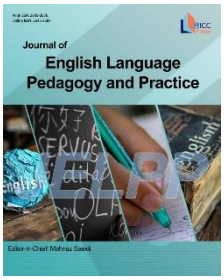

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The Impact of Combining Mind Mapping MALL to Enhance Academic Collocation Learning

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Abstract

Collocational knowledge is considered a crucial component of English writing in academic prose. Nevertheless, students every so often have problems generating appropriate collocations in their academic writing in another language. Given the importance of collocations and Mobile-Assisted-Language-Learning (MALL) apps as a quite novel area in L2 learning, the existing quasi-experimental pretest-posttest research design attempted to survey the potential influence of a mind mapping MALL application on EFL learners' academic collocation knowledge. A total of 76 EFL students were randomly assigned to two groups (control and experimental). One group was assigned to mind-mapping MALL application and the other paper-pencil mind-mapping learning strategies to learn academic collocations. Both were supposed to take multiple-choice question pre and posttest to assess their academic collocation knowledge. The result specified that administering the mind-mapping MALL application strategy resulted in superior academic collocation learning gains in comparison with the paper-pencil mind-mapping strategy. The obtained outcomes of this study will help material designers and curriculum developers to systematically plan their language learning-related programs.

Keywords: Academic collocation; Collocation learning; Collocation knowledge; Mind-mapping; Mobile-Assisted-Language-Learning (MALL) app

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1. Introduction

Vocabulary knowledge is the cornerstone of language education (Schmitt et al., 2017), making it a key to successful competence in language acquisition. The capacity to learn a language is strongly correlated with vocabulary size and depth (Meara & Jones, 1987). Vocabulary development has been shown to correlate with the four skills of language learning (Groot, 2000). The ability to string together words in written work is an essential component of lexical competence. This necessitates familiarity with the lexical preferences of a language which helps users understand acceptable, customary, and idiomatic uses of language (Frankenberg-Garcia, 2018).

There is widespread agreement that acquiring and using idioms, collocations, and other multiword units is crucial to fluency in a language (Yamashita & Jiang, 2010). Formulaic language usage, of which collocation is a subset (Wray, 2002), is considered a necessary

precondition for reaching high levels of competence and fluency in L2 education (Schmitt, 2010).

A collocation is any group of words that are frequently used together at both the word and sentence levels. Syntactic and semantic rules, as well as lexical limitations (Shimohata et al, 1999), make collocations challenging to deal with. The conception of collocation is interpreted as the occurrence of certain words together that can be understood literally (Chan & Liou, 2005). Collocations improve both accuracy and fluency and are especially useful for students aiming for a high proficiency level in another language and those with more modest goals (Wray, 2002).

Regarding language production, collocations have long been documented as a cause of frustration for students, instructors, and lexicographers (Bahns & Eldaw, 1993; H.-J. H. Chen, 2011; Frankenberg-Garcia, 2018). When compared to native speakers, learners employ fewer collocations and are more prone to making collocational mistakes owing to a lack of exposure to target language idioms and cross-linguistic differences (Nesselhauf, 2003).

Shimohata et al. (1999) categorized collocations into two classes: general and domain-specific. Technical jargon and other domain-specific collocations are distinguished from more generic collocations like idioms, which may arise in any context. Domain-specific collocations are significant in number and difficult to learn and their styles and meanings are unique to specific domains (Shimohata et al., 1999). In addition, collocations were classified as either grammatical or lexical by Benson et al. (1986). Grammatical collocations involve the occurrence of function words together. Examples of such collocations include the following pairs: adjective followed by preposition (e.g., envious of), noun followed by preposition (e.g., objection against), adjective followed by that (e.g., pleased that), preposition followed by noun (e.g., under pressure), noun followed by to infinitive (e.g., willingness to help), noun followed by that clause (e.g., my suggestion that), adjective followed by to infinitive (e.g., pleased to receive), and verb followed by propositions (e.g., insist on). Lexical collocations, on the other hand, are those content words that occur together, such as noun followed by noun (e.g., shoe shop), adjective followed by noun (e.g., delicious food), verb followed by noun (e.g., buy some eggs), noun followed by verb (e.g., the balloon bursts), verb followed by adverb (e.g., change dramatically), and adverb followed by adjective (e.g., extremely useful)(Benson et al, 1986).

Even native speakers of a language may have difficulties using collocations in specialized registers, such as academic writing, and must adapt to new social and intellectual responsibilities (Hyland, 2008). To complete current definitions of single-word academic vocabulary, academic collocations are well-defined as groups of words that occur together at a moderate frequency across several academic fields but are rare in everyday speech (Durrant, 2009). Due to their prominence in academic writing, collocations are often studied profoundly (Hyland, 2008) and are often utilized in several fields (Durrant, 2009; Hyland & Tse, 2007). English academic writing tends to involve familiarity with academic collocations (Chen et al, 2023).

As a vital component of any second language acquisition process, learning new target collocations has been profoundly altered by the development of modern technological tools. Interest in learning a second language may enhance via the use of technology, offering students greater occasions to perceive, see, and utilize the target language in meaningful contexts (Hao, Wang, & Ardasheva, 2021). With the proliferation of mobile communication technology, MALL apps in education have made genuine multimedia language-learning resources more available to L2 learners (Montero Perez et al., 2018). The widespread availability of mobile instruments like smartphones and tablets had a significant influence on the rapid development of MALL. Early studies on MALL examined content delivery in mobile learning (m-learning). However, current orientations examined MALL in terms of its roles in learner participation and knowledge co-construction (Karakaya & Bozkurt, 2022). Mobile devices should be studied and positioned in language education to improve education, cater to students' requirements, and eventually replace traditional approaches (Miangah & Nezarat, 2012). MALL helps students practice the language without others and could be appealing to students who are low-achieving and have poor learning self-efficacy (Hao et al., 2021). MALL may facilitate the construction of context-specific learning atmospheres that cater to the varied requirements of L2 students (Lan et al., 2013). MALL approaches are also helpful for learning a language in isolation from its natural environment (Loewen et al., 2020).

To broaden students' lexical knowledge, various MALL applications such as those that facilitate mind-mapping, have been designed. Making use of mind-mapping application allows learners to focus intently on their vocabulary knowledge, which improves the retention and comprehension of the words (Shi & Tsai, 2022). As a student-centered perspective of teaching (Gavens et al, 2020), mind-mapping is a learning method that activates and stimulates the learner's whole brain, allowing for more creative and transparent thought processes (Buzan, 2018). Learners may gain more

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English vocabulary and enhance their memory skills by using mind maps, which help them cognitively link pictures together (Betancur & King, 2014).

A mind map presents smaller topics in association with broader concepts, with the central topics being in the center (Budd, 2004). British psychologist, Tony Buzan, pioneered the implementation of mind maps in the late 1960s. According to Buzan and Buzan (1996), mind maps are a network of connections among words and images that follow a main idea on a unique platform (Buzan & Buzan, 1996). This method employs verbal and symbolic components to depict links between ideas, concepts, and data in the form of a network or a non-linear diagram (Dhindsa & Roger Anderson, 2011). In addition to helping students solve problems, generate new ideas, and take notes, the mind-mapping approach promotes language acquisition as a whole (Buran & Filyukov, 2015).

The use of mind maps has been shown to increase students' engagement with the material being taught, as well as to make lectures and presentations more dynamic, adaptable, creative, and fun. Students might benefit from mind maps to better understand research issues, literature, and conceptual frameworks (Kotcherlakota et al., 2013). Due to restricted access to L2 outside the classes and inadequate instructional practices, vocabulary is observed as the most challenging feature of language learning for students. Therefore, integrating technology into language education is important for learning efficiency (Hao et al., 2021). Using a mind map to teach and learn new words is highly recommended by researchers (Buzan, 2018). A vocabulary mind map helps students retain and extract information by visually displaying the links between words to create an organized and accessible network. Secondly, the dual coding hypothesis proposed by the American psychologist, Pavio suggests that knowledge retention and identification are improved when visual and verbal cues are presented simultaneously. In addition, mind mapping is supposed to be an operative means for teaching vocabulary. It encourages students to actively create knowledge and learning processes by helping them integrate previously acquired information into the larger framework of cognition (Nie, 2020). As Betancur and King (2014) observed, mind maps support second language acquisition in a variety of ways including note-taking, brainstorming, reading comprehension, visual associations, analysis, and project management (Betancur & King, 2014).

Mind-mapping is shown to be beneficial for education over the last few decades. Some studies have documented the usefulness of mind-mappings in reading and writing and idea associations (e.g., Al Naqbi, 2011; Bloom et al., 1956; Hasanah et al., 2017; Liu et al., 2010; Mohaidat, 2018; Ojima, 2006; Shi & Tsai, 2022; Shu, 2009; Wang & Chen, 2018). Mind-mapping is an operative means of acquiring new vocabulary, but its full potential has not yet been investigated (Betancur & King, 2014; Kim & Kim, 2012; Shi & Tsai, 2022). For instance, Kim and Kim (2012) found that primary school students' vocabulary knowledge and learning satisfaction might be enhanced by using digital mind maps. Mind-mapping's impact on EFL writers' ability to structure their texts has also been studied. Lee (2013) found that the content, structure, and vocabulary of the final text significantly improved when groups collaborated to develop mind maps. Liu (2016) compared the effectiveness of conventional teaching methods with computerized mind-mapping programmer Inspiration and found significant improvements in digitally learned vocabulary knowledge (Liu, 2016). Recent research by Shi and Tsai (2022) found that the MALL app containing mind maps facilitated EFL vocabulary acquisition (Shi & Tsai, 2022). The probable impact of mind-mapping on acquiring academic vocabulary and collocations has received little consideration in the literature. Therefore, more research is necessary to decide how to assess students' collocational knowledge.

Using and producing collocations presents tremendous problems for L2 learners regardless of the allocated time spent studying the target language, the learner's native language, or the nature of the job at hand (Laufer, 2011). Earlier studies have extensively targeted single words and a handful of studies have explicitly explored the efficiency of mind-mapping on vocabulary acquisition (Al-Jarf, 2015; AlSaleem, 2019; Dilek & Yürük, 2013; Liu, 2016; Rundell & Fox, 2010). Academic collocation lists (Ackermann & Chen, 2013; Benson et al., 1986; Durrant, 2009; Lei & Liu, 2018) have been developed by numerous researchers over the past few decades to assist non-native English speakers in communicating effectively in scholarly settings, such as English for Academic Purposes (EAP) contexts. Despite the challenges associated with collocations and their importance in fluency development and language learning, the explicit teaching of multiword items, such as academic collocations through mind-mapping MALL applications has been rarely explored. In this study, the aim was to explore how mind-mapping MALL tools affect students' academic collocations in the classroom. Our goal is to find out whether using MALL apps in mind-mapping may considerably improve the learning of academic collocations in the classroom.

To do so, the current research was conducted to examine the subsequent research question:

RQ: Does application of a mind mapping MALL have any significant effect on EFL learners' collocation learning?

Method

Design

A quasi-experimental pre-test post-test design was employed to conduct the current study. The researchers assigned the participants in two groups based on their proficiency scores, utilized a pre-test, administered the experimental condition to one of the groups, and applied the post-test. Among the whole students of two classes (N=76), one of the classes was allocated at random to the control group (N=38) and the other class to the experimental group (N=38).

The experimental group employed a mobile mind-mapping application in learning new collocations, while the control one learned the same collocations in a traditional paper-pencil mind-mapping way. The study's independent variable was the mobile-based mind-mapping learning strategy and the dependent variable was learning academic collocations. The time duration of the experiment was eight weeks, with one 90-minute weekly session. The first 45 minutes of class were spent with the same English teacher introducing the new academic collocations to both groups. In the subsequent 45 minutes of class time, experimental group learners were required to learn collocations using the Xmind mapping app. Accordingly, the individuals designated to the control group were expected to learn academic collocations using their paper-pencil mind-mapping technique.

Participants

Seventy-six sophomore students studying applied linguistics at Islamic Azad University, Ardabil Branch, made up the entire sample size of the current study. The study was initiated with 85 participants however the data of nine students were eliminated as the results of their proficiency PET scores. Seventy-six participants from among 85 were allotted into two control and experimental groups based on convenience sampling procedures. The experimental group was comprised of 38 participants, 23 females and 15 males, and the control group comprised of 38 participants, 21 females and 17 males. They were aged 19-25 and their mother tongues were Azeri and Persian.

Instruments

To investigate the aforementioned research questions several instruments were utilized. These materials are: (1) PET, (2) Xmind mapping mobile application, (3) Academic Collocation List (ACL), and (4) collocation achievement pre-and post-tests.

Preliminary English Test: PET is an intermediate level test considered for proficient students in English that have the capability of using language skills practically and efficiently. The test was comprised of 43 items including 10 questions for reading comprehension, 10 questions for writing skills, 10 questions for vocabulary, and 13 questions for listening skill. To scrutinize the homogeneity level of both groups, the proficiency test was administered to 85 intermediate language learners and just those learners (N=76) whose test results fell within meaningful range of standard deviation were supposed to participate in this study. Cronbach's alpha reliability estimate showed that the test reliability was 0.81.

Xmind mapping mobile application: A mobile mind-mapping program called Xmind (version 22.11) was utilized to carry out the current study. The mind-mapping program, Xmind, is marketed by XMIND LTD as being cutting-edge technologically. The application is a free science-based learning instrument created to be utilized in visualizing ideas, clarifying thoughts, managing complex information, and promoting team collaboration. Xmind supports logic charts, tree tables, mind maps, organization charts, brace maps, tree structures, timelines, and matrices. Currently, the software is available across all operating systems including Windows, Linux, iOS, iPadOS, Android, and the Web. The application offers various types of maps, charts, and diagrams that students can employ to create their mind maps.

The following screenshots of the app reveal the main menu and different options available for the learners in the process of self-mind-map creation. As seen in Figure 1, the app's home screen features three major folders for saving produced maps in predetermined folders on students' smartphones as well as a sample mind map for demonstrating how to create different types of maps. At the right-bottom of the page, there is a (+) mark which, by clicking on it, four alternatives will be available for the users. These alternatives are quick entry, creating a new folder, choosing a template, and creating a new map. By selecting each of these options, students can create their maps in different forms of templates (as

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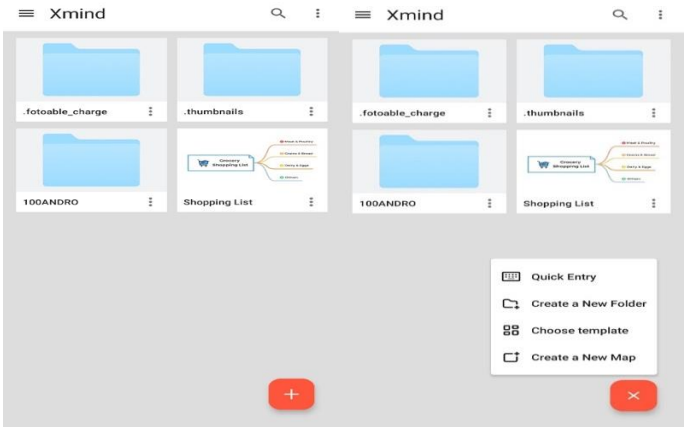

Figure 1. Snapshots of the Layout and Features of the Xmind App

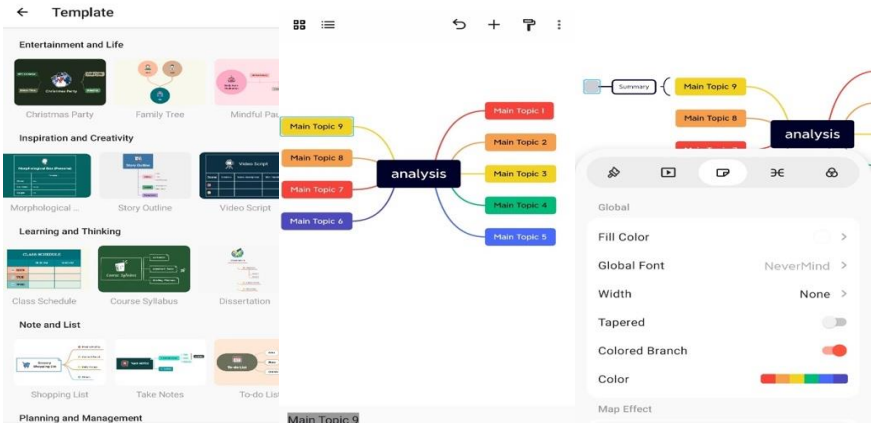

Figure 2. Snapshots of the Sample of the Created Mind Map by Xmind App

shown in Figure 1) and save their self-created maps in predetermined folders. After drawing the map, the learners could change the color, font, and width of the maps by choosing the options available in the top-right corner of the app. Additionally, they can click on each of the options provided at the bottom of the page to add or remove various subtopics from the primary topic (Figure 2).

Academic collocation list: As aforementioned, the foremost resolution of the present research paper was to scrutinize the efficiency of using a mobile-based mind map in acquiring academic collocation. It would therefore be essential to select the necessary academic collocation before the experiment begins. While choosing the collocations, the current study's collocations were carefully chosen from the Academic Collocation List (ACL) retrieved from https://www.eapfoundation.com/vocab/academic/acl/. Ackermann and Chen (2013) created the Academic Collocation List (ACL) containing 2,469 of the most practical and frequently used collocations found in written academic English. ACL is sorted in two different ways: headword or frequency. Generally, there are seven grammatical types of collocations. Despite the wide range of collocations, the study's corpus was chosen from the noun + noun, verb + noun, adverb+ adjective, and adjective+ noun combinations to teach the most essential and frequent categories of collocations. A total of 80 collocations were selected from the ACL (22 noun+ noun, 21 verb + noun, 18 adverb+ adjective, and 19 adjective+ noun) to be analyzed via utilizing a mobile-based mind-mapping strategy. Some of the examples of these varieties are revealed in Table 1.

Collocation Achievement Tests: The researchers designed two separate academic collocation tests to find out whether any significant distinction exists in the academic collocation knowledge of the experimental and control groups in both pre and posttests. In designing pre-test collocation questions, initially, 47 multiple-choice questions were developed and piloted with 69 university students with the same level of proficiency as the target group. The results showed that seven items had been eliminated since the item discrimination levels of these items were under the significant range of acceptance (ID<0.19). Accordingly, the ultimate form of the test involved 40 question items. The same procedure was followed for preparing post-test questions and from among 45 piloted questions, 40 items were selected to measure learners' knowledge of academic collocations in the posttest.

Procedure

The current study aimed to demonstrate how effectively using mobile technology may raise learners' academic collocation knowledge. Therefore, a quasi-experimental research design was directed during the university semester which lasted for eight weeks. As stated before, on the whole, 76 EFL students joined in this study. To begin with, they were required to take a proficiency test (PET) to scrutinize the homogeneousness level of the students.

Based on the outcomes of the proficiency test, the students were assigned into two groups. The same teacher taught the same English academic collocations to each group of students. In order to check the student' knowledge of English collocations, they were supposed to take collocation multiple choice pre-test. Both groups received one 90-minute weekly session, divided into two 45-minute instruction. The teacher presented the new academic collocations to both groups throughout the first 45 minutes of class using a computer, projectors, and printed materials. The second 45 minutes of teaching used different experimental interventions to present academic collocations through mind-mapping. In the control group, the learners were required to learn collocations via a paper-pencil method. Conversely, in the experimental group, the students were required to apply a mobile phone with an Android or iOS system and an Xmind mapping application. All through the treatment, the learners were supposed to start up and compose their academic collocation knowledge. They utilized the Xmind mapping tool to create mind maps to illustrate their collocational knowledge (two samples of both groups' mind maps of the same word are revealed in Figures 3 and 4). In each 90-minute treatment sessions, both groups were required to lean ten collocations. The learners' mistakes were treated by providing peer corrective feedback. Finally, a post-test was administered after the experimental intervention to establish the usefulness of the mobile mind-mapping strategy compared to the traditional paper-pencil method. In conclusion, the data of both pre and post-tests were collected and submitted to SPSS software.

Results

The primary objective of this paper was to inspect the possible influence of utilizing mobile-assisted mind-mapping strategy training on enhancing EFL students' academic collocational knowledge. Both descriptive and inferential statistical tests were computed using SPSS software to examine the quantitative data obtained from the scale.

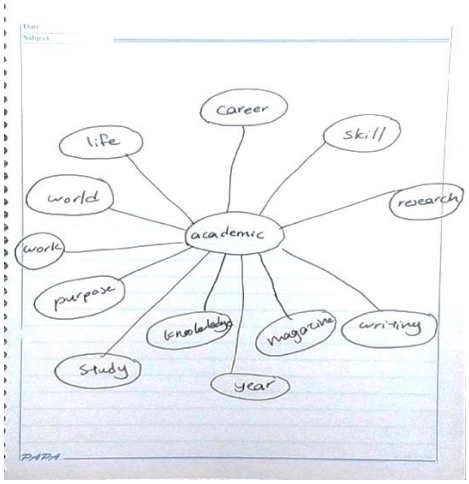

Figure 3. Samples of Control Groups' Paper-Pencil Mind Maps

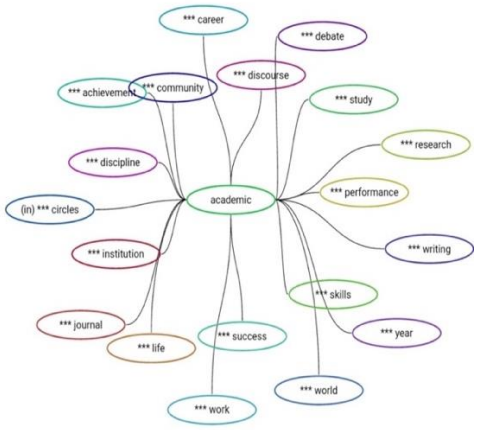

Figure 4. Samples of Experimental Groups' MALL Mind Mapping

Initially, descriptive statistical analysis was run on the proficiency PET to inspect the homogeneity level of the learners. Then, an independent sample t-test was computed to determine the statistical differences between the experimental and control groups. Additionally, to reveal the probable potential differences between the pre and post-tests within each group, the obtained data from both tests were analyzed by performing a paired-sample t-test analysis.

To respond the first research question which explores the efficiency of mobile-based mind-mapping strategy, the possible differences between the pre-tests and post-tests of both groups were assessed using the paired-sample t-test analysis method. The consequences of the analysis were verified in Tables 2 and 3.

The mean scores for both groups' pre- and post-tests are displayed in Table 2. According to this Table, the mean score of the pre-test in the control group is 24.00, in contrast the mean score of the pre-test in the experimental group is 23.00.

Therefore, it would be rational to state that the learners in both groups are approximately at the same level of homogeneity in acquiring academic collocation since any noteworthy difference between the performances of both groups in the pre-test was proved. Additionally, as revealed in Table 2, higher post-test outcomes were achieved by the experimental group learners rather than those in the control group. The mean score of the post-test in the experimental group was 28.00, whereas the control group mean score was 25.00. Consequently, based on the differences between the post-test mean scores of both groups, results illustrated that the mobile-based mind-mapping application learning group performed superior to the traditional paper-pencil learning group.

As Table 3 illustrated, there was a meaningful difference between the pre-test and post-test scores of the experimental group (t (37) =5.00, p=.000<0.05, X post-test=28.00>X pre-test=23.00). In other words, the scores of the post-test of this group were statistically more significant than the pre-test scores, since the P value of the experimental group is within the acceptable range of P value (0.05). Therefore, it would be logical to comment that the use of a mobile-based mind-mapping strategy was more influential for learning academic collocations in the experimental group.

An independent sample t-test analysis was performed on the post-test results to assess whether there was a statistically significant difference between the post-test scores of the experimental and control groups. Table 4 demonstrates a superior mean score for the learners in the experimental group than those in the control group. As a result, the findings confirmed the superior performance of the learners who learned academic collocations through MALL mind-mapping strategy training.

The findings of Table 5 presented that the post-tests of both groups differed significantly (t (74) =2.91, p=.000<.005). Students who used the MALL mind-mapping training strategy were superior to the traditional strategy group. The statistical analysis revealed that in response to the aforementioned research question, the learners in the experimental group acquired more collocational phrases than their counterparts who acquired academic collocations using the conventional paper-pencil methods of learning. The treatment group therefore surpassed the control group in terms of performance.

Table 1. Examples of Different Types of Research Collocation Corpus

Noun + Noun	Business transaction, data gathering, information flow, learning process, research topic, stress level, etc.
Verb + Noun	Address an issue, give priority to, place emphasis, provide guidance, raise awareness, use criteria, etc.
Adjective + Noun	Academic performance, basic assumption, close relationship, ethical problem, high level, strong correlation, etc.
Adverb + Adjective	Broadly similar, highly variable, particularly effective, relatively common, statistically significant, etc.

Table 2. Pre-Test and Post-Test Descriptive Statistics for the Control and Experimental Groups

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-control	24.0000	38	7.00000	1.00000
	Post-control	25.0000	38	7.09502	1.00000
Pair 2	Pre-experiments	23.0000	38	6.00000	1.09033
	Post-experimental	28.0000	38	6.00000	1.01671

Table 3. Paired Sample T-Test Analysis of Experimental group

	Paired Differences					T	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 2 Pre-experimental – post-experimental .000	-5.02632	1.00000	.00000	-5.00000	-4.00000	-16.000	37	

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Table 4. Descriptive Statistics of Post-Tests

	Group	N	Mean	Std. Deviation	Std. Error Mean
Post-tests	Control	38	25.0000	7.09502	1.00000
	Experimental	38	28.0000	6.00000	1.01671

Table 5. Independent Sample T-Test for Both Groups' Post-Tests

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Post-tests	Equal variances assumed	.000	.000	-2.091	74	.040	-3.00000	1.00000
	Equal variances not assumed			-2.091	72.000	.040	-3.00000	1.00000

Discussion

With foci being mainly on academic collocations, the present-day research is designed to discover the efficiency of mobile-based mind maps in acquiring academic collocations. To this end, mobile-based mind maps and paper-pencil maps were created. The first question examined the effectiveness of learning academic collocations through both mobile-based mind-mapping strategy training and paper-pencil-based mind-mapping strategy. The possible variances between the pre- and post-test results of both groups were evaluated through the paired-sample T-test analysis method. The consequences of the paired sample T-test analysis of control and experimental groups showed that the use of mobile-based mind-mapping strategy was more influential for learning academic collocations than paper-pencil maps. Relating to the abovementioned research question, independent sample t-test results illustrated that the mobile-based mind map was operative in enhancing EFL learners' academic collocation knowledge.

The finding was in line with Burston (2012) claiming that the learning consequences of MALL applications are undisputable and constructive in nearly 80% of the cases(Burston, 2012). The fallouts of this study indicated that through mind-mapping MALL learners were provided occasions to progress from basic stages of memorizing to more advanced stages of analyzing and thinking (Bloom et al., 1956). It is also indicated that mind-mappings have been comprehensively delved into with affirmative consequences (Jelodar & Farvardin, 2019; Zhang, 2018).

Some studies (e.g., Basoglu & Akdemir, 2010; C.-M. Chen & Chung, 2008; Liu & Chen, 2015) indicated that making use of mobile technologies had a significant weight on vocabulary acquisition in comparison to paper-based strategies. Mahdi (2017) argued that in virtually all phases of target word learning, the implications of mobile strategies would be confirmed to have constructive effects(Mahdi, 2018). In the reviewed literature, numerous studies related to vocabulary learning (e.g., Al-Jarf, 2015; Liu, 2016; Shi & Tsai, 2022) indicated that computer-based mind maps and mind-mapping MALL apps enhanced EFL vocabulary learning. Today, it is highly validated that the MALL app provides learners with many chances to learn words with inquiry (Şahin Kızıl & Savran, 2018; Shi & Tsai, 2022; Suarez et al, 2018). Due to the centrality of collocations within academic writing (Hyland, 2008), it is imperative to be aware that novice EAP academic writers might be hampered due to less than optimum remembrance of academic collocations and that L1-English writers may require support in this domain (Frankenberg-Garcia, 2018). To this end, teachers can aid English language learners in achieving their learning objectives by engaging them in activities that stimulate the brain and use a mind-mapping MALL app in language classes.

Conclusion

The current study was inspired by the possible impression that learners' academic collocation knowledge could be boosted employing a mobile-based mind-mapping training strategy. The fallouts of this study confirmed the efficiency of utilizing technology within the pedagogical domain. It was revealed that the participants who used the MALL mind-mapping app instead of the conventional paper-pencil mind-mapping strategy were able to attain higher levels of success when learning academic collocations. Through using the

mind-mapping MALL app and more brain-stimulating mind maps rehearsals, the teachers could encourage learners to accomplish their educational objectives. In this learning situation, the role of the teachers and the learners are overturned and the students are more authorized. As well, approachable and close relationships are created in this way of learning as a result of a collaborative learning environment. Teachers are also expected to deal with potential challenges and unplanned situations in language classrooms and lessen the inconsistency between mobile-based tools and diverse learning strategies while utilizing technology in the learning context. EFL students have limited exposure to the target language in educational foreign language contexts. To overcome this limitation and encourage students to engage in mobile-based mind-mapping academic collocation acquisition, they must be equipped with opportunities to enhance their collocational knowledge beyond conventional mind-mapping.

It is crucial to recognize some limitations of the current study. First, this analytical study has scrutinized different types of academic collocations in terms of only their forms and did not take into consideration the functions of these collocations. Since there are many academic collocations used across disciplines, it is unknown whether they are all used consistently or not. Second, given the small size of the sample, the descriptive results in this study did not warrant that the outcomes are generalizable to other groups or not. Third, while collocational patterns are of many types and can be found beyond the two-word level, this study was just limited to acquiring two-word academic collocations. Despite the limitations of this study, the discoveries of the study include some implications for both teachers and learners, particularly in the case of the significant effect of using the MALL mind map application on improving EFL learners' academic collocation retention and learning. As it will pique learners' interest and enhance their recall and retention, this result may also be useful to teachers and students during presentations. Teachers will also benefit from this technology in making handouts as they contain images, colors, and attractive visual layouts. The need for creating of collocation lists is highlighted by the fact that academic collocations are not regularly used in everyday language and are not covered in required course materials (Nation, 2001). Therefore, collocations merit a significant role in language instruction due to their importance and learning challenges (Ackermann & Chen, 2013).

Authors Contribution
All authors have contributed equally to prepare the paper.

Availability of data and materials
The data that support the findings of this study are available from the corresponding author, upon reasonable request.

Conflict of interests
The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Biodata

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