IUGJEPS
Vol 28, No 4, 2020, pp 869 - 888

ISSN 2410-3152

مجلة الجامعة الإسلامية للدراسات التربوية والنفسية

Received on (06-05-2019) Accepted on (17-06-2019)

The Effect of an Electronic Collocation-Based Instructional Program on Enhancing Jordanian EFL Tenth Grade Students' Reading Comprehension

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Abstract:
This quasi-experimental study investigated the effect of an electronic collocation-based instructional program on Jordanian EFL tenth grade students' reading comprehension. Two sections, of 25 students each, from a government school in Irbid were assigned randomly as experimental and control groups. A Reading Comprehension pre-test, entailing five literal comprehension and five inferential comprehension questions, was administered to find out whether the two groups were equivalent before implementing the program. Lexical collocations in *Action Pack 10* were identified, through a content analysis of certain reading passages, and those collocations were taught to the experimental group through Quizlet: a flashcard mobile application. The control group received no collocation instruction. After treatment, the two groups took a Reading Comprehension post-test. The findings indicated that the experimental group outperformed the control group in the overall Reading Comprehension Test and in each part of the test: literal and inferential comprehension.

Keywords: e-learning, Quizlet, collocations, reading comprehension

فاعلية برنامج الكتروني لتدريس التلازم اللفظي في اللغة الانجليزية في تحسين أداء طلاب الصف العاشرفي استيعاب نصوص القراءة في الأردن

الملخص:
هدفت الدراسة إلى كشف أثر برنامج إلكتروني لتدريس التلازم اللفظي في اللغة الإنجليزية، في استيعاب نصوص القراءة لدى طلاب الصف العاشر في الأردن. شارك في الدراسة خمسون طالبا من شعبتين في مدرسة حكومية في اربد، وتم تعيين الشعبتين عشوائيا كمجموعة تجريبية ومجموعة ضابطة تضم كلٌ منهما خمسة وعشرين طالبا. أجري للمجموعتين اختبار استيعاب قراءة قَبلي لقياس تجانس المجموعتين قبل تطبيق البرنامج. وتكوّن الاختبار من قسمين: الأول يقيس الاستيعاب المباشر والثاني لقياس الاستيعاب الاستنتاجي. حلل الباحثون محتوى بعض نصوص القراءة في كتاب اللغة الانجليزية للصف العاشر للكشف عن المتلازمات اللفظية، واللتي تم إدراجها ضمن مجموعات في تطبيق Quizlet الالكتروني، وتم تدريس هذه المتلازمات اللفظية للمجموعة التجريبية من خلال التطبيق الالكتروني، أما المجموعة الضابطة فلم تتلقّ أي تدريس قائم على المتلازمات اللفظية. وبعد انتهاء البرنامج خضعت المجموعتان لاختبار استيعاب القراءة البعدي، وأشارت نتائج الاختبار إلى تفوق المجموعة التجريبية على الضابطة في اختبار استيعاب القراءة ككل، وكذلك في جزأي الاختبار: الاستيعاب المباشر والاستنتاجي، كلٌ على حدة.

كلمات مفتاحية: التعلم الالكتروني، تطبيق كويزلت، التلازم اللفظي، استيعاب القراءة

Introduction:

English is an Indo-European language and the most widely learned second language. English as a foreign language (EFL) is a basic subject in Jordanian schools and a mandatory course in colleges and universities in Jordan. It is also an essential requirement for those seeking career development, effective communication and easy access to information. Thus, serious EFL learners are expected to make a determined effort to hone their language production through speaking and writing skills and language comprehension through listening and reading skills.

Background of the study:

Reading and listening are the two receptive skills in language. People read to inspire, motivate and convince themselves, to learn or to simply spend their free time (Lakshmi, 2000). For Grauberg (1997), reading in the first language paves the way for literacy, while reading in the foreign language is globally needed to keep abreast of specialist publications printed in other languages. There are three aspects of reading: *word recognition*, *comprehension* and *reflection* (Dallmann, Rouch, Char & Deboer, 1978).

Reading comprehension was defined by Grellet (1981) as extracting the information needed in an efficient fashion. Dechant (1982), Smith (1975) and Lakshmi (2000) stressed that reading is not complete unless comprehension takes place. Reading comprehension is not only one single level. Barrett (1967) introduced four types of reading comprehension; *literal*, *inferential*, *evaluative* and *appreciational*. Almost similarly, Caldwell (2008) discussed three components of reading comprehension: *literal*, *inferential* and *application*. Richards and Schmidt (2010) distinguished between four types of reading comprehension: *literal*, *inferential*, *critical* or *evaluative* and *appreciative.* The two levels highlighted in this study, which are literal and inferential levels, are outlined below:

Literal comprehension is the basic level of reading comprehension, in which the reader is able to locate information explicitly stated in a text. For Barrett (1967) there are two kinds of literal meaning tasks: *recognition*, which involves finding ideas directly stated in the text, and *recall*, i.e. the ability to produce from memory those ideas explicitly contained in a text. Literal comprehension questions might ask about names, dates, places, reasons and the like. The reader does not have to go beyond the text or read between lines.

Inferential comprehension is the ability to comprehend ideas that are not directly contained in a text. Inference, for Moreillon (2007), occurs when the reader is capable of making their own meanings depending on limited clues found in the text. For inferential comprehension to take place, according to Day and Park (2005), the readers should link their literal comprehension of the passage to their intuitions and knowledge. There are different inferential tasks the reader might be requested to perform. Barrett (1967) stated that the reader might be asked to predict outcomes, infer similarities or differences in characters or places, infer cause and effect relationships and infer personality traits. Inferential questions might also request the reader to think of a suitable title for the text being read.

This study explored the relationship between collocation instruction and reading comprehension. Collocation is one type of multi-word units in English. It refers to the frequent co-occurrence of words, such as *to enforce discipline* and *a rigorous examination*. Firh (1957) was the first to use this term in its linguistic sense. As for the term origin, the verb *collocate* is from Latin *collocatus*, meaning 'placed together' (The New International Webster's Comprehensive Dictionary of the English Language, 1998). Each collocation is made up of at least two words. Sinclair (1991) used the term *node* for the word being studied and the term *collocates* for the words surrounding the *node*. In the following phrases: *lasting peace*, *to keep peace*, *peace negotiations* and *peace activists*, the word *peace* is the *node*, and the other words, such as *lasting* and *negotiations*, are the *collocates*.

Collocations have established idiomatic semantic relations because they are often placed together (Bussmann, 2006). Of idiomatic language areas, collocation is regarded as one of the most significant, and therefore, ignoring collocations would result in failure to express difficult ideas and thoughts in a simple but precise fashion (Hill, 2000). However, such idiomaticness is in its broad sense: typicality to a language. It does not mean that collocations are pure idioms, in the narrower sense of idioms as fixed expressions usually carrying figurative meaning. Rather, according to McKeown and Radev (2000) and Duan and Quin (2012), collocations are placed somewhere between the two extremes: idioms and free-word combinations.

For example, the *cat* idiom: *let the cat out of the bag* is a fixed expression and its meaning, *to tell a secret*, is not obtained from the meaning of its individual words. On the other hand, the *cat* collocations: *He petted the cat* might be less fixed and its meaning is more direct.

Benson, Benson and Ilson (1997) distinguished between *lexical* collocations, those combining lexical or dominant components, and *grammatical* collocations, which entail lexical plus grammatical words. According to this dichotomy, *searing heat* is a lexical collocation, while *to campaign against (something)* is a grammatical collocation. Further, collocations can be categorized on the basis of the part of speech of the components making up the combination. Common combinations include: an adjective and noun (*a radical shift*), a noun and noun (*incident rate)*, a verb and noun (*to raise one's esteem*), an adverb and adjective (*seriously mistaken*), a noun and verb (*the eyelids droop*), a verb and adverb (*to punish physically*), a preposition and noun (*without distraction*), a noun and preposition *sort of*), a verb and preposition (*to immerse in*), an adjective and preposition (*doubtful about*) and phrases (*pain and anguish*).

Collocations can be also classified as *strong* and *weak*. Conzett (2000) stated that *strong* collocation means that the presence of a certain word calls for the other word to be present, while *weak* collocates are expected to vary a lot, and there are other collocations lying between the strong and weak ones. For Hill and Lewis (2002), storing and using strong collocations, such as *to impose rigid discipline* and to *declare war*, will probably make one's English sounds natural. Other strong collocations may include: *to whisk an egg*, *to categorically deny* and *mitigating circumstances*.

The lexical approach to language teaching accentuated the significance of collocations. It suggested, according to Lewis (1997), that language is not made up of grammar and vocabulary but often of prefabricated multi-word units, of which collocations and fixed expressions are the most central. Fluency, in the eyes of this approach, relies heavily on the acquisition of chunks, which are fixed and semi-fixed word combinations (Debabi & Guerroud, 2018).

Electronic learning (e-learning) was the mode used to teach collocations in this study. E-learning is learning with the aid of electronic devices. E-learning goes back to the 1980s and 1990s (Sekhon & Hartley, 2014), but as a term, e-learning was first used in the mid-1990s (Garrison, 2011). Wallace (2015) defined e-learning as learning with the aid of computers, the Internet, intranet or disks. As a subdivision of e-learning, learning supported by personal digital assistants (PDAs) and smart mobile phones in particular is called mobile learning (m-learning). Despite being a relatively new field, m-learning has attracted a lot of research attention (Boylan, 2018). Since many people own smart phones or tablets, m-learning has become part of their daily lives.

With regard to making use of mobile devices to learn language, mobile-assisted language learning (MALL) could be a move in the right direction. MALL is a term coined by Chinnery in 2006. MALL has emerged, as stated by Kim (2016), as a principal constituent of computer-assisted language learning (CALL) in a brief period of time. Today, smart phone and tablet applications (apps) devoted to teach and improve language seem to grow quickly.

Statement of the problem:

Based on the researchers' teaching experience, Jordanian EFL learners sometimes face difficulty in understanding reading texts. The researchers have also noticed that many students fail to naturally and coherently link their vocabulary items together while speaking or fully grasp written chunks while reading. Moreover, the researchers' keenness on the intriguing topics of collocations and MALL is another primary underlying motive for investigating their potential effectiveness on improving students' reading comprehension. Finally, in this age of rapid, substantial technological innovations, utilising smart phone apps and gadgets in language teaching and learning might produce promising results.

Purpose of the study:

This study aims at investigating the potential effect of an electronic collocation-based instructional program on enhancing Jordanian EFL tenth grade students' reading comprehension.

Question of the study:

The study aims to answer the following question: Are there any statistically significant differences between the mean scores of the experimental group and the control group on the Reading Comprehension post-test that are attributed to an electronic collocation-based instructional program?

Significance of the study:

The present study, targeting Jordanian EFL tenth grade students, has added pieces of research into the potential effect of both explicit collocation instruction and technology on foreign language proficiency. No previous study, to the best of the researchers' knowledge, has measured the influence of an electronic collocation-based instructional program on enhancing reading comprehension, and this is a significant breakthrough this study is bound to make.

The findings of the present research will probably be of particular interest to mobile phone app developers, EFL curriculum designers, educational policy makers as well as EFL teachers and

students. Also, the study will probably raise EFL teachers' awareness of the significance of incorporation of technology into foreign language teaching and learning.

Procedural definitions:

Reading comprehension: This study is exclusively concerned with the participants' understanding of and recalling the information and details directly and indirectly stated in the reading text, i.e. *literal* and *inferential* comprehension respectively. Reading comprehension was measured in terms of how many literal and inferential reading comprehension questions a participant was able to answer correctly in the Reading Comprehension Test developed by the researchers.

Collocation refers to the way in which words co-occur on a regular basis. This study dealt with *lexical* collocations, which typically consist of content words: verbs, nouns, adjectives and adverbs, identified through a content analysis of certain reading passages in *Action Pack 10*.

In this study, **an electronic collocation-based instructional program** is a nine-week program, designed by the researchers, that makes use of a MALL flashcard app: Quizlet. The program consisted of twelve collocation sets that the researchers have identified and fed into the Quizlet app, using the website: https://quizlet.com.

Limitations of the study

The present study dealt with *lexical* collocation presented in *Action Pack 10*, to the exclusion of *grammatical* collocations. Lexical collocations were considered in the study because they are more related to reading than grammatical collocations. Reading comprehension was restricted to *literal* and *inferential* comprehension levels. The other reading comprehension levels, such as *evaluative* or *appreciative* comprehension, were left out of the study.

This study was limited to the students in two tenth grade sections in Ammar Bin Yasser School, Irbid, and the treatment was restricted to nine weeks in the first semester of the scholastic year 2018-2019. Targeting different participants or changing the treatment time or duration might yield different results.

Content analysis of lexical collocations:

Since the instructional program in this study is based on lexical collocations, it was vital for the researchers, at an early stage of the study, to conduct a content analysis of lexical collocations in *Action Pack 10*. The purpose of this content analysis was identifying lexical collocations in certain reading passages in *Action Pack 10* and deciding whether the number of the collocations identified could form a basis for an instructional program.

The lexical collocations in this content analysis should meet two criteria. First, they should be listed in either or both of the following significant collocation dictionaries: McIntosh, Francis and Poole's (2009) *Oxford Collocations Dictionary for Students of English* and *Longman Collocations Dictionary and Thesaurus* (2013). Second, they should fall under one of the following seven combinations/patterns: An adjective and noun (*a live show*), a noun and noun (*personality traits*), a verb and noun (*to furl an umbrella*), a noun and verb (*a crisis arises*), a verb and adverb (*to walk briskly*), an adverb and adjective (*desperately nervous*) and short phrases (*pale and drawn*). In the

two dictionaries, there are some collocations listed under *preposition* category, such as *fascination for (something)* and *to disapprove of (something)*. Those are not considered in the study because they belong to *grammatical*, not *lexical*, collocations.

All the eleven reading passages in Module 2 and the first two reading passages in Module 3 of the *Student's Book* (SB) and *Activity Book* (AB) of *Action Pack 10* served as the units of analysis. However, any texts belonging to grammar, vocabulary or listening activities were excluded.

The results of the content analysis showed that the thirteen reading passages contain ninety lexical collocations (see Appendix A), and this number is adequate for the purpose of the instructional program. The ninety target lexical collocations (see Appendix C) have been fed into 12 Quizlet sets by the researchers. (One Quizlet set consisted of collocations from two reading passages).

Empirical studies:

To the best of the researchers' knowledge, there has been no empirical study that used an electronic program or app, such as *Quizlet*, to teach collocations. However, few researchers, such as Lees (2013), Barr (2016) and Baptist (2018), used Quizlet to teach EFL learners English vocabulary items, not collocations, in order to explore the relationships between a Quizlet-based program and participants' vocabulary development.

None of the studies that examined the effect of collocation-based instruction on reading skills or comprehension made use of e-learning, to the best of the researchers' knowledge. Eight studies explored the effect of non-electronic collocation instruction on reading comprehension, and they have been touched upon below.

Six studies pointed to the positive influence of collocation instruction on reading comprehension. Of them, three studies targeted Taiwanese students. Lien (2003) concluded that collocation instruction had more positive effects on the college students' reading comprehension than vocabulary instruction and no instruction. Similarly, Lin (2009), who targeted high school students, revealed that the group that received collocation instruction achieved more progress in English reading proficiency than the group that did not receive any special collocation instruction. In a similar vein, Hsu (2010) indicated that lower level English majors, in particular, made a considerable progress in their reading comprehension after receiving direct collocation instruction. The other three studies (Ganji, 2012; Kiaee, Moghaddam & Hosseini, 2013; Abedi & Mobaraki, 2014) targeted university and institude students in Iran, and all of them came to the conclusion that collocation instruction was efficacious in enhancing reading comprehension.

On the other hand, two studies failed to point to any effect of collocation instruction on reading comprehension. Kim and Bae (2012) arrived at a conclusion that there was no significant correlation between Korean university students' collocation knowledge and their reading skills. Tekingul (2013), who targeted Turkish university students, found that there were no significant differences between the two groups: the one with collocation instruction treatment, and the group with single item vocabulary instruction. The present study was carried out to confirm or revise the potential effect of teaching collocation on reading comprehension, but with the technological element included. The studies published on the effect of collocation instruction on reading comprehensions are summarized in Table (1).

Table (1): Studies Investigating the Effect of Non-electronic Collocation Instruction on Reading Comprehension

Researcher(s)	Year	Country	Participants	Was collocation instruction effective?
Lien	2003	Taiwan	College students	yes
Lin	2009	Taiwan	High school students	yes
Hsu	2010	Taiwan	University students	yes
Ganji	2012	Iran	University students	yes
Kim and Bae	2012	Korea	University students	no
Kiaee, Moghaddam and Hosseini	2013	Iran	Institute students	yes
Tekingul	2013	Turkey	University students	no
Abedi and Mobaraki	2014	Iran	University students	yes

Since the studies that used MALL flashcard apps, such as Quizlet, have not been concerned with teaching collocations, and those studies addressing collocation have not incorporated technology into language instruction, the present study attempted to bridge the gap between MALL and collocation-based instruction. This endeavor might be a major contribution that adds to MALL and collocation instruction literature.

Also, as shown in Table (1), almost all of the eight studies have targeted college or university EFL students, whereas this study was concerned with a different age group: tenth grade students. As for location, the present study was done in Jordan, which contributes to the novelty of this study. Pertaining to variables, the present study addressed two levels of reading comprehension: literal and inferential comprehension and that was not the case in the previous studies.

Research Methods and Procedures

Participants

Two intact tenth grade sections, of 25 students each, enrolled at Ammar Bin Yasser Secondary School for Boys in Irbid City, Jordan were selected conveniently since the first researcher is an English language teacher in that school. The participants are 15-year old male students who have been studying EFL since the first grade, at the age of six. The two sections were randomly assigned as experimental and control groups. The experimental group used the Quizlet mobile app to learn lexical collocations. The control group received traditional classroom instruction, with no emphasis on collocations.

Design and variables of the study

The present study used the semi-experimental research design and entailed two variables. The independent variable was instruction, and it had two levels: an electronic collocation-based instruction and traditional instruction. The dependent variable was the participants' performance on the Reading Comprehension post-test.

Instruments

The **Reading Comprehension Test** (Appendix B) consists of a reading passage that is followed by two parts of questions. The first part consists of five literal comprehension questions, and the second part is comprised of five inferential comprehension questions. The test is out of 20, two marks per question.

Both the experimental and control groups took a Reading Comprehension pre-test to find out if the two groups were homogenous in terms of their reading comprehension. The results are shown in Table (2). Once the instructional program was over, a Reading Comprehension post-test was administered to the two groups.

Table (2): Equivalence tests

Dimension	Group	N	Mean	Std. Deviation	F	Sig.
Overall Reading comprehension (out of 20)	Experimental	25	7.04	5.14	0.85	0.36
	Control	25	5.88	4.42		
Literal comprehension (out of 10)	Experimental	25	4.96	3.08	0.63	0.43
	Control	25	4.36	2.78		
Inferential comprehension (out of 10)	Experimental	25	2.08	2.45	0.31	0.58
	Control	25	1.64	2.16		

Table (2) shows that there are no statistically significant differences at ($\alpha \leq .05$) between the experimental group's and control group's pre-test scores on overall reading comprehension pre-test, and on each part of the test ($p > .05$). Thus, the two groups' reading comprehension levels were equivalent before implementing the instructional program.

Content validity of the tests and instructional program

The Reading Comprehension Test and the instructional program (outline below) were given to a validation jury of university professors, English language supervisors and experienced English language teachers. The jury validated the test and the instructional program.

Reliability of the test

A pilot sample of 15 tenth-grade students, other than those in the experimental and control groups took the reading comprehension test. To ensure that the tests' items correlate to each other, internal consistency reliability using Cronbach Alpha test was calculated. The results are presented in Table (3).

Table (3): Internal Consistency of the Reading Comprehension Test

Dimension	No. of items	Cronbach's Alpha
Literal comprehension	10	0.81
Inferential comprehension	10	0.86
Overall reading comprehension test	20	0.89

Table (3) demonstrates that the alpha coefficient for the overall Reading Comprehension Test and its parts range from 0.81 to 0.89. This indicates that the items on the test have relatively high internal consistency.

For the purpose of obtaining a coefficient of stability, the same pilot sample retook the same test two weeks after the first test-taking session. Pearson correlation coefficient was computed to find out about the correlation between the test takers' scores in the two sessions. The results are shown in Table (4).

Table (4): Test-retest Reliability of the Reading Comprehension Test

Dimension	N	Pearson coefficient
Literal comprehension	15	0.80
Inferential comprehension	15	0.84
Overall reading comprehension test	15	0.87

Since the correlation coefficient is high, as shown in Table (4), there are very strong positive correlations between the scores in the two sessions on the test. That suggests that the responses of the pilot sample are consistent and the reading comprehension test are highly reliable.

The electronic collocation-based instructional program

To achieve the purpose of the study, the researchers designed an electronic collocation-based instructional program. The key objective of this nine-week program is to assist participants in getting familiar with those collocations in their textbook with the assistance of technology, provide students with an intriguing mobile learning experience and evaluate the potential effect of the program on students' reading comprehension. The researchers have already identified the collocations, by conducting a content analysis, created collocation sets and fed them into Quizlet.

As for teaching the control group, their teacher neither stressed to the students the importance of collocation in language nor drew their attention to those lexical collocations lying in the reading passages. Rather, teaching the control group was based only on the Teacher's Book guidelines.

Teaching the experimental group followed the procedures below:

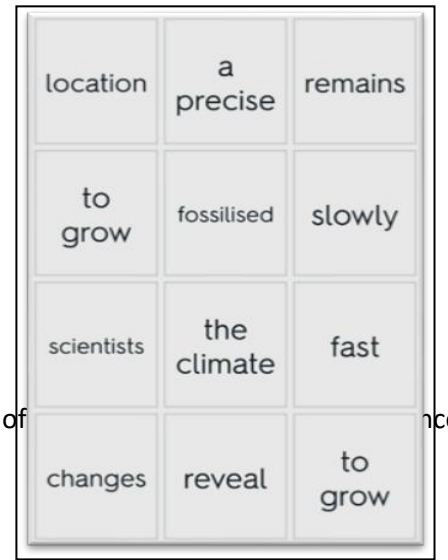
1. The first researcher, who taught the experimental group, introduced Quizlet to the students.
2. The first researcher helped them to download the app, create a free account and locate the target collocation sets.
3. He gave them a hands-on training to ensure that they were completely ready to take full advantage of the mobile app.

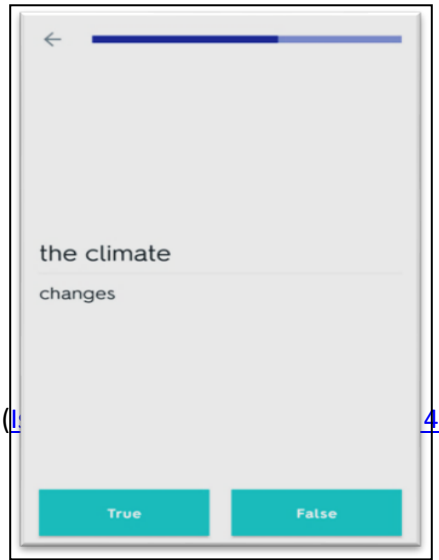
4. Once a reading activity was done in class, the participants, under close supervision of their teacher, located the corresponding collocation set in the mobile app, learned these collocations in that reading passage and monitored their own progress.

5. On average, they practiced two collocation sets per week.

6. During their practice, the participants made use of the five engaging Quizlet modes, *Learn*, *Flashcards*, *Write*, *Match* and *Test*.

The Quizlet Learn Mode facilitates learning a set of flashcards by devising a personalized study plan depending on the user's knowledge of the set and helps the user to keep learning until they attain mastery (Studying with Learn mode, 2019). The Flashcards Mode lets the user study the sets as flashcards (Studying with Flashcards mode, 2019). Here, the user flips between cards in the same study set. The Write Mode assesses how well the user is familiar with the items, based on whether the user types the missing item accurately (Studying with Write mode, 2019). In the Match Mode, learners are required to match the items with their definitions or match the two sides of the flashcard as quickly as possible (Playing Match, 2019). Finally, the user could practice before an exam making use of the Test Mode to ensure they have got a grip on the target items (Studying with Test mode, 2019). It is worth noting that most of the Quizlet tools and modes are customizable, and the user could tailor each mode to suit their objectives, preferences and learning styles. Below are some screenshots of one of the researcher-created Quizlet sets.





The flashcards Mode **The Learn Mode**

The Write Mode **The Match Mode** **The Test Mode**

Figure: Some Screenshots of the Researcher-Created Quizlet Set: *Collocations 5*

When the instructional program was over, a Reading Comprehension post-test was administered to the experimental and control groups. Then, the results of the test were presented and statistically analyzed. Finally, the findings were discussed and pedagogical implications were put forward.

Findings, Discussion, Conclusions and Implications

The question of the study reads as: *Are there any statistically significant differences between the mean scores of the experimental group and the control group on the Reading Comprehension post-test that are attributed to an electronic collocation-based instructional program?* To answer this question, the researchers calculated the means and standard deviations of the participants' performance on the Reading Comprehension post-test. The results are shown in Table (5).

Table (5): Means and Standard Deviations of the Participants' Performance on the Reading Comprehension Pre-test and Post-test

Test Dimension	Group	N	Pre-test		Post-test	
			Mean	Std. Dev.	Mean	Std. Dev.
Literal comprehension (out of 10)	Experimental	25	4.96	3.08	8.36	2.27
	Control	25	4.36	2.78	6.44	2.35
Inferential comprehension (out of 10)	Experimental	25	2.08	2.45	6.84	3.21
	Control	25	1.64	2.16	3.08	2.90

Table (5) shows that the mean score of the experimental group on the literal comprehension post-test (8.36) was higher than that of the control group (6.44). Regarding the participants' performance on the inferential comprehension post-test, the mean score of the experimental group (6.84) was also higher than the mean score of the control group (3.08). The researchers used MANCOVA in order to address the question of the study. The results are presented in Table (6) below.

Table (6): MANCOVA Results of the Participants' Performance on the Reading Comprehension Post-test

Source	Dependent Variable	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Wilks' Lambda

Literal comprehension pre-test	Literal comprehension	0.194	1	0.194	0.039	.845	0.001	0.248
	Inferential comprehension	3.784	1	3.784	0.443	.509	0.010	
Inferential comprehension pre-test	Literal comprehension	15.325	1	15.325	3.050	.087	0.062	2.627
	Inferential comprehension	43.863	1	43.863	5.138	.028	0.100	
Group	Literal comprehension	39.573	1	39.573	7.875	.007	0.146	9.149
	Inferential comprehension	159.058	1	159.058	18.630	.000	0.288	
Error	Literal comprehension	231.160	46	5.025				
	Inferential comprehension	392.735	46	8.538				
Corrected Total	Literal comprehension	302.000	49					
	Inferential comprehension	625.920	49					

Table (6) shows that *f* equals 7.875 for literal comprehension and 18.630 for inferential comprehension, and these values are related with significance level that =.000 at ($\alpha \leq .05$), which means that there is a significant difference on the participants' performance on the Reading Comprehension post-test. In order to find out this difference is in favor of which group, the researchers calculated the adjusted means and standard errors for the Reading Comprehension post-test. Table (7) shows the results.

Table (7): Adjusted Means and Standard Errors of the Participants' Performance on the Reading Comprehension Post-test

Dependent Variable	Group	Mean	Std. Error
Literal comprehension	Experimental	8.30	0.45
	Control	6.51	0.45
Inferential comprehension	Experimental	6.75	0.59
	Control	3.17	0.59

Table (7) shows that the mean differences were in favor of the experimental group in each part of the reading comprehension test: literal and inferential, because the means of the experimental group are higher than those of the control group. That indicates that there is an effect

of the electronic collocation-based instructional program on enhancing Jordanian EFL tenth grade students' Reading Comprehension post-test.

Then, the researchers calculated the means and standard deviations of the participants' *overall* performance on the Reading Comprehension post-test. The results are presented in Table (8).

Table (8): Means and Standard Deviations of the Participants' Total Performance on the Reading Comprehension Post-test

Group	N	Pre-test		Post-test	
		Mean	Std. Dev.	Mean	Std. Dev.
Experimental	25	7.04	5.14	15.20	5.28
Control	25	5.88	4.42	9.52	4.44

Table (8) shows that the mean score of the experimental group on the overall comprehension post-test (15.2) was higher than that of the control group (9.52). Then, ANCOVA was used and the results are shown in Table (9).

Table (9): ANCOVA results of the participants' total performance on the Reading Comprehension Post-test

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Pre-test	94.161	1	94.161	4.231	.045	0.083
Group	351.247	1	351.247	15.781	.000	0.251
Error	1046.079	47	22.257			
Corrected Total	1543.520	49				

Table (9) shows that *f* equals 15.781 for the total performance on the Reading Comprehension post-test , and this value is related with significance level that =.000 at ($\alpha \leq .05$), which means that there is a significant difference on participants' total performance on the Reading Comprehension post-test . To find out this difference is in favor of which group, the researchers calculated the adjusted means and standard errors pertinent to the total performance on the Reading Comprehension post-test. Table (10) shows the results.

Table (10): Adjusted Means and Standard Errors of the Participants' Total Performance on the Reading Comprehension Post-test

Group	Mean	Std. Error
Experimental	15.03	0.95
Control	9.69	0.95

Table (10) shows that the mean differences in the overall Reading Comprehension post-test were in favor of the experimental group because the mean of the experimental group is higher than

that of the control group. That indicates that there is an effect of the electronic collocation-based instructional program on enhancing Jordanian EFL tenth grade students' reading comprehension. As shown above, the experimental group, which received direct and explicit collocation instruction through Quizlet outperformed the control group, which received no collocation-based instruction, in *overall* Reading Comprehension post-test and in each part of the test: *literal* and *inferential* comprehension. This result indicates that familiarity with lexical collocations can be one of the gateways to enhancing reading comprehension.

Discussion

The results of the Reading Comprehension post-test support most of the previous relevant research (Lien, 2003; Lin, 2009; Hsu, 2010; Ganji, 2012; Kiaee, Moghaddam & Hosseini, 2013; Abedi & Mobaraki, 2014). The present study and those six studies reported that direct collocation instruction exerted a positive effect on reading comprehension.

One possible factor contributing to the experimental group's superior performance is the e-learning environment. In this concern, Clark and Mayer (2008) argued that offering practice with automated feedback and instruction tailored to learner's responses are among the effective features brought by e-learning. In the current study, these two attributes were present in the electronic instructional program. In the same vein, Diaz-Vera (2012) asserted that mobile applications have been instrumental in moving language learning to a leading position.

Another possible explanation for the performance of the experimental group on the reading post-test is students' motivation that was crystal clear during the training. The researchers in this regard lend support to Martin, McGill and Sudweeks (2013) who looked on mobility as an underlying motivator for m-learning, and to Laurillard (2007), who considered motivation a distinctive characteristic offered by m-learning. Cunningham (2017) acknowledged the great effect of Quizlet as it enabled students to become highly motivated and fully engaged in language learning. Naturally, a language learner's success according to the findings leads to motivation, which, in turn, results in more success; this was confirmed earlier in the 1990s by Lightbown & Spada, 1993.

A further explanation for the performance of the experimental group might be attributed to the instructional and training program *per se*, which was cautiously developed and watchfully implemented to facilitate learning. Here, the researcher-teacher introduced the mobile flashcard app, Quizlet, to the experimental group, helped them to download and install the program, gave them a hands-on training on how to sign up, locate the target collocation sets and use the five modes of the app. The researcher-teacher, in each reading lesson, directed the students' attention to the collocations in the text. Then, the participants used Quizlet on mobiles or tablets to practice those collocations and measure their progress. According to Cunningham (2017), when Quizlet is combined with proper training, it might increase learner autonomy and involvement in language classroom.

Another likely explanation of the experimental group's superior performance to that of the control group is the Quizlet app. Admittedly, Quizlet is an engaging yet easy-to-use online learning app, which provides learning and teaching tools for teachers. It provides free convenient study tools for learners in five engaging Quizlet modes, *Learn*, *Flashcards*, *Write*, *Match* and *Test*. Most of the

Quizlet tools and modes are customizable, and the user could tailor each mode to suit their objectives and preferences. During the training sessions, the participant students were able to flip through the flashcards with the hand, see and read the words on screens and hear the pronunciation of the words, in return, the app responded to different learning modes.

The experimental group surpassed the control group in inferential Reading Comprehension post-test. This finding accentuates the importance of taking control of collocation in particular and language in general in learner cognition, especially drawing inferences from written texts. Here, the researchers' choice of direct instruction was intended as it brings learners cognitive benefits. Mastery of words and the items attached to them, according to Sprenger (2014), assists in building cognitive skills. In this concern, and as early as the late 1970s, McLaughlin (1978) established that bilingualism appears to positively influence cognitive functioning.

Another plausible explanation of the experimental group outperforming the control group on the Reading Comprehension post-test is developing awareness of and getting familiar with lexical collocations. At the beginning of the training, the participants were not familiar with the concept of collocations. So, initially the researcher-teacher introduced the term collocations to the experimental group, demonstrated how collocations are significant in language production and comprehension, highlighted some examples of collocations, and commented on learner's common miscollocations. Good command of lexical collocations, being an integral part of word knowledge, might be a key factor in improving reading comprehension. In this respect, Perfetti (1985) stressed that both reading comprehension and word knowledge take place simultaneously. Hill (2000) maintained that collocation is the strongest force behind creating and comprehending natural texts and underlined the necessity for language teachers to make their students aware of collocation as the secret to language learning.

The results of this study support the lexical approach to teaching. In this study, the researcher invited his students to appreciate the significance of multi-word units for language production and comprehension by familiarizing them with chunks and encouraging them to identify such chunks in texts as pivotal activities in implementing the instructional program under the study. In this concern, Lewis (1993), who introduced the lexical approach, stated that being acquainted with collocations is essential in language teaching. Similarly, Boers and Lindstromberg (2009) stressed the contribution of prefabricated chunks to comprehending and producing the first and second language.

On the other hand, the results of this study are inconsistent with Kim and Bae's (2012) and Tekingul's (2013) findings, which failed to reveal any significant effect of collocation instruction on enhancing reading comprehension. Kim and Bae (2012) concluded that there was no significant correlation between the participants' collocation knowledge and their reading skills. Tekingul (2013) established that there were no significant differences in the reading assessment scores between the groups receiving collocation instruction treatment and the one with single-item vocabulary instruction.

Using an electronic collocation-based instructional program was beneficial to the participants in a number of ways. First, many participants enjoyed the instructional program and were totally absorbed in m-learning. Second, the researcher-teacher observed that the participants developed interest in lexical collocations, noticed them in reading activities and used some of them in writing and speaking activities. Such interest was also evident in their questions about collocations of target

vocabulary items. Third, learning lexical collocations, extracted from the text book reading activities, was found effective in enhancing literal and inferential reading comprehension. Fourth, the participants appreciated the significance of MALL and gained hands-on experience in the Quizlet app. Thus, they have become more autonomous and hopefully lifelong learners.

Conclusions and implications

In light of the findings of this study, the researchers are in accordance with Zaabalawi and Gould's (2017) suggestion that reading texts should be regarded by teachers as a source of collocations. This way, learners are expected not only develop better reading comprehension but also take notice of collocations in context. Another pedagogical implication of this study entails incorporating explicit collocation instruction into EFL school textbooks and providing a variety of collocation activities such as multiple-choice and fill-in-the-blank questions. Even in speaking and writing activities, EFL teachers may provide suitable feedback to learners' miscollocations and then offer the right combinations.

Getting the most out of Quizlet, and other similar apps or programs, is also recommended since most learners own smart phones or tablets. Nevertheless, such utilization of technology should be rigorously monitored and closely supervised by teachers, and above all, should not go against the institutional policy.

Finally, the researchers suggest that further studies into the effect of collocation-based instruction on other levels of reading comprehension, such as *critical* or *appreciative*, should be conducted. They also believe that more research into collocation and reading but that is technology-aided might be a further step in the right direction.

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