization	13.00	2.739	0.015
C		10.15	2.824	
E	Language Use	16.46	3.230	0.002
C		11.62	4.011	
E	Vocabulary	13.46	2.787	0.001
C		9.46	2.436	
E	Mechanics	3.54	1.050	0.176
C		3.00	0.913	

Note: ESL C.P= ESL Composition Profile, E= Experimental, C= Control

The Effect Size of the academic writing posttest was calculated for the IELTS and ESL Composition Profile. The mean and standard deviation values of the experimental groups based on the IELTS test were used first in Cohen's d formula as the following:

$$\text{Cohen's } d = (M1 - M2) / \sqrt{[(sd1^2 + sd2^2) / 2]}$$

$$= (5.69-4.23) / \sqrt{((1.251)^2 + (1.536)^2) / 2}$$

$$= 1.042286036172093 \text{ integrated into } 1.04$$

The effect size of the academic writing posttest based on the ESL Composition Profile was calculated as the following;

$$\text{Cohen's } d = (M1 - M2) / \sqrt{[(sd1^2 + sd2^2) / 2]}$$

$$= (66.85-51.15) / \sqrt{[(11.957)^2 + (12.185)^2] / 2}$$

$$= 1.3005798934623887 \text{ integrated into } 1.3$$

The values of Cohen's *d* for both IELTS and ESL Composition Profile show that the morphological awareness training had a strong effect on the academic writing of the L2 postgraduate students in the current study.

4.2 Findings of Research Question Two

The impact of MA training on the productive vocabulary knowledge of L2 postgraduates was evaluated in this current research. The assessment of vocabulary knowledge among L2 postgraduates started with testing the degree of differences between the two groups of the MA experiment, whether they were similar or different regarding the vocabulary knowledge in the pretests. Table 7 presents vocabulary knowledge in the pretest. It also shows that the two groups in the pretest were approximately similar, and the *P*-value was much larger than .05 (*P* = .489).

Table 7. Independent Sample T-Test Between the Two Groups of the Experiment

Variable	Test	Levene's Test for Equality of Variances		Sig. (2-tailed)
		F	Sig.	
Vocabulary Knowledge	Pretest	2.129	.157	.489

Therefore, the level of vocabulary knowledge in both groups was not different before carrying out the MA training. After the experimental group received MA training, the results of both groups were examined and analyzed to evaluate the difference in the students' performance in vocabulary knowledge. A paired sample t-test was carried out to compare the results of vocabulary knowledge in the pretests and posttests.

Table 8. Paired Sample T-Test

Group	Pair (Posttest-Pretest)	t value	Sig. (2-tailed)
Experimental	Vocabulary Knowledge	4.619	.001
Control		-0.574	.576

Table 8 shows a significant difference in the performance of L2 postgraduates concerning productive vocabulary knowledge in the experimental group (*P* = .001 < .05). In contrast, the control group's performance was not significantly different (*P* = .576 > .05). The result of the effect size test (Cohen's *d* = 1.413) shows that the effect of the training on the students' productive vocabulary knowledge was large.

The effect of morphological awareness on productive vocabulary knowledge with respect to its frequency levels in the independent productive vocabulary test and in the free active essay writing was examined in the current study. A paired sample t-test was conducted to examine at which frequency level there was a significant difference in the performance of L2 postgraduate students in the productive vocabulary knowledge.

Table 9 reveals that there was a significant difference in the productive vocabulary levels test in terms of its frequency levels produced by the L2 postgraduate students in the independent productive vocabulary test (*P* < .05). Regarding the frequency levels of vocabulary produced in free academic writing, there was a significant difference in the 1000 words and academic words levels, but the 2000 words level was not significantly different.

Table 9. Paired Sample T-Test for the Frequency Levels of Productive Vocabulary Knowledge

Group	Pair (Posttest-Pretest)	t value	Sig. (2-tailed)
Experimental	OPVLT	2.889	.014
	SPVLT	5.196	.000
	TPVLT	2.993	.011
	APVLT	2.993	.011
	OW	4.055	.002
	SW	0.642	.533
	AW	3.618	.004
Control	OPVLT	-0.822	.427
	SPVLT	-0.714	.489
	TPVLT	0.322	.753
	UPVLT	0.000	1.000
	OW	0.635	.538
	SW	1.141	.276

	AW	0.983	.345
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Note: OPVLT= 1000 Productive Vocabulary Levels Test; SPVLT= 2000 Productive Vocabulary Levels Test; TPVLT= 3000 Productive Vocabulary Levels Test; UPVLT= University Productive Vocabulary Levels Test; OW= 1000 Words in Free Writing; SW= 2000 Words in Free Writing; AW= Academic Words in Free Writing

5. Discussion

5.1 Discussion of Research Question One

This research question aimed to investigate the impact of training on academic writing among L2 postgraduates. The test results suggested that the training was beneficial to L2 postgraduates in enhancing their writing. There is considerable evidence in the literature about the impact of training on improving reading comprehension (Amirjalili & Jabbari, 2018; D áz Contreras, 2018; Lesaux et al., 2010; Yucel-Koc, 2015), word reading (Li & Chen, 2016), vocabulary knowledge (Akbulut, 2017; Alsaedi, 2017; Lin, 2017), and spelling (Carlisle, 2016; Griva & Anastasiou, 2009). However, there is a lack of studies focusing on the impact of MA training on L2 postgraduates' academic writing.

The findings of the present study were hypothesized. Improving MA could assist writers in managing grammatical choices by helping them change fluently from verbs into nouns or from nouns into verbs by manipulating suffixes. The ability to manipulate words already in their lexical knowledge by changing suffixes would help students express their intended meaning more concisely and precisely. A good understanding of morphemes could help bridge the word and sentence-level syntax by manipulating words, which could later assist writers in generating texts efficiently, fulfilling larger rhetorical goals, and sustaining syntactic accuracy during writing by reducing working memory loads to achieve those goals.

The findings were hypothesized on the basis of the findings of previous studies, which focused on the impact of training on other English skills, like reading comprehension, word reading, and spelling. The results of studies conducted by Amirjalili and Jabbari (2018) and D áz Contreras (2018) revealed that the experimental group significantly outperformed the control group on the reading comprehension test, which indicated the influence of the training on the learners' performance. Similar results were found in previous studies on reading comprehension (e.g. Apel & Diehm, 2014; Baumann et al., 2002; Lesaux et al., 2010), word reading (e.g. Li & Chen, 2016), and spelling (e.g. Carlisle, 2016; Griva & Anastasiou, 2009).

The results revealed that the experimental group performed significantly better in the posttest than in the academic writing pretest (including the components of the ESL composition profile). One exception was found to be not significantly different in one of the ESL composition profile components, Mechanics. A previous study also revealed this result (Binti Shukor & Noordin, 2014). The researchers found no statistically significant difference in students' performance in Mechanics between the posttest and the pretest. The same result was found in a study conducted by Nik et al. (2010). They aimed to compare two groups (Diploma and Matriculation students) in terms of their writing performance. The ESL composition profile was used to assess the students' performance. It was found that the score of Mechanics was not different between the two groups, and Mechanics did not contribute to students' writing performance. The researchers attributed the reason for the non-significance of the Mechanics result by stating "Mechanics do not make a great difference on writing performance because it only includes capitalization and writing conventions so that the writing will look the way formal writing is expected to look."

The lexical quality hypothesis may provide an interpretation of the findings reported in this research question. It was hypothesized that teaching L2 postgraduates about morphology in the training would be beneficial to enhancing the quality of their vocabulary knowledge and academic writing. Being aware of morphology could assist L2 postgraduates in creating various sentence forms (Nagy et al., 2014). Instruction in morphology may effectively enhance students' lexical quality, facilitate word formation, and provide vocabulary options and cognitive resources directed toward higher writing procedures, such as planning and reviewing.

5.2 Discussion of Research Question Two

This study explored how MA training influenced vocabulary knowledge among L2 postgraduate students. Table 6 shows a notable statistical difference in vocabulary scores between the posttests and pretests for these students. The findings indicate that MA training contributed positively to improving their vocabulary knowledge. Numerous studies have also highlighted the positive effects of MA training on vocabulary development (Akbulut, 2017; Alsaedi, 2017; Bowers & Kirby, 2010; Crosson et al., 2018; Ferguson, 2006; Lin, 2017). Previous research has primarily investigated the effects of morphological awareness (MA) training on learners' receptive vocabulary. For instance, Akbulut (2017) conducted a quasi-experimental study to explore how MA training influenced participants' receptive vocabulary breadth, finding that the training helped expand learners' vocabulary. Likewise, Alsaedi (2017) demonstrated that teaching MA positively impacted both learners' receptive vocabulary and their understanding of morphological structures. Furthermore, the results indicated that the training significantly impacted the participants' performance. The study suggested that teaching morphology significantly increased the students' morphological knowledge and receptive vocabulary knowledge.

Craik and Lockhart's (1972) Depth of Processing Theory supported the present study's findings. The theory postulates that when students exert more cognitive energy while reflecting on and manipulating a word, the ability of students to remember that word will increase, and they will be able to use it later. The ability of students to retain a word and use it productively depends on the extent of analysis, enrichment, and elaboration of the new information about the word. The lexical quality hypothesis can also interpret the findings (Perfetti, 2007). The MA training might have helped L2 postgraduates strengthen their lexical representations, thereby increasing their vocabulary retrieval

during writing.

The paired sample t-test showed also that the performance of the experimental group in the 1000 words level and academic words level in the academic writing posttest was significantly different than the performance of the pretest. However, the results showed that the performance of the experimental group at the 2000-words level was not significantly different. A similar result was found in a previous study conducted by Karakoç and Köse (2017), who found that the respondents' productive vocabulary knowledge at the 2000-word level was low and not significant compared to their receptive vocabulary knowledge. This could lead to one possible reason for the finding of this research question, and that was the difficulty of producing words of low frequency that are not frequently used, and the learners might choose to produce words from the 1000-word level to avoid making mistakes. According to Zhong (2011), "the ESL/ EFL learners, though they have larger receptive vocabulary size, still relied heavily on the high frequency words in their productive (writing) use" (p 120). Djiwandono (2016) compared essays written by lecturers and students, and found that there was no significant difference at the 2000-word level between the essays written by both groups.

5.3 Theoretical Implications

The results build upon the theories surrounding morphological awareness by showing its importance beyond just the receptive language components to also incorporate productive academic writing in the ESL context. This affirms theories of language development that incorporate the seamless integration of both form and meaning in a variety of language applications, and that the morphological knowledge serves as an important transferable element in the construction of academic language. The results, thus, reposition the theories on morphological awareness to be of central importance to advanced academic literacy and not merely a by-product of the earlier stages of vocabulary development or reading. Thus, building upon the theories surrounding advanced academic literacy, these results showcase morphological awareness not as an isolated skill but as an integral part of advanced literary competency. Practical Implications for ESL Instruction

5.4 Practical Implications for ESL Instruction

The results offer targeted implications for key educational stakeholders. ESL instructors are encouraged to incorporate explicit morphology-focused instruction that links word formation to academic writing tasks, rather than treating vocabulary as an isolated skill. Curriculum designers should integrate morphological awareness objectives across reading and writing components to support productive vocabulary use. Teacher educators and professional development providers may use these findings to train teachers in strategies that connect morphology to discipline-specific academic language. Finally, policy makers and program coordinators should consider allocating instructional time and assessment emphasis to morphology-based instruction as a means of strengthening ESL learners' academic writing outcomes.

6. Conclusion

This research makes inferences and provides new insights into the benefit and impact of MA training on overall writing performance and productive vocabulary knowledge among L2 postgraduates. The training introduced in this current study was specifically designed for the ESL context for postgraduates by employing a systematic method of teaching affixes by topics and using learning tools such as the English Intensive Course textbooks. The study also provided a new perspective on MA training by teaching morphemes and using them productively in the writing context. The instructional content of the training was suitable for L2 postgraduates to develop their vocabulary and academic writing by using the different forms of affixes in writing. Carrying out another MA training in an L2 environment with learners from various age groups and educational stages (e.g. school, undergraduate, and postgraduate levels) may yield different outcomes. The findings could help other scholars conduct other ESL/EFL studies in morphology. Conducting additional studies on morphological awareness interventions with learners of various ages (children, adults) and at different educational levels (school, undergraduate, postgraduate) is recommended.

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Author contributions

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APPENDIX

APPENDIX A

Instructional Procedures Used in the MA Training

Procedure	Description
Preparation	It is a preparatory stage in which the instructor activates the students' previous knowledge and prepares them for the training session.
Presentation	In this stage, the instructor presented the affixes of a session using PowerPoint slides, a whiteboard, and a model of reading text. The instructor provided examples of the affixes and explained their uses to the students.
Practice	The instructor provided opportunities to practice the taught affixes in the training session by giving activities to be answered by the students individually, in pairs, or groups.
Evaluation	Students were asked to evaluate the other students and themselves at the end of the provided activities.
Expansion	The instructor provided the students with practice opportunities by providing homework assignments and a variety of tasks to strengthen their knowledge of the affixes taught in the session.

APPENDIX B

Bauer and Nation (1993)'s Levels of Affixes

Level No	Affixes
Level One	Each word form is considered as a different word (no word family)
Level Two	Regularly inflected words are part of the same family. The inflectional categories are - plural; third person singular present tense; past tense; past participle; -ing; comparative; superlative; possessive.
Level Three	The most regular and frequent derivational affixes : -able, -ish, -er, -ly, -less, -ness, -y, -th, un-, non-
Level Four	Regular and frequent affixes: -al, -ation, -ize, -ess, -ful, -ous, -ism, -ist, -ity, -ment, in-, im-, ir
Level Five	Fifty Regular but Infrequent affixes: e.g. -age, -an, -ance, -ant, -ary, -dom (kingdom), -ence, -ese, -hood (childhood), -ory, -ship, etc.
Level Six	Frequent but irregular affixes: -able (permeable), -ee, -ic, -ify, -ion, -ist, -ition, -ive (productive), -th, -y, pre-, re-
Level Seven	Classical (Greek and Latin) roots and affixes, e.g., astronaut, bibliography, -ure, de-, sub-, com-, ab-, etc.