

# Effectiveness of Using Augmented Reality Strategy in Enhancing Learning English for Cycle One Students in the Elementary Stage in the Kingdom of Bahrain

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The current study aimed at measuring the effectiveness of a designed software computer programme based on augmented reality in teaching English to cycle one students in the elementary stage in the Kingdom of Bahrain. The study also aimed to investigate the competencies that are fulfilled through utilizing the designed programme. The study implemented the quasi-experimental methodology by applying the programme on two groups, controlled and experimental. The data analysis revealed an improvement of students' performance in learning English in the experimental group than their peers in the controlled group, which indicates the effectiveness of designed programme.

*Keywords:* Augmented Reality, teaching English to speakers of other languages, cycle one students, educational software, E-Learning

## Introduction

The modern educational institution has started implementing technology in the teaching learning process as an attempt to enrich the teaching and learning practices that occur in the school context and also to add more harmony to the educational experience by making it more sensual and tangible than limiting it to abstract thinking only. For this,

Devises, equipment, and materials are used by the teacher to enhance the teaching learning process in order to facilitate learning on the part of the students, simplifying concepts for young learning, fulfill their immediate needs, and motivate them towards more engagement in the learning process, in addition to reinforcing the relationship between them and their teacher. (Salama, 2005, p. 66; Khalaf, 1985, p. 42)

With the start of the new millennium, drastic developments have been made to the educational technological utilities and software to the extent that some have become a fundamental element of the learning environment inside the classroom, such as the computer, as many classrooms today are equipped with computers that are linked to the Internet, where the teacher uses as a main source for curriculum content and delivery of extra information. Consequently, this has led for a new development of what the concept of E-learning could mean, what its styles and modes are, and how it can be applied.

In this regard, the elementary stage is considered as one of the main stages in the formal education, in which educational computer has become a need for the students to learn and use. This is due to multiple reasons, some of which are that students' characteristics diverse in this stage and they tend more toward concrete thinking than abstract thinking, so utilizing facilities that fulfill the concrete side of their learning will influence and quick their learning in a more efficient way (Al-Kathiri, 1987).

Further, using computer at the elementary stage increases students' motivation and enthusiasm to learn and absorb the scientific part of the curriculum. EmadAldeen and Abu Sha'ar (1990) found during their tour to some of the elementary classes that using computers in the class added an atmosphere of harmony and enthusiasm to the learners to get more involved in the learning process and enabled the teachers to use more diverse methods other than the traditional way they have been used to.

To conclude, it is shown from the above that computer—educational computer—enjoys huge potentials and facilities, especially the multimedia, that if used in the teaching learning process, more encouragement and motivation to learning will occur on the part of the learners.

### **Study Problem**

The Ministry of Education (MoE) in the Kingdom of Bahrain encourages E-learning through directing its teachers and schools' administrations to utilize and apply the technological facilities in their teaching and work. These attempts have been put in action to align with the new trends which the MoE has launched, such as King Hamad's Project for Future Schools and the updated vision and mission of the MoE, where investing in students' abilities and their skills is the target from using the technological facilities.

As a consequent, the MoE has introduced new technology and facilities to all the government schools' infrastructure by equipping classrooms with computers and data shows that are linked to the Internet and also training its teachers on the modern ways of using these facilities and devices in the way that it serves their teaching practices and increases the quality of their students' learning.

As it is the case, elementary education in the Kingdom of Bahrain is considered a wealthy field for utilizing technology in this regard. This is due to the fact that learners at this stage tend more towards using technology plus that they are able to be trained and taught on this. Wardle (2008) asserted this fact and stated that using technology for teaching elementary students, particularly computer, fulfills and matches with those students' characteristics and needs, and it enables them to interact with the outsider society since it reinforces their visual, audio, and physical skills in this regard.

To conclude, conducting lessons by using technology is believed to add more interaction and fun to the learning process for these young learners, especially those who study English as a foreign language as learners in this regard will need to get exposed to new teaching styles, new devices, and facilities that match with their characteristics, especially that most families today own smart devices, such as mobile phones. Therefore, the problem of this study is shaped in the attempt to propose a new teaching style in teaching English to non-native English speaker learners by using a new technology in the classroom that is called "Augmented Reality". This will be approached through answering the following main research question:

"How effective is a proposed teaching programme that is designed on Augmented Reality in teaching English as a foreign language for cycle one students in the elementary stage in the Kingdom of Bahrain?"

### Study Hypothesis

To answer the above main research question, the following hypothesis will be tested:

#### Hypothesis 1

There are significant statistical differences in the score means between the students in the controlled and experimental groups, for the benefit of those in the experimental group.

#### Hypothesis 2

The proposed programme based on Augmented Reality has a satisfied level of effectiveness (1.2 as in Blake's, 1972) in teaching English to cycle one students in the elementary stage in the Kingdom of Bahrain.

#### Aims of the Study

This study aims to:

- (1) Offer a teaching programme that is based on Augmented Reality to teach the learning competencies of English as a foreign language for cycle one students in the elementary stage in the Kingdom of Bahrain;
- (2) Determine the effectiveness of the Augmented Reality programme in teaching English for cycle one students in the elementary stage;
- (3) Recommend ways to improve the utilization of computer in the teaching learning process when teaching English as a foreign language for cycle one students in the elementary students in the Kingdom of Bahrain.

#### Significance of the Study

This study is important as it:

- (1) Investigates a concurrent issue that is the effectiveness of Augmented Reality on teaching English as a foreign language to young learners in the elementary stage in the Kingdom of Bahrain;
- (2) Targets a sensitive learning stage—cycle one elementary—in which students have specific individual characteristics that are important to be considered and fulfilled when teaching them the subject content;
- (3) Assists teachers who teach students in this stage, especially English language, to better fulfill their students' needs and develop their teaching styles and methods to match with the current trends and aims of the MoE in the Kingdom of Bahrain.

### Operational Terminologies

The main terms are defined and used procedurally in this study are:

#### (1) Augmented Reality

“It is a concept for displaying digital content overlaid on top of real world scenes that can enhance remarkably a user's learning experiences. Augmented Reality (AR) utilizes advanced computer” (Rattanaungrot, White, & Newbury, 2014, p. 327).

It is also defined as:

“A direct or indirect view of a physical, real-world environment whose elements are augmented by computer-generated sensory inputs such as sound, by video, or graphics. It is related to a more general concept called mediated reality” (Joan, 2015, p. 8).

The Augmented Reality (AR) in this study is defined operationally as making integration between the virtual reality through images, shapes with the actual reality for the learners in a way that enables them to gain the subject competences more efficiently.

### (2) Effectiveness

Kemp (1991) defined it as “measurement for assessing the educational software programmes and its capability to fulfil the aims these software programmes are designed for through certain criteria” (p. 21).

FakherAldine (1986), however, viewed it as “a criterion that measures the extent to which the student achieves the learning objectives through using computer” (p. 61).

Consequently, the operational term for “effectiveness” in this study is defined as the ability of the proposed programme, that is Augmented Reality in fulfilling the required learning competencies when teaching and learning English. This was measured through an achievement test given to the learners in this study.

### (3) Cycle One Students

“Cycle One Students” refers to those students who study in grades 1-3 at the elementary stage in the kingdom of Bahrain and whose age ranges from seven to nine years.

## Literature Review

With the rise and spread of the Augmented Reality concept, several definitions have been given by researchers. For instance, *What is website* (2017) saw “Augmented Reality” as the integration of digital information with the user’s environment in real time. In this regard, Augmented Reality is found unlike virtual reality, which creates a totally artificial environment, and that it uses the existing environment and overlays new information on top of it.

It can be seen here how the focus on integration and inclusion between the learner’s environment and the target information and digital reality is emphasized, which indicates recognition of the actual reality and no adaptation of virtual reality that technology promotes for.

In addition, Augmented Reality is defined from Mariam Webster’s (2017) view as an “enhanced version of reality created by the use of technology to overlay digital information on an image of something being viewed through a device, such as a smart phone camera”. This definition goes in line with what is mentioned about Augmented Reality in other dictionaries, such as Oxford, where this concept is defined as “a technology that superimposes a computer-generated images on a user’s view of the real world, thus providing a composite view”.

Augmented Reality is also defined as “a type of interactive, reality-based display environment that takes the capabilities of computer generated display, sound, text and effects to enhance the user’s real-world experience” (Techopedia, 2017).

Similarly, *Investopedia website* (2017) defined Augmented Reality as the “The modification of a real-life environment by the addition of sound, visual elements or other sensory stimuli. Augmented reality is a growing trend in mobile computing, where apps can alter a live or saved image captured by the device’s camera”.

Other definitions for Augmented Reality are seen in the way this concept expresses a “technology that allows for transforming real images with two dimensions to virtual images with three dimensions on the screen of smart devices in a way that it exclude actual reality with digital information” (Ahmed, 2016, p. 6). Al-Hussaini (2014) suggested similar meaning as he viewed Augmented Reality as “an inclusion of virtual reality with actual reality by computer in a way in which digital information is shown in the form of images, video clips, 3D shapes, websites other shapes” (p. 11). Others like Emspak (2016) defined this concept as using technology to superimpose information on the world we see. For example, images and sounds are superimposed over what the user sees and hears. Picture the “Minority Report” or “Iron Man” style of

interactivity. This concept is also defined as a “technological means that is based on mixing photos and images with the actual reality elements as computer controls all these elements” (Al-Otaibi & Al-Balwi, 2016, p. 63).

Based on the above, it can be concluded that Augmented Reality concept consists of certain elements, such as virtual reality that is linked to the actual reality of the learner, and technological devices that facilitates the existence of images and interaction in a 3D mode.

### **Background on the Use of Augmented Reality**

Since the invention of computer as a technological device in the domain of education, attempts have been made to utilize this set to simulate actual reality of the learners especially by using multimedia (Al-Asheeri, 2011, p. 81).

The stages that Augmented Reality went through to be developed can be summarised in the following stages (Kandikonda, 2011, p. 1; Arth, Gruber, Grasset, Langlotz, Mulloni, Schmalstieg, & Wagner, 2015, p. 2; Ahmed, 2016, p. 12; Al-Hussaini, 2014, p. 32; Al-Dahasi, 2017, p. 96):

(1) The first attempt was in 1952 by Morton Heilig who is considered as the pioneer of virtual reality as he invented a small box named as cinematographer. This was developed later to called Sensorama and its idea was based on producing sounds similar to those in reality and creating an atmosphere of enthusiasm and excitement;

(2) In 1968, Ivan Sutherland presented a new technology at that time known as Augmented Reality through a device that adds three dimensions to the images and shapes found in reality. This was considered the transformational step towards Augmented Reality;

(3) In the 1970s, several attempts were done to develop the technological devices to match with the actual reality. For instance, Motorola Company introduced a vision of the first laptop, in addition to Myron Krueger who did an experiment in which the user can interact with the virtual elements;

(4) In the 1980s, the uncovering of the first laptop was released despite its heavy weight and expensive price. The production of the virtual glasses and smart gloves was also made by Jaron Zepel Lanier and was considered the first attempt for investing in technology;

(5) In the 1990s, several attempts were made through Boeing Company by the engineers, Tom Caudell and David Mizell. Also, several inventions of digital cameras were developed to improve the opportunity of Augmented Reality. At this stage, many electronic games were produced and marketed;

(6) With the start of the new millennium, a huge development on the technological devices was made. This has been accompanied with an easy access offered for the Internet especially through the smart phones which facilitated the process of learning and teaching in this regard.

### **The Implementation of Augmented Reality in Education**

Bicen and Bal (2016, p. 59) saw that the technology of Augmented Reality is one of the modern tools that have appeared as associate facilities in the smart phones and digital tablets and that are linked to the Internet that can be used in the classroom when presenting the subject content. Recently, several studies have been done to investigate the influence on these devices on education.

For instance, Al-Dahasi (2017) conducted a study in which he aimed to investigate the nature of technology that influences Augmented Reality in teaching and learning math in primary education. The results showed positive results that Augmented Reality facilitates learning math, increases their abilities, and recognises their individual differences.

Also, Yingprayoon (2015) did a study to explore the using of Augmented Reality on training workshops programmes for teachers. The results showed strong influence of Augmented Reality on teachers' training to create a positive learning environment.

McMahon and Wright (2015) did a study to investigate the effects on Augmented Reality on applying maps in aviation through comparing Google Map with the paper maps as a means for learners with special needs. The study results showed that Augmented Reality assists those students to better learn using maps.

Ahmed (2016) did a study to see the effectiveness of Augmented Reality in developing optical skills for science students in grade 9 in Gaza. The study results revealed an effectiveness of this technology in this regard.

Moushtaha (2015) made a study on measuring the influence on Augmented Reality on developing the creative thinking skills of science students in Gaza in Palestine. The results showed positive results for sake of the experimental group than to the controlled group.

Al-Hussaini (2014) aimed to see the effects of using Augmented Reality on academic achievement cognitive levels in the computer course in Mecca AlMukarama-Saudi Arabia and found that this technology was effective.

In Spain, Perez-Lopez and Contero (2013) did a study to measure the effects of Augmented Reality technology on gaining scientific knowledge related to the digestive system in the science subject for students in the elementary stage. The obtained results confirm the effectiveness of the teaching strategy that implemented the Augmented Reality approach on the expense of the traditional method in the way students showed better comprehension and presence of the scientific studied content.

CHEN (2013) also did his study on investigating the influence of using Augmented Reality in teaching chemistry on some sample students at Washington University and found that the target technology helped students improve their achievement in this subject.

Nevertheless, Kandikonda (2011) discovered in his comparative study that the sample studied using Augmented Reality using 3D models in teaching biology that using this technology results in positive aspects regarding teaching and learning despite some challenges that students and teachers might face when using this technology.

In the same trend, Schrier (2005) conducted a study to see the influence of 21st century technology on teaching history and role play to some historical persons through using Augmented Reality in gathering data and analysing it. The results showed positive aspects in this regard as well that augmented strategy helped those students develop their skills for this and also made them good decision makers.

However, some other researchers like Al-Dahassi (2017) found that elementary teachers in the city of Dammam in Saudi Arabia did not show consideration to this technology as they have found it not effective enough for their students.

Al-Hussaini (2014) investigated the students' attitudes in the intermediate stage toward using augmented technology in their learning and found that students hold positive attitudes due to the fulfilment of this technology to those students' needs and interests.

El-Sayed (2011) found in his study that augmented technology has a positive effect on reinforcing a positive learning situation for the learners.

Similarly, Yuen, Yaoyuneyong, and Johnson (2011) found using augmented technology in the classroom increases students' motivation toward learning and comprehending the subject content.

## Procedures

### Methodology

The study followed the quasi-experimental method of research through assigning controlled and experimental groups of cycle one students who were studying English as a foreign language in the Kingdom of Bahrain.

### Limitations

The current study is limited to the followings:

- (1) Time limitations: The study was conducted using the augmented technology in the second semester of the academic year 2016-2017;
- (2) Human limitations: The study findings are limited to cycle one students in the elementary education in the Kingdom of Bahrain's government schools;
- (3) Objective limitations: The study is limited to the English language curriculum in which English is considered as a foreign language;
- (4) Physical limitations: The study was conducted in Glory Educational Institute in Muharraq in the Kingdom of Bahrain.

### Study Participants

The study was conducted on a random sample of cycle one students at the elementary stage ( $n = 59$ ) who were involved in a General English language programme at Glory Educational Institute. The students were randomly distributed on two groups, controlled ( $n = 30$ ) and experimental ( $n = 29$ ).

### Instruments

(1) Mobile phone (Iphone 7+): Iphone 7+ was used to download some applications that are relevant to Augmented Reality to use when delivering some lessons. The reason behind selecting this device for the experiment in this study was due to the advantages this device has which suit the nature and design of this study in terms of linking it to the Apple TV;

(2) Apple TV: The researcher used this device to link the mobile phone with Apple TV through a facility called Air Play Mirroring for the purpose of showing the Augmented Reality elements in a clear view;

(3) TV set: A TV with high resolution HD was also used and linked with Apple TV to support the planned learning situations to introduce the Augmented Reality at them;

(4) Augmented Reality Applications: A package of Augmented Reality technology that is offered on Apple Store. These applications are: String Reality Showcase, Augment-3D Augmented Reality, and Lumyer Augmented Reality Camera Effects.

### Measurement Tool

An achievement test was developed to measure students' achievement of the required learning competences related to learning English in cycle one in the elementary stage.

## Data Collection and Analysis

Obtained data were analysed using SPSS (Statistical Package for the Social Sciences) programme to analyse the results of the pre-post test to test the study hypothesis and answer the addressed research questions in this study. This was done as follows:

- (1) T test was used to calculate the statistical significant differences between score means;
- (2) Blake equation to measure the effectiveness of learning occurred by using Augmented Reality.

### Study Results and Discussion

Results related to research Question 1:

“How effective is a proposed teaching programme that is designed on Augmented Reality in teaching English as a foreign language for cycle one students in the elementary stage in the Kingdom of Bahrain?”

The researcher analyzed the obtained data of students’ performance in the pre-post test using T test factor. The following Table 1 summarizes the results:

Table 1

*T-test Means Scores Between Controlled and Experimental Groups in the Post Test*

Group	N	Mean	S.D.	D.F	T value	Sig.	Level
Experimental	29	26.92	2.026	57	43.362	.043	Sig. at level below 0.05
Controlled	30	12.41	2.055				

Table 1 shows a statistical significance at level 50.0 between the means of the controlled and experimental groups for the benefit of the experimental as T value (43.362) for the experimental group exceeds the value registered for the controlled group ( $t = 26.92$ ). This goes in line with the mean scores registered for the controlled group (12.41) in the achievement test (total score = 30). Accordingly, Hypothesis 1 was achieved and therefore the null hypothesis is rejected.

In addition and to test Hypothesis 2, the researcher calculated Blake Modified Gain Ratio and it is:

$$\text{Black Modified Gain Ratio} = \frac{\bar{Y} - \bar{X}}{T - \bar{X}} + \frac{\bar{Y} - \bar{X}}{T}$$

Y = Mean of scores for the post test for the experimental group students;

X = Mean of scores for the pre-test for the experimental group students;

T = Total score in the test.

The registered Blake value is found to range between 0-2 and this allows claiming that the proposed programme can be described as effective since the obtained ration is 1.2 and above which shows its effectiveness for the participants in the experimental group. The following Table 2 presents the differences in the mean scores between both groups after their performance in the pre- and post tests:

Table 2

*Blake Modified Gain Ratio for Experimental and Controlled Groups*

Total score	Mean in the pre test	Mean in the post test	Modified gain ration	Significance
30	4.03	26.92	1.85	Accepted as it is above 1.2

The above table shows that the teaching programme that is based on Augmented Reality for teaching English to cycle one students can be described as effective in achieving its aims since the gain ration (1.85) is higher than 1.2 which indicates an acceptance to Hypothesis 2 and so the null hypothesis is rejected in this



regard. This all indicates that the designed programme based on Augmented Reality was effective enough to help students gain the learning competences required for learning English in cycle one at elementary stage in the Kingdom of Bahrain. This result could be referred to the followings:

The electronic design of the proposed programme that is based on Augmented Reality as it was described easy in use on the part of the teacher, which enabled him to engage intensively the learners in the learning situation, in contradiction to those in the controlled group who could not get fully engaged in the lesson but rather were led by the teacher to learn the target language.

Students in the experimental group managed to utilise their different senses through using the multimedia facilities when learning English. This assisted them to better grasp the subject content, whereas this was not fulfilled by those in the controlled group.

The programme helped both the teacher and the students in the experimental group to implement an exploratory approach when learning using the Augmented Reality, whereas this was not shown in the controlled group that is depended on the traditional method.

The proposed programme allowed the teacher for more interaction and involvement of the students which enabled the teacher to provide more materials that reinforce the students' confidence in themselves when learning English. This also added more enthusiasm and motivation to the learning process inside the classroom.

### Conclusion

Based on the results obtained in this study, it can be concluded that using Augmented Reality in designing programmes for learning English for cycle one students in the elementary stage can facilitate their learning more and assist those students to gain the required learning competencies in this regard more easily and quickly. Also, the Excel of students in the experimental group shows how Augmented Reality supported those students to be active participants in the class and get engaged when learning the foreign language. In sum, the current study would recommend the followings:

- (1) Encourage the learning institutes and teachers of English to apply the Augmented Reality in designing and presenting their lessons for students in the elementary stage as it helps in engaging students and raise their motivation towards learning the target language;
- (2) Conduct workshops and training sessions for teachers to train them on how to use Augmented Reality in designing and presenting their lessons;
- (3) Reconsider the current used learning materials and substitute them with others that are designed according to Augmented Reality.

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