

**The Effectiveness of Using Augmented Reality Applications in Developing
English Vocabulary Acquisition Among Preparatory Schools Pupils.**

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Abstract

Learning EFL vocabulary is a challenging undertaking, therefore teachers do everything they can to make it easier for their students. The purpose of this study is to determine the efficacy of employing AR apps in increasing English vocabulary acquisition in pupils in preparatory school. The pre-post test control/experimental group design was used in the study. The study sample consisted of 40 first-year pupils from Engineer Muhammad Osama Emara Joint Preparatory School in Egypt, who were separated into two groups: an experimental group and a control group. Pupils in the experimental group used AR applications to acquire vocabulary, whereas students in the control group got regular instruction. A pre-post vocabulary achievement test, a suggested teacher's guide for the text course "New Hello" for first preparatory grade, and an AR application designed for the purpose of the study were among the study's tools. The pupils took pre-post vocabulary achievement test, and the results show that there is a statistically significant difference in mean scores between the experimental and control groups in the pre/post-test of English vocabulary achievement in favor of the experimental group.

Key words: AR applications, Vocabulary Acquisition

Introduction

The COVID-19 outbreak recently caused the largest disruption in education systems in history, forcing educational institutions to close and affecting an unprecedented number of students globally (VUTA, 2020). Since March 2020, when WHO declared the COVID-19 pandemic, 1.6 billion pupils in over 190 countries on all continents have been infected. Closures of schools and other learning facilities have affected 94 percent of students worldwide, reaching 99 percent in low- and lower-middle-income countries (United Nation, 2020). In this context, the potential of digital technologies extends well beyond online learning platforms, with immersive computing technologies such as augmented reality allowing users to interact with digital content in creative ways.

With the beginning of the 21st century, there are a lot of technologies that could have a significant impact on education. The rise of computer and smart phone technologies has presented broad opportunities for teachers and researchers to make use of them in the field of language learning and teaching processes. Because of the benefits of multimedia, such as accessibility, integration of many media, and efficiency, some English instructors and researchers try to develop a variety of multimedia ways to improve students' vocabulary acquisition (Wang S., 2021). One of these technologies is augmented reality (AR) technology. It is a powerful technology combining virtual and real worlds using 3D models. Augmented reality is a part of e-learning. This has the potential to change education (Sliusar, 2017).

The introduction of modern smartphones with greater computing power, hardware for environmental interaction and also fully functional operating systems has allowed implementation of AR in more compact size solutions. With this great development AR technology steps out from researchers laboratories into real world applications and mass market.

The basic concept of augmented reality (AR) is to superimpose digital information directly upon a user's sensory perception (Feiner, 2002), rather than replacing it with an artificial environment like what VR systems do. Both technologies may process and show the same digital data and utilize the same specialized hardware, however AR systems employ more complicated and advanced software techniques than VR systems (Liarokapis, 2005). In technical terms, it isn't a single technology but a collection of different technologies that can operate in conjunction, with the objective of enhancing the user's perception of the real world through computer-generated information (Azuma, 1997). This kind of information is generally mentioned as virtual, digital, or synthetic information. The real word must be matched with the virtual in position and

context in order to provide an understandable and meaningful view (Mahoney, 1999). Users can work independently or collaboratively, experiment with computer-generated content, and engage in a natural way with a mixed environment (Klinker, 1997). In the next years, AR systems will be able to incorporate a comprehensive set of augmentation that takes use of all of people's senses (Azuma, R., Bailiot, Y., et al. 2001). Finally, a recent survey of AR describes some known limitations regarding human factors that developers need to overcome with (Van Krevelen, 2009).

The quick development of new digital devices and technology has offered both innovative opportunities and challenges for instructional designers and teachers. Among the recent types of digital media, Augmented Reality (AR) will become so popular. (Lim, C et al, 2011)

Augmented reality (AR) is an emerging technology for various fields of application. AR has extended to many fields such as marketing, architecture and construction, entertainment, medical and military applications, tourism, education and others (Yuen, Yaoyuneyong, & Johnson, 2011; Yang, 2015). In the field of education, AR has been applied to create learning experiences in almost every educational level from early childhood education to higher education (Bacca, J , 2017) . Augmented reality is a highly effective educational application owing to its ability to embed digital objects into a real environment (Liu et. al, 2008).

Research on AR has created AR learning experiences for almost any educational level from early childhood education to tertiary education in which many studies have been conducted. The concept of AR was produced in contexts of training and maintenance when the first Head-mounted display was designed to assist maintenance operations of aircrafts.

Written and spoken intelligible input are essential for learners in the field of language training, since incorporating images, videos, sounds, and animations enriches the input and makes the learning long lasting and fascinating. In this regard, AR technologies have the potential to open up a plethora of new doors in the field of language teaching and learning (Solak and Cakır, 2015).

Learning the alphabets and small words is one of the basic tasks that every child has to achieve, it doesn't matter the language. Vocabulary learning is a complicated task that requires different strategies and techniques, and all students faced difficulties in understanding the meaning of 'unknown words' met in a reading text and in a listening text, either.(Griva, Kamaroudis, & Geladari, 2009). It is quite difficult to learn new vocabulary, to keep new words in mind and to recall them when there's a need to use them. (Tozcui & Coady, 2004).

Most EFL learners find it difficult to communicate with English language due to their limited number of vocabulary. In this sense, Saengpakdeejit (2014) stated that insufficient vocabulary knowledge leads the learners to encounter difficulties in language learning.

Learning EFL vocabulary is a difficult task so that teachers try as much as possible to facilitate it for their learners (Mohamed, 2021). In order to help pupils learn a foreign language, (Rixon, 2008) stated that "Language acquisition is a difficult endeavor that may be unpleasant at times."

Understanding, producing, and manipulating the target language necessitates continuous work. Vocabulary acquisition is simply one part of learning a foreign language, but it is a huge and important one. Although language research studies were seen as a Cinderella subject in the 1980s (Meara, 1980), it has gained traction in empirical studies in the 1990s and 2000s (Broady 2008; Klapper, 2008) and has "achieved a position of considerable importance" (Daller et al., 2007). While this is definitely a positive development, it also means that is virtually impossible to give an overview of the whole field within the limited space of this study.

Extramural English activities, which include learner-initiated activities outside of the classroom in a non-instructional setting with or without the intention of acquiring the language, such as playing computer games, have been shown to improve learners' vocabulary acquisition and English language. In his research (Daryany, 2021) indicates proficiency test scores (Asifa, 2021). that the teachers observed during the investigation were not aware of enough knowledge about the current methods regarding vocabulary acquisition and they would benefit from more training in the methods they used. They were aware of the importance of vocabulary acquisition through reading yet their practices had shortcomings which need to be addressed. Lack of time to cover all vocabulary related to the theme, difficulty of chosen material, and a tendency to ignore low achieving students during the reading task by one of the teachers are some major issues which had a negative effect. Certain positive points were observed in teachers' methods as well: including different types of materials connected to the same topic in their practice, using pre and post-reading tasks, and providing pupils with glossary lists before reading.

The Nature of Vocabulary Acquisition

In elementary school situations, Andrä et al. (2020) determined that learning foreign language vocabulary using gestures (conveyed via dynamic video) was as successful as learning with pictures (conveyed with static images). In many EFL circumstances, vocabulary learning may be ineffective (Siyanova Chanturia & Webb, 2017). Furthermore, even if the lesson is

carefully structured in terms of contemporary pedagogical concepts, it is not always possible to meet all of the objectives of formal vocabulary education. According to Nation and Waring (1997), vocabulary learning in EFL requires more attention than in ESL because, despite studying English for many years, EFL learners' vocabulary size is much less than 5000 words, making it impossible to close the gap between their and native speakers' vocabulary size. ESL learners, on the other hand, can grow their vocabulary as much as native speakers (Tandoğan,2019).

Learning the meaning of a new word does by no means secure retention of that knowledge. In fact, if new words are not repeated within a certain time frame, they will be forgotten and the next time they are encountered it will be as if it were for the first time (Henriksen, 1995).

An advanced language learner knows approximately ten thousand words Schmitt(2002). Although there is not a consensus on how learners learn such a large amount of vocabulary, there is a general picture of vocabulary acquisition in the literature Schmitt(2002). Some important features of vocabulary acquisition have been revealed through research on vocabulary acquisition.

The progressive nature of vocabulary understanding is one of these characteristics. The incremental aspect of vocabulary acquisition refers to the progressive learning of several knowledge categories associated with a single word. Schmitt(1997). Schmitt (2002) emphasizes that these many sorts of information cannot be learned all at once. Furthermore, some forms of information are mastered before others.

The contrast between receptive and productive vocabulary is another facet of vocabulary learning. The term receptive vocabulary refers to the type of vocabulary knowledge that allows learners to recognize and understand a word when it appears in a written or audio piece of language, whereas productive vocabulary refers to the type of vocabulary knowledge that allows learners to produce a word when it appears in a written or audio piece of language (Melka, 2001).

According to Melka (2001), although there are certain levels of knowledge about a particular word, such knowledge should not be considered as two separate systems. They should be considered as differing degrees of familiarity dependent on each other . In other words, “knowing a word is not an all-or-nothing proposition; some aspects may have become productive, while others remain at the receptive level.”

Another important feature of vocabulary acquisition is its retention fragility. When there is learning, there is also forgetting what has been learned. Forgetting is a natural part of learning. When it comes to second language

vocabulary, according to several research studies, lexical knowledge is more likely to be forgotten than grammatical knowledge (Craik ,2002).

According to Schmitt (2002), the fragility of vocabulary knowledge is due to the fact that “vocabulary is made up individual units rather than a series of rules.” Forgetting the learned vocabulary can mean losing all the effort put into learning them. Thus, once the vocabulary items are partly or completely learned, they should be recycled systematically to foster successful retention.

Knowing a word means mastery of its pronunciation, spelling, relation to other words, and the other meanings it has. Once these knowledge types are learned, further effort should be put into activation of this knowledge. In addition, due to the existence of different types of knowledge about a word, the mastery of all these features cannot be developed at once Schmitt (2002).

Furthermore, vocabulary knowledge is subject to forgetting.

To avoid being forgotten, words should be changed on a regular basis(Craik, 2002). Considering all these insights, learners need to allocate a considerably long time to extend, consolidate, and retain their vocabulary knowledge.

Statement of the Problem

New technologies should be used to improve education. Because the technology is new and is not frequently used, augmented reality is a source of contention. As a result, it is impossible to foresee its influence on the educational system and the study process. Furthermore, the connection between augmented reality and students is novel. I've been teaching English for 16 years and have seen that pupils in the preparation stage have numerous issues with vocabulary acquisition; they readily forget the terminology they've recently learned. As a result, students are having difficulty with reading comprehension skills. The current study sought to evaluate the impact of augmented reality applications on the development of English vocabulary acquisition and reading comprehension skills in students in preparatory schools.

The study Questions

The problem of this study can be tackled through answering the following main question:

1- What is the effect of using augmented reality applications in developing English vocabulary acquisition for preparatory schools pupils?

The main question can be branched into the following sub-questions:

1. What are the features of augmented reality applications?
2. How can these applications develop vocabulary acquisition?

Aim of the Study:

The following study aimed at identifying the following:

1. The effectiveness of using augmented reality applications in developing English vocabulary acquisition for preparatory schools pupils.

Significance of the Study

The following study might help to achieve the following:

1. Helping students at 1st preparatory stage to enhance their acquisition of some English vocabulary.
2. Presenting an experimental model to show that integrating more interactive technology promotes the process of teaching and learning.
3. Introducing some new teaching approaches that can help teachers to achieve English teaching goals and to develop their teaching styles in approaching vocabulary and reading comprehension.
4. Bringing instructors' attention back to their lost duties as facilitators and supervisors of their students' learning, as well as supporting active learning practices.

Definition of terms

Augmented Reality:

Augmented reality is defined by the British Computer Society as "combining the digital world with the physical one and therefore augmenting the real-world experience" [the British Computer Society, accessed in 2020]. McMahon Donald (2014) defines augmented reality as a field of technology and/or a medium using technology that combines a live view of the physical world, overlaid with digital information, which can include text, pictures, audio, and video.

Vocabulary Acquisition:

Wallace (1982) argues that mastering a word entails mastering its pronunciation, spelling, grammatical usages, collocation, and connotation and denotation, i.e., mastering the word in terms of its form, meaning, syntax, and grammar (Wang, 1998). In the current study, "vocabulary acquisition" is defined as learners accurately extracting the meaning of a learned term while also appropriately using the word in a specified situation.

Hypotheses of the Study

The current study aims at examining the following hypotheses:

- 1- There would be statistically significant differences between the mean scores of the experimental group before the use of augmented reality applications and their mean scores after application, using a pre-post test to measure vocabulary acquisition for the benefit of telemetry.
2. There would be statistically significant differences between the mean scores of the experimental group and the mean of the control group scores after the

use of augmented reality applications using a pre-post test to measure vocabulary acquisition in favor of the experimental group.

Delimitation of the study

When we ask teachers about their points of view concerning incorporating augmented reality applications in teaching language aspects, specially teaching vocabulary and reading comprehension skills, they will appreciate the technique; however, they will state the difficulties which face them when using it. In this research the researcher is going to focus only on the significance of augmented reality applications in improving pupils' vocabulary acquisition and reading comprehension skills. Furthermore, the researcher is aiming at investigating how we can adopt the interactive activities to benefit from them as much as possible for enriching our EFL learners' vocabulary acquisition and reading comprehension skills.

Population

The total number of participants is 40 pupils, selected from among pupils at a preparatory school namely Engineer Muhammad Osama Emar Joint Preparatory School in Egypt, ranged from 12 to 13 years old. The purpose of this study is to investigate the efficacy of employing augmented reality applications in increasing English vocabulary acquisition and reading comprehension skills in pupils in preparatory school.

Samples

The study deals with two groups from first year preparatory school pupils who are enrolled in the academic year 2020/2021. The size of the sample is about 40 pupils. The sample has been chosen because of the following reasons:

- They can be motivated to interact within mobile applications.
- They are in need to learn vocabulary and reading comprehension as much as possible
- They have the ability to learn new words if they are well presented.

The Results

Verifying the First Hypothesis

The first study hypothesis states that: There would be statistically significant differences between the mean scores of the experimental group before the use of augmented reality applications and their mean scores after application, using a pre-post test to measure vocabulary acquisition for the benefit of telemetry. To validate the study hypothesis the researcher used the paired t test to compare between pre and post test.

Table (1)

The difference between the mean scores of the experimental group on the pre/post-test to measure vocabulary acquisition

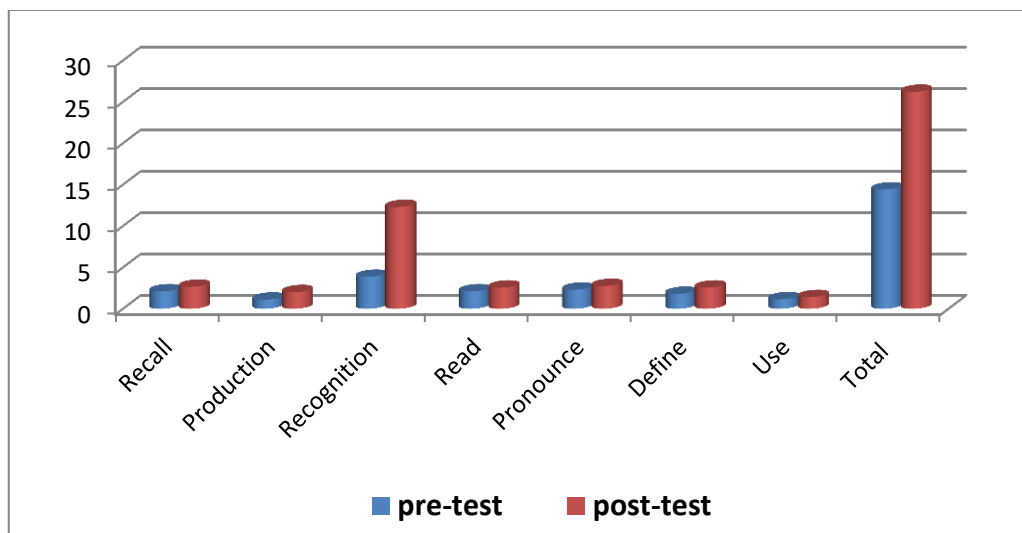
Sub skill	Group	N	Mean	Std.Std. Deviation	Error Mean	df	T	Sig
Recall	Pre-test	20	2.10	0.96	0.22	19	2.463	0.024
	Post-test	20	2.65	0.49	0.11			
Production	Pre-test	20	1.10	0.31	0.07	19	13.077	0.000
	Post-test	20	2.00	0.00	0.00			
Recognition	Pre-test	20	3.85	0.81	0.18	19	55.060	0.000
	Post-test	20	12.30	0.47	0.11			
Read	Pre-test	20	2.10	0.31	0.07	19	2.932	0.009
	Post-test	20	2.55	0.51	0.11			
Pronounce	Pre-test	20	2.30	0.73	0.16	19	2.269	0.035
	Post-test	20	2.75	0.44	0.10			
Define	Pre-test	20	1.80	0.41	0.09	19	4.682	0.000
	Post-test	20	2.55	0.51	0.11			
Use	Pre-test	20	1.15	0.37	0.08	19	2.032	0.056
	Post-test	20	1.40	0.50	0.11			
TOTAL	Pre-test	20	14.40	1.76	0.39	19	21.620	0.000
	Post-test	20	26.20	1.58	0.35			

The above table shows a significant difference in the mean scores of the experimental group in the pre and post-test of vocabulary acquisition for the benefit of telemetry, where the t calculated (19.521.620) is greater than the t tabulated (2.093) and the p value is less than 0.05. The effect size is 0.980.

However, there is no significant difference in use, with a p value of 0.056.

Figure (1)

The difference between the mean scores of the experimental group on the pre/post-test to measure vocabulary acquisition



Verifying The Second Hypothesis

The second study hypothesis states that: There would be statistically significant differences between the mean scores of the experimental group and the mean of the control group scores after the use of augmented reality applications using a pre-post test to measure vocabulary acquisition in favor of the experimental group.

To validate the study hypothesis the researcher used the independent t test.

Table (2)

The difference between the mean scores of the experimental group and the control group scores in vocabulary acquisition after the use of augmented reality applications.

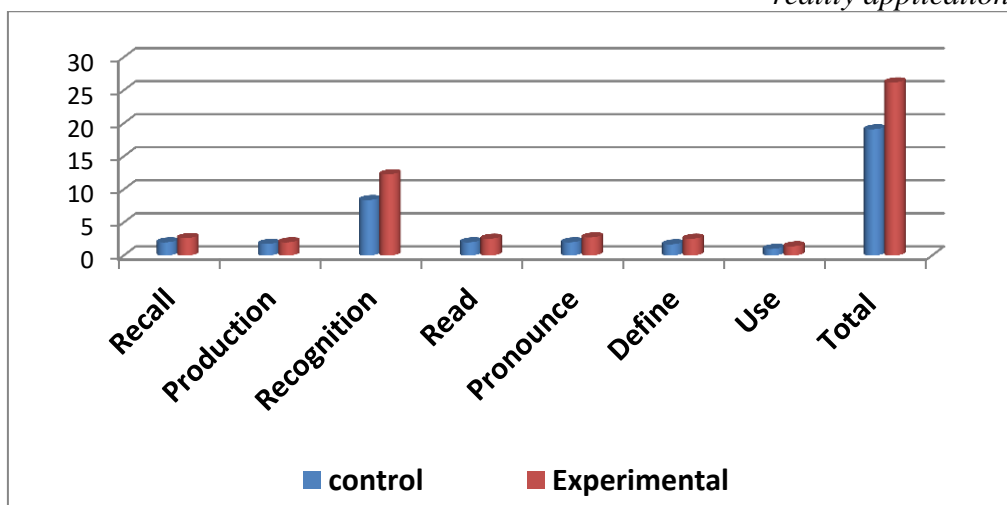
Sub skill	group	N	Mean	Std.Std. Deviation	Error Mean	Df	T	Sig
Recall	Control	20	2.00	0.00	0.00	38	5.94	0.00
	Experimental	20	2.65	0.49	0.11			
Production	Control	20	1.75	0.44	0.09		2.52	0.021
	Experimental	20	2.00	0.00	0.00			
Recognition	Control	20	8.40	0.50	0.11		25.34	0.000
	Experimental	20	12.30	0.47	0.11			
Read	Control	20	2.00	0.00	0.00		4.82	0.000
	Experimental	20	2.55	0.51	0.11			
Pronounce	Control	20	2.00	0.00	0.00	7.55	0.000	

	Experimental	20	2.75	0.44	0.09		
Define	Control	20	1.70	0.47	0.11	5.48	0.000
	Experimental	20	2.55	0.51	0.11		
Use	Control	20	1.00	0.00	0.00	3.56	0.002
	Experimental	20	1.40	0.50	0.11		
TOTAL	Control	20	19.10	0.81	0.18	18.54	0.000
	Experimental	20	26.20	1.58	0.35		

From the above table shows that there is a significant difference between the mean scores of the experimental group and the mean of the control group scores after the use of augmented reality applications favor of the experimental group, where the t calculated (18.54) more than t tabulated (2.56) at p 0.01.the effect size equal .

Figure (2)

the difference between the mean scores of the experimental group and the control group scores in vocabulary acquisition after the use of augmented reality applications



It was hypothesized that the AR application would have a positive effect on vocabulary acquisition. Cohen's (1988) equation was used to verify this hypothesis as shown in table 3.

Table (3)

Results of Cohen's equation comparing the pre- to post-measurements of the vocabulary skills achievement test for the experimental group.

Group	Group	N	Mean	Std.Deviation	Std. Error Mean	df	T	sig	Effect size
Experimental	Pre-test	20	14.40	1.76	0.39	19	21.620	0.000	0.980
	Post-test	20	26.20	1.58	0.35				

As indicated in table 3, the final value of Cohen's equation for the experimental group, comparing its pre- to the post-measurements in the vocabulary achievement test is (0.980). Based on that, it has been concluded that there is a positive effect of the AR application on the pupils' vocabulary acquisition skills.

Discussion of the Results

The current study's findings show that the experimental group outperformed the control group in the post-measurement of the vocabulary achievement test, as there were statistically significant differences between the mean scores of the experimental group and the control group in favor of the former.

The pupils' improvement in the post-measurement of vocabulary accomplishment test might be linked to the fact that they were engaged and motivated to read about themes related to their syllabi while utilizing AR applications. Pupils engaged in a variety of vocabulary assignments. The experimental group outperformed the control group in the post-measurement of the vocabulary accomplishment test, according to the findings of this study. The statistical results revealed statistically significant changes between the experimental group's means of scores in their performance of each post-test compared to the pre-measurement, preferring the post-measurement . The mean score of the experimental group in each test is higher than that of the control group. As a result, the significant difference seen on post-measurement of each test is the result of this group being exposed to AR applications.

The improvement attained by the present study's students using AR applications might be attributable to a variety of factors, including:

1. The teaching content given through the AR apps piqued the students' attention and matched their needs.
2. The augmented reality program inspires pupils and allows them to learn the content at their own pace.
3. The AR application displays information in a number of formats, including dynamic animations and video.
4. The AR application allows pupils to practice and engage in classes, as well as discuss and enhance their vocabulary acquisition .

This was obvious while utilizing AR apps to teach the course by presenting the pupils with a range of activities and splitting the responsibilities among them, allowing them to engage with one another. Using this application to provide students with a variety of activities, changing the teaching method, and dividing roles among students to improve their vocabulary and reading comprehension achievement gave them the opportunity to interact with one another and react to the material presented to them.

They developed a cooperative atmosphere in which less focus was placed on relaying knowledge from the teacher and more attention was placed on the student as a result of this interaction. As a result, the AR application used as a teaching tool throughout the research aided the students in completing various stages.

Throughout the testing, it was discovered that the participants had a favorable view regarding the AR application. By introducing new vocabulary through reading topics related to their studies, increasing enthusiasm and involvement, and enhancing performance, the vocabulary and reading comprehension activities influenced how students felt about developing these two skills.

Nowadays, educational technology is growing all over the world, gradually changing the teaching and learning styles via the use of Internet technology. As a result, the researcher attempted to use AR apps to build a better learning environment for EFL preparatory school pupils. The technique of merging text, color, graphical pictures, animation, music, and movies into a single program that can be executed on smart phones and Ipads is known as AR application technology. The current study proposes an AR application to help EFL first preparatory pupils improve their vocabulary learning. The recommended augmented reality application taught vocabulary through the use of various forms of multimedia such as videos, animation, and images.

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