

# Developing EFL Students' Vocabulary and Reading Comprehension Skills within an Interactive Learning Environment

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## Abstract

The current study investigates the effects of an interactive learning environment on EFL students' vocabulary acquisition and reading comprehension skills. The study utilized a quasi-experimental design. The sample consisted of 41 students enrolled in the English program at Umm Al-Qura University studying Reading in EFL course in Summer 2018/2019. The sample was randomly divided into two groups: A control group consisting of 21 students and an experimental group of 20 students. The results revealed statistically significant differences at ( $\alpha \leq 0.01$ ) between the mean scores of the experimental group and the control group in the post-test of the vocabulary test and the reading comprehension test favoring the experimental group. Finally, the study concluded with a call for more studies on modern technologies in teaching EFL skills in the Saudi context.

## Keywords:

*Mobile, learning environments, Infographic, English, language, skills, reading.*

## 1. Introduction

Mobile environments such as smartphones, tablets, and related applications have become an essential part of learners' lives, regardless of their culture, educational, economic, and social levels. Technologies have brought about remarkable changes in the means of communication used by the teacher and the learner, and it has presented teachers with a great challenge to explore how to activate them in support of the teaching and learning process [1].

These changes have led to the emergence of many teaching and learning strategies, which appeared with the technological revolution to meet the learner's needs. One of the most prominent multi-source technologies is "Infographic" with its various designs, as it is one of the latest technologies that have been widely used in light of the increasing knowledge. Technologies have changed the way we think about complex data and information, giving a new visual form to collect and attractively present information to facilitate its understanding, assimilation, and dissemination. It also helps those in charge of the educational process present the curriculum differently [2].

Given the importance of infographics in the educational process, Mansour recommended new methods for using infographics in education. This is due to its effectiveness in simplifying information, accelerating learning time, and keeping it in long-term memory [3]. Al-Quds Open University symposium on "Ways of Employing Infographics in the Educational Process" and some other studies have recommended preparing training courses for faculty members and students in order to employ them in planning lessons [3]. Infographics use in the educational process positively affects students' achievement and motivation toward learning environments [4], [5], [6], [7]. In addition, its inclusion in the educational process contributed to increasing students' motivation, achievement, and interest in educational courses [4], [8].

Since learning English is an active mental process, teaching it should employ technologies that develop language skills and activate their roles for effective education. Therefore, the current study came to employ a mobile learning environment based on interactive infographics to develop reading comprehension and vocabulary acquisition among English language students.

Therefore, based on what was mentioned previously from the recommendations of previous conferences and studies, and the need to develop reading comprehension skills as one of the most important skills and the importance of acquiring vocabulary in learning English; The current research should answer the following questions:

1. What is the effect of utilizing a mobile learning environment based on interactive infographics on English language students' vocabulary acquisition?
2. What is the effect of utilizing a mobile learning environment based on interactive infographics in developing the reading comprehension skills of English language students?

### 1.1 Objectives of the study

This study is an extension of a previous study conducted by the researcher, in which he examined the effects of using infographics on EFL listening comprehension skills [9]. The main aim of the current research study was to design a similar mobile learning environment based on the use of interactive infographics and to reveal its impact on reading comprehension skills and vocabulary acquisition.

## 2. Literature Review

There is great interest in employing technological innovations in the educational field, developing mobile educational environments, and attracting the attention and interest of students through mobile learning environments and the use of mobile devices, digital assistants, laptops, and personal computers [10]. Mobile learning has been given more freedom due to its modern technologies, lightweight devices, various sizes, and screens, which help learn within and outside educational walls without being restricted by time and space limits.

Mobile learning also respects the learners' desire to interact with the parties of the educational community without the need to sit in specific places and times in front of computer screens [1], [11], [12]. All of this reinforces the role of mobile learning technologies as an active learning environment that contributes to achieving cooperation, sharing ideas, exchanging knowledge, and working freely among students with each other or with their professors.

A mobile learning environment is an environment in which the learner benefits from mobile devices and their applications linked to the Internet, such as the use of mobile devices such as personal digital assistants (PDAs), mobile phones, laptops, and other devices that are used in teaching and learning [13]. The field of mobile learning includes many new teaching and learning technologies applications. The value that this new model adds to the educational process includes two aspects:

- Cognitive aspect: mastering reading, writing, and research skills.
- The educational aspect is represented in changing behavior, acquiring life skills, and developing motivation for the learner [14].

This is what the European Committee for Mobile Learning Projects in Britain, Italy, and Sweden focused on; studying the impact of mobile technologies on the performance of learners, teachers, and designers of curriculum and educational programs [15].

From this point of view, many studies have dealt with e-learning environments according to various approaches

and from different perspectives, especially modern technologies in learning the English language and its skills or other sciences. In 2019, the researcher himself conducted a similar study investigating the effects of interactive learning environment on EFL listening comprehension skills. The study revealed significant results confirming that using mobile interactive environment had a great impact on listening comprehension skills at different level [9]. Among similar studies is the study of Abdel Aziz, which aimed to design an e-learning environment based on computer simulation and measure its impact on developing some office work skills. The study sample consisted of (62) male and female students in commercial secondary schools. The results showed statistically significant differences between the experimental group and the control group in acquiring the skills of operating, using, and maintaining office equipment in favor of the experimental group. It also showed a significant and statistically significant improvement in the degree of depth of learning for the experimental group compared to the control group [16].

Al-Harbi measured the impact of using Twitter in developing writing and reading skills and improving the motivation of EFL students in the Kingdom of Saudi Arabia. The researcher used the quasi-experimental method. The study was conducted on 60 students who were randomly distributed over the experimental and control groups. The application of the study continued for eight weeks. The most noticeable results of this study were the high motivation of students who studied using Twitter. The study recommended using this approach in teaching reading and writing skills [17].

Al-Zakari also aimed to design a mobile learning environment to teach EFL and then test it on secondary school students in Saudi Arabia. The study used the quasi-experimental design, where the sample consisted of 57 students in the third grade of a secondary school in Riyadh. The study concluded a statistically significant effect on learning English language vocabulary for students who used the electronic design. The study also found a statistically significant effect favoring those who learned vocabulary in the mobile learning environment. The study recommended employing the mobile learning environment in learning English vocabulary [18].

Despite the popularity of mobile instant messaging applications mentioned above, the Telegram application has reached more than 900 million active monthly users, exchanging more than 10 billion daily messages. While the WhatsApp application is at the forefront of instant messaging applications, Telegram provides its users with several features that are not available in WhatsApp and that no other application provides, most notably:

- Access to messages from different devices enables users to send messages through different devices separately.
- Sending large files without restrictions: Telegram supports sending an unlimited number of photos, videos, zip files, audio files (mp3), and text files (doc).
- Speed and security: Telegram relies on servers worldwide to ensure speed and security. The sources of the company that developed the application stated that it is more secure than other instant messaging applications.
- Free: Telegram is always available free to its users without paying anything.
- Encrypt and Secret Chats: Telegram users can start secret chats with friends. All messages are end-to-end encrypted, and no third party will be able to read messages other than the sender and only the addressee.
- Channels: The Channels feature in Telegram allows you to broadcast messages or content to a large audience. Furthermore, any application user can create a private channel to broadcast the content with a particular link and a private image, and then others can subscribe to it. One of the most critical features of channels of all kinds is that they allow the subscribed user to view the contents of the channel from the beginning of its creation as soon as he joined it [19].

The interest in expanding the use of mobile learning environments in learning is evident in their influential roles in improving the educational process and keeping pace with the developments of the current era. Serious attempts are being made to keep pace with technological developments and to employ them in all forms of educational fields. Some local and international experiences have received support. They have proven their effectiveness in this field through the diversity and renewal of studies, field, and field experiments that monitor and investigate the impact and effectiveness of learning through mobile environments.

### 2.1 Infographic

Infographic technology has appeared with various designs to give new visual and interactive forms so that it displays information and conveys it to learners in ways that are more attractive. Since infographic designs help teachers and curriculum designers present the curriculum in a new and exciting way, the search for a new way to apply this technology in the service of the educational process and

integrate it into the curriculum has become one of the necessities of scientific research in this field [2].

Yildirim aimed to identify the importance of using infographics and their position as educational material from the learners' point of view. The study was carried out using the case study method on 64 students from Ataturk University. The study results showed that learners prefer using infographics in the learning process over using standard texts. The results also indicated that infographic occupies second place after the video in ranking the best educational materials used in the learning process from the learners' point of view [8].

From the above, it is clear that providing the educational content to the learner in the course "Reading in EFL" and its integration with others using infographics may contribute to enticing learners and achieving the objectives of the current research study. This is in line with the results of the two previous studies to make maximum use of technologies by providing an interactive infographic, which allows the learner to receive the amount of information he needs to complete this course.

There are two types of infographics, and each type has characteristics that distinguish it and clarify the mechanisms of its implementation. A static infographic is a permanent poster that can be printed, spread or circulated on the Internet. This type of infographic explains information about a specific topic that its designer chooses according to the goals he seeks. On the other hand, animated infographic, which is divided into two parts:

- Shooting a standard video and putting the data and explanations on it in an animation that shows some facts and concepts in the video itself. This type of little use these days [2].
- Designing data, illustrations and information in a fully animated form. This type requires creativity and good selection of expressive movements. It contains full text for the final output; this is the most commonly used type.

Among the studies on this is Darwish and Al-Dakhny, which aimed to provide a pattern of infographics (fixed, moving) via the web to see their impact on learning outcomes. The study used the quasi-experimental approach, depending on the pre and post-experimental design. It was applied to a sample of 30 autistic children, where the first group has studied according to the fixed infographic style, and the second has studied according to the mobile infographic style. The study recommended using the infographic technology in both static and mobile styles by presenting the knowledge structure of the course content to the students of the category, conducting more similar research, and applying it to different educational stages [20].

The advantages of using infographics in the educational process can be summarized as follows:

- Communicate complex information smoothly and straightforwardly.
- Addresses the mind with the appropriate preference for visual information, vision, and representation.
- It helps the learner form an overall view of the information provided and know the relationships between them, which integrates knowledge within the same field.
- Links knowledge with each other in different fields.
- Directs the teacher and the learner to focus on more understanding than memorization.
- The low cost of using infographics compared to other educational means.
- Provides an element of suspense and fun in the educational process [21].

## 2.2 Reading comprehension

Reading comprehension is a learned/acquired skill that focuses on comprehending inputs (read or audible). It is "the act or fact of understanding with the mind; understanding; ... assimilation with the mind, the power of receiving and containing thoughts" [22]. Comprehension "the process of receiving language; reading or reading; input" [23] When we say that comprehension has been achieved, we describe a result that the reader has reached after taking the information, analyzing it and absorbing the input in a coherent and accurate way. Advanced reading comprehension capabilities include interactive strategies between the reader and the text that are used to develop a meaningful reading experience [24].

Three levels are involved in the comprehension process: word level, sentence level, and text level [25]. The word level includes phonemic and graphic knowledge skills of the word. While the sentence level includes grammatical knowledge skills, and finally the text level includes contextual understanding skills [26]. Therefore, every sentence given in the text has four meanings: "conceptual, hypothetical, contextual, and pragmatic." The conceptual meaning is "the meaning a word alone can have"; as for the default meaning, it is "the meaning that the sentence can have on its own". Contextual meaning is "the meaning a sentence can have when it is only in its context"; While the practical meaning is "the meaning of the sentence as part of the interaction between the writer and the reader." Each of these levels of meaning is important to ensure reading comprehension [27].

Reading comprehension is classified into six types that work together in a parallel and linear manner: literal comprehension, reorganization, inference, prediction, evaluation, and personal response. Literal comprehension is about understanding the direct meaning of a text. Reorganization occurs when readers find different pieces of information from reading and combine them for further understanding. This means that readers still use literal understanding to answer specific questions about the text. In Inference, readers integrate and use their knowledge to arrive at answers to the information implied. While prediction combines the reader's prior, knowledge and understanding of a passage to predict what will happen next. Finally, evaluation requires the learner to have a general knowledge of the text topic and an understanding of the reading material to give a judgment or opinion about the read text (personal response) [28].

Reading comprehension can provide many benefits to learners in different disciplines. Reading effectively can improve both personal and professional life and increase the overall enjoyment of reading. Knowing how to understand a text can also help boost a learner's knowledge in certain areas and help him/her learn new skills and information faster.

As for the current study, the focus will be on developing some reading comprehension skills proven to help EFL learners in different fields. These skills include:

- Summarizing
- Inferencing
- Comparing and contrasting
- Drawing conclusions
- Self-questioning
- Problem-solving
- Relating background knowledge
- Finding the main idea, important facts, and supporting details.

## 3. Methodology

The study used a quasi-experimental design—the sample consisted of two randomly selected groups. One of them consisted of 20 students representing the experimental group and the other of 21 students representing the control group. The experimental group was taught using a mobile learning environment based on interactive infographics in developing reading comprehension skills, while the control group studied in the usual way.

### 3.1 Instruments

The current study adopted the same principles of a previous study by the researcher [9]. However, it requires a specification of the effectiveness of a mobile learning environment based on interactive infographics in developing some reading comprehension skills and acquisition of vocabulary. The researcher has designed two instruments for the study:

- A reading test: aims to measure students' comprehension at different levels (literal, inferential, and critical/evaluative).
- A vocabulary test: also aims to measure students' vocabulary size.

To assess the tests' validity, they were presented in their initial forms to a group of experts in the field to identify the following:

- The extent to which the vocabulary is related to the objectives set and its adequacy.
- The accuracy of the linguistic formulation for each word.
- The suitability of the suggested alternatives for each question.
- The accuracy of the terms used in the test.
- Clarity of tests instructions and appropriateness of the grading system.

The experts have advised the researcher to modify the language of some test items to become more evident. Furthermore, some other items were modified, considering the amendments recommended by the experts. The researcher has finalized the final drafts of the tests, and the number of test items was 25 items. Thus, the test became valid for application to the research sample.

The internal validity of the achievement test was also checked by applying the two tests to an exploratory sample of 20 students who did not participate in the primary sample of the research. Pearson correlation coefficient was calculated between the score of each item and the total scores of the tests using the SPSS program. The results proved that all tests items were statistically significant at  $p$  (0.01) & (0.05). This indicates that all items of the two tests are internal consistency.

The "Cronbach's Alpha" coefficient was used to calculate the reliability coefficients for the total score of the reading comprehension test and the vocabulary test. The results came as the following table 1 shows:

Table 1: Reliability coefficients

Test	Number of items	Cronbach's Alpha
Reading comprehension	15	0.82
vocabulary	10	0.93

It is clear from table 1 that the reliability coefficient reached (0.82) for the reading test and 0.93 for the vocabulary test., which indicates that both tests had a high degree of reliability and can be relied upon in-field application.

### 3.2 Research procedures

The students were randomly divided into two groups, one control (N=21) and the other experimental (N=20). The researcher explained the purpose of the experiment to the students and the steps that would take place during it. The two research instruments were pre-administered to the sample to verify the equivalence of the control and experimental groups in the pre-measurement. The independent sample T-test was used to verify the equivalence and homogeneity of the sample members. Here are the results of the application:

Table 2: Results of the differences between the experimental and control groups in the pre-measurement of the reading test

Group	N	Mean	SD	DF	t	Sig.
Expr.	20	9.45	2.35	39	1.12	0.26
control	21	8.69	3.23	39		

Table 3: Results of the differences between the experimental and control groups in the pre-measurement of the VOC. test

Group	N	Mean	SD	DF	t	Sig.
Expr.	20	11.86	3.35	39	1.37	0.17
control	21	13.11	4.22	39		

It is evident from the results of Tables 2 and 3 that there were no statistically significant differences between the control and experimental groups in the pre-measurement of the reading comprehension and vocabulary tests. The mean of the reading test scores for the experimental group was 9.45 and the control group 8.69, and the mean of the vocabulary test scores for the experimental group was 11.86 and the control group 13.11, which are relative values,

indicating that equivalence has been achieved between the two groups.

Students of the experimental group were trained on some reading comprehension skills using mobile e-learning before the application to ensure the availability of smartphones and the Internet for the experimental sample. The control group studied in the traditional lecture method, which followed the prescribed book and the presentation of lectures through PowerPoint presentations. In contrast, the experimental group studied using a mobile learning environment through the Telegram application and the use of interactive infographics in order to develop vocabulary acquisition and reading comprehension skills in the Reading in EFL course. The whole experiment lasted for five weeks and was applied during the summer semester of 2018/2019.

#### 4. Results and discussion

The first question was: What is the effect of utilizing a mobile learning environment based on interactive infographics on English language students' vocabulary acquisition? To answer this question, the independent sample T-test was used. The aim was to identify the significance of the differences between the mean scores of the experimental and control groups students in the post-application of the vocabulary test. The corresponding "*d*" value of the effect size was calculated. For the vocabulary test, the following table shows the results reached by the researcher:

Table 4: Results of the "*t*" test and the "*d*" value for the differences between the experimental and control groups in the post administration of the VOC. test

Group	N	Mean	SD	DF	<i>t</i>	<i>d</i>	Sig.	Effect size
Expr.	20	35.23	2.12	39	15.35	3.67	0.00	large
control	21	25.45	3.11					

It is clear from table 4 that there are statistically significant differences at the level of  $p \leq 0.01$  between the mean scores of the experimental group and the control group in the post-application of the vocabulary test. The differences were in favor of the experimental group students. It is noted from the table that the value of "*d*" has reached 3.67, a value that confirms that the use of a mobile learning environment based on the use of interactive infographics has a "large" effect on the vocabulary acquisition of English language students.

The researcher explains the previous result by the positive attitudes of university students toward mobile and Internet in education. In addition to the excellent selection of infographic applications used in designing the content of the Reading in EFL course and the excellent selection of the infographic elements that support the course, they are directly related to the achievement of the procedural objectives of the course. In addition to introducing students to deal with the electronic content of the infographic-supported course and training them on interaction skills and dealing with it before implementation. In general, students prefer visual information, and the course provided it by designing a static and moving infographic that supported visual thinking and made it easier for students to acquire information. The researcher continuously communicated with students via e-mail to face any problem during the application (technical or educational)

The results of the current study are similar to previous studies on the effect of mobile education in developing the achievement of different subjects, such as the study of "Al-Zahrani" and "Ahmed" (2013), the study (Kansara, 2016), and the study of "Al-Ghamdi" (2012)

The second research question was: What is the effect of utilizing a mobile learning environment based on interactive infographics in developing the reading comprehension skills of English language students? To answer it, the independent sample T-test was used for two independent groups to identify the significance of the differences between the mean scores of the students of the experimental and control groups in the post-application of the reading comprehension test. The researcher also calculated the corresponding "*d*" value for the differences between the experimental and control groups in the post-application of the reading comprehension test. The following table shows the results:

Table 5: Results of the "*t*" test and the "*d*" value for the differences between the experimental and control groups in the post administration of the reading test

Group	N	Mean	SD	DF	<i>t</i>	<i>d</i>	Sig.	Effect size
Expr.	20	19.0	1.1	39	11.57	2.76	0.00	large
control	21	14.2	2.2					

It is evident from table 5 that there are statistically significant differences at  $p \leq 0.01$  between the mean scores of the experimental group and the control group in the post-application of the reading comprehension. The differences were in favor of the experimental group students. It is noted from the table that the value of "*d*" was (2.76), a value that confirms that the use of a mobile learning environment has

a "large" effect on the development of reading comprehension of English language students. The researcher attributes these results to:

- Good design of the interactive infographic elements employed within the course activities to develop reading comprehension skills.
- Building the practical aspects of the Reading in EFL course according to the reading comprehension skills.
- Increasing the number of activities and practical exercises for each skill within the designed course.
- Providing feedback on the educational tasks presented to students in general, especially the practical ones, during the implementation of the infographic-supported course.

The current study results are similar to previous studies on the development of mobile learning for the English language reading skills. It goes in line with the study of "Khubyari & Narafshan" (2016), "Najmi" study, (2015), Wang & Shih (2015), and the study of "Al-Ghamdi" (2012). All of these studies agree on the effect of infographic in developing various language skills.

## 5. Recommendations

- Employing mobile education supported by infographics in designing student-learning activities in university education in various academic courses.
- Due to its scarcity, the need to enrich English language learning with more research and studies.
- Organizing visits for some faculty members to the leading universities in the Kingdom that offer mobile education to find out the challenges and obstacles they may face and ways to overcome them.
- Arranging training courses for faculty members on interactive infographic design in mobile learning systems.

## 6. Conclusion

Infographic has emerged with various designs to give a new interactive visual form that displays information in attractive ways. The current study investigated using an infographic, within a mobile interactive environment, on developing students' vocabulary and reading

comprehension skills. Infographic has been proved to help develop reading comprehension skills, as students are more into teaching activities, and they have personalized learning and become more involved in the process, which improves their vocabulary size and reading comprehension skills. The study revealed interesting findings calling for more integration of modern technologies in teaching English in the Saudi context.

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