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University of Babylon
College of Basic Education
Department of Special Education/ General Methods of Teaching



**The Effectiveness of a Proposed Instructional
Program Based on Augmented Reality
Technology on Academic Achievement and
Developing Visual Intelligence Skills for
College of Basic Education Students**

A Dissertation
Submitted to the Council of the College of Basic Education/
University of Babylon in Partial Fulfilment of the
Requirements for the Degree of Doctor of Philosophy in
Education / General Methods of Teaching

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالَ رَبِّ أَوْزِعْنِي أَنْ أَشْكُرَ نِعْمَتَكَ الَّتِي
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صَدَقَ اللَّهُ الْعَلِيُّ الْعَظِيمُ

سورة الاحقاف: الآية : ١٥

In the Name of Allah, Most Gracious, Most Merciful.

He says, "O my Lord! Grant me that I may be grateful for Thy favour which Thou has bestowed upon me, and upon both my parents, and that I may work righteousness such as Thou mayest approve; and be gracious to me in my issue. Truly have I turned to Thee and truly do I bow (to Thee) in Islam."

(Quran, Al Ahqaf: 15)

(Translated by Ali, 2004)

Supervisors' Certificate

We certify that the dissertation entitled “**The Effectiveness of a Proposed Instructional Program Based on Augmented Reality Technology on Academic Achievement and Developing Visual Intelligence Skills for College of Basic Education Students**” submitted by **Ahmed Ali Alwan AL-Qaraghooli** has been prepared under our supervision at the College of Basic Education/University of Babylon in partial fulfilment of the requirements for the degree of a Ph.D. in Education / General Teaching Methods.

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Dedication

To the owner of the first and last endowment, to the guide to the right path, my Lord “**Allah**”.

To the one who led mankind’s hearts and minds, to the harbour of safety, the first teacher of humanity, Prophet **Muhammad**, may Allah prayers and peace be upon him.

To the righteous martyrs, those who wrote with their pure blood the most beautiful and bright pages of glory, redemption, sacrifice and giving... To **the Martyrs of Iraq**.

To who taught me altruism, steadfastness and love of life, no matter what the difficulties were, and from whom I drew my strength and my self-esteem, **my dear father**.

To the light of my eyes, the light of my path, and the joy of my life, whose her prayers and words were the companion of brilliance and excellence, **my dear mother**.

To my shadow when fatigue struck me, **my dear and faithful wife**.

To the seed of the heart and the hope of tomorrow, my beloved children, **Ruqayah, Abdullah, Hassan and Soumana**.

To **my brothers and sisters** a source of pride and honour.

To my brothers in the field of work and study, **my dear colleagues**.

To all the sincere hands and hearts that helped me, **my dear instructors**.
I dedicate this humble work, asking God to accept it.

The researcher

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The researcher

Abstract

There is no doubt that the integration of technology into the educational process with its various forms (e-learning, blended learning, and educational applications such as platforms or Google Classrooms) has become stronger and clearer, as educational technology today represents an urgent necessity in the educational system of Iraq in order to keep pace with international educational institutions, increase the motivation towards learning at all educational levels, and to provide an exemplary interactive classroom environment for the learners. Since we live in the age of information, technological applications, smart devices and artificial intelligence techniques that are surrounded us from every direction, we find that technology has become an important and essential part of life in general, and thus it has become necessary for technology to have a role in the educational process as well.

The problem of this study can be identified in 2nd stage university, students' weakness regarding academic achievement and visual intelligence skills. The current study aims at figuring out the effectiveness of a proposed instructional program based on ART on developing 2nd stage university students' academic achievement and figuring out the effectiveness of a proposed instructional program based on ART on developing 2nd stage university students' visual intelligence skills. In this study, it is hypothesized that there is no statistically significant difference at the level of significance (0.05) between the mean scores of the experimental group students who are taught reading comprehension using the instructional program based on ART and the mean scores of the control group students who are taught the same subject using the conventional method in the post-achievement test. It is also hypothesized that there is no statistically significant difference at the level of significance (0.05) between the mean scores of the experimental group students who are taught reading comprehension using the instructional program based on ART and the mean scores of the control group students who are taught the same subject using the conventional method in the post visual intelligence skills test.

To achieve the aims of the study, the researcher used quasi-experimental method: the descriptive approach to study ART, academic achievement, and visual intelligence. The experimental approach was also

used to reach the effectiveness of the proposed instructional program based on ART in both academic achievement and the development of visual intelligence skills. The researcher prepared an ART instructional environment according to the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) Model for simplicity of design, ease of use and suitability for age stage of the study sample. The experiment was limited to use Quick Response (QR) Code Reader Application and EyeJack Creator Application to design and produce the content of ART as well as uploading the digital instructional content (designed by the researcher for seven topics of reading comprehension textbook) on Google Sites. Both smartphones and tablets were used to display the ART-based content. The experiment was applied in the second semester of the academic year 2020/2021.

The study sample consisted of 91 male and female students from the second stage, College of Basic Education, University of Babylon. They were divided into two equivalent groups, the control group consisted of 45 male and female students, and the experimental group consisted of 46 male and female students. The topics (passages and stories) of the reading comprehension textbook were taught to the control group by the conventional method, while the experimental group students were taught the same content by using the proposed instructional program based on ART. The measurement tools included two tests: the achievement test and visual intelligence test that are designed by the researcher. At the end of the experiment, two post-tests for both achievement and visual intelligence skills have conducted. After analysing the results, it has been indicated that there is a statistically significant difference in achievement and developing visual intelligence skills between the experimental group and the control group in the post-tests in favor of the experimental group. The results of the study showed the superiority of the experimental group that was taught using the instructional program based on ART over the control group that was taught using the conventional way. In light of the discussed results of the study, the researcher has recommended and suggested a number of further studies.

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Table of Abbreviations

NO.	Abbreviations	Description
1	AA	Academic Achievement
2	ADDIE	Analysis, Design, Development, Implementation, and Evaluation
3	AR	Augmented Reality
4	ARBL	AR-based Blended Learning
5	ARLEs	Augmented Reality Learning Experiences
6	ART	Augmented Reality Technology
7	CG	Control Group
8	EG	Experimental Group
9	HHD	Hand-Held Display
10	HMD	Head-Mounted Display
11	IQ	Intelligence Quotient
12	MIT	Multiple Intelligence Theory
13	ML	Mobile Learning
14	MRT	Mixed Reality Technology
15	PDA	Personal Digital Assistant
16	QRC	Quick Response Code
17	RC	Reading Comprehension
18	RCC	Reading Comprehension Course
19	SD	Spatial Displays
20	SES	Socioeconomic Status
21	TEL	Technology – Enhanced Learning
22	VI	Visual Intelligence
23	VIS _s	Visual Intelligence Skills
24	VIT	Visual Intelligence Teaching
25	VR	Virtual Reality
26	VRT	Virtual Reality Technology

المُلخص:

مما لا شك فيه ان دمج التكنولوجيا في العملية التعليمية بأشكالها المختلفة (كالتعليم الالكتروني و التعليم المدمج والتطبيقات التعليمية مثل المنصات أو صفوف جوجل التعليمية وغيرها) أصبح أقوى وأوضح، حيث تمثل تكنولوجيا التعليم اليوم ضرورة ملحة في النظام التعليمي في العراق من أجل مواكبة المؤسسات التعليمية العالمية وزيادة الدافعية نحو التعلم في جميع المراحل التعليمية وتوفير بيئة صفية تفاعلية نموذجية للمتعلم. و بما اننا نعيش في عصر المعلومات والتطبيقات التكنولوجية والاجهزة الذكية وتقنيات الذكاء الاصطناعي المحاطة بنا من كل اتجاه، نجد ان التكنولوجيا قد باتت جزء هام وأساسي في الحياة بشكل عام، وبهذا أصبح من الضروري أن يكون للتكنولوجيا دور في عملية التعليم أيضاً.

يمكن تحديد مشكلة هذه الدراسة في ضعف طلبة المرحلة الثانية في الجامعة فيما يتعلق بالتحصيل الدراسي ومهارات الذكاء البصري، حيث تهدف الدراسة الحالية إلى معرفة فاعلية برنامج تعليمي مقترح قائم على تكنولوجيا الواقع المعزز (ART) في تنمية التحصيل الدراسي لطلبة المرحلة الثانية في الجامعة، ومعرفة فاعلية برنامج تعليمي مقترح قائم على تكنولوجيا الواقع المعزز (ART) في تنمية مهارات الذكاء البصري لطلبة المرحلة الثانية في الجامعة. وتضمنت هذه الدراسة الفروض الآتية: لا توجد فروق ذات دلالة إحصائية عند مستوى الدلالة (0.05) بين متوسط درجات طلبة المجموعة التجريبية الذين درسوا مادة الاستيعاب القرائي باستخدام البرنامج التعليمي القائم على تكنولوجيا الواقع المعزز (ART) ومتوسط درجات طلبة المجموعة الضابطة الذين درسوا نفس المادة الدراسية باستخدام الطريقة التقليدية في اختبار التحصيل البعدي. كما افترضت الدراسة بأنه لا توجد فروق ذات دلالة إحصائية عند مستوى الدلالة (0.05) بين متوسط درجات طلبة المجموعة التجريبية الذين درسوا مادة الاستيعاب القرائي باستخدام البرنامج التعليمي القائم على تكنولوجيا الواقع المعزز (ART) ومتوسط درجات طلبة المجموعة الضابطة الذين درسوا نفس المادة باستخدام الطريقة التقليدية في اختبار مهارات الذكاء البصري البعدي .

ولتحقيق أهداف الدراسة، استخدم الباحث المنهج شبه التجريبي: المنهج الوصفي لدراسة تكنولوجيا الواقع المعزز، والتحصيل الدراسي، و الذكاء البصري، كما تم استخدام

المنهج التجريبي للتوصل لفاعلية البرنامج التعليمي المقترح القائم على تكنولوجيا الواقع المعزز في كل من التحصيل الدراسي وتنمية مهارات الذكاء البصري. أعد الباحث بيئة تعليمية قائمة على تكنولوجيا الواقع المعزز لتدريس المادة وفقاً لنموذج ADDIE الذي يمتاز ببساطة التصميم وسهولة الاستخدام والملاءمة للمرحلة العمرية لعينة الدراسة. واقتصرت التجربة في استخدام تطبيق قارئ الباركود QRC Reader و تطبيق اي جاك EyeJack Creator لتصميم وإنتاج محتوى تكنولوجيا الواقع المعزز القائم على (النصوص، الصور المتحركة و الثابتة، الفيديوهات، و التسجيلات الصوتية) ، و كذلك تم رفع المحتوى التعليمي الرقمي (المصمم من قبل الباحث لسبعة موضوعات من كتاب الاستيعاب القرائي) على جوجل سايتس Google Sites. أُستخدم كل من الهاتف الذكي والأجهزة اللوحية لعرض المحتوى التعليمي القائم على تكنولوجيا الواقع المعزز. وطُبقت التجربة في الفصل الدراسي الثاني من العام الدراسي ٢٠٢٠ - ٢٠٢١ م.

تكونت عينة الدراسة الأساسية من (٩١) طالباً و طالبة من المرحلة الثانية، و قد تم تقسيمهم و توزيعهم إلى مجموعتين متكافئتين. تكونت المجموعة الضابطة من (٤٥) طالباً و طالبة وتكونت المجموعة التجريبية من (٤٦) طالباً و طالبة. تم تدريس موضوعات كتاب الاستيعاب القرائي للمجموعة الضابطة بالطريقة التقليدية، بينما درست المجموعة التجريبية نفس المادة العلمية (المحتوى) من خلال البرنامج التعليمي المقترح القائم على تكنولوجيا الواقع المعزز. أما أدوات القياس المستخدمة في الدراسة الحالية فقد شملت اختبارين: الاختبار التحصيلي و اختبار الذكاء البصري من إعداد الباحث. في نهاية التجربة ، تم إجراء اختبارين بعديين للتحصيل الدراسي و مهارات الذكاء البصري. وبعد تحليل النتائج لوحظ "أن هناك فروق ذات دلالة إحصائية في التحصيل وتنمية مهارات الذكاء البصري بين المجموعة التجريبية والمجموعة الضابطة في الاختبارات البعدية لصالح المجموعة التجريبية". أظهرت نتائج التجربة تفوق طلبة المجموعة التجريبية التي تم تدريسها باستخدام البرنامج التعليمي القائم على ART على طلبة المجموعة الضابطة التي تم تدريسها بالطريقة التقليدية. وفي ضوء نتائج الدراسة التي تمت مناقشتها، أوصى و اقترح الباحث بضرورة اجراء المزيد من الدراسات و البحوث حول فاعلية تكنولوجيا الواقع المعزز في التعليم .

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CHAPTER ONE

INTRODUCTION

1.1 The Problem and its Significance

The evolution of technology has brought about with it, several benefits the world over. Apart from enhancing efficiency, it has turned the world into a global village and made access to information quite easy. Because some needs appear as a result of transformation of the society, there has been a remarkable interest in developing computer and communication oriented technologies to overcome the issue of gathering the desired information, revising it and even sharing it. As a result, many different technological approaches, methods, and techniques have appeared in order to adapt individuals to the new society and the new 'brave world'. It is clear that computer and communication oriented technologies have a great role on the whole changes, improvements, and developments so far and will continue to shape the future (Kurubacak & Altinpulluk, 2017, 155). Technology is one of the areas of great and remarkable development. It is the process of applying knowledge and science in various fields to meet the needs of individuals and communities. It is a modern lifestyle necessity. There are new ideas and advances in technology every day, as the world becomes more involved in the discovery and use of natural resource potential. By providing convenience and efficiency, technology has significantly improved human lives. It made access to education, communication, medicine, transportation, and sports easily possible for us.

Educational technology is changing the way people engage and interact with learning material. Its goal is to create a powerful environment where the student can use their innate abilities of learning to grasp complex concepts and acquire knowledge through observation, imitation and participation. Technology enhanced learning is most effective when it integrates into the curriculum, mitigates the passive lecture experience and the large number of students in a class, and also provides a tool within which students can engage in meaningful experiences and gain knowledge (Moro et al., 2017, 549) .

Teaching and learning nowadays have become challenging in some ways due to the world's rapid change, most significantly, in the aspect of

technology. The surrounding scene that the new generation has grown up with is different from the older generation, causing some contradictions on value and approach between these generations. In higher education, the teaching and learning challenges include the lack of understanding of students' characteristics; and the lack of educators' enthusiasm in adopting technology into their teaching methodologies (Abdul Kadir, 2020, 134).

The large number of variables related to university learning is an important issue that must be considered when attempting to utilize research for teaching reform. For example, in a review of many studies and papers, Iraqi researchers identified variables significantly related to the achievement in school and university . Academic achievement is taken as a key criterion to evaluate one's total potentialities and capabilities. It occupies a very important place in teaching and learning process. The technology and information based society demands the people who are able to find out the solution of different issues, to analyze carefully and adapt new situations such as solving problems of various kinds and sharing their thinking successfully. The need to make systematic educational efforts primarily aimed at influencing attitudes, behavior, values and personality of individuals to manage their growth and development well is very important (Joseph, 2017, 1).

Covington (2000) states that “academic achievement is considered within society culture to be an important step in one's life course, whereby great significance and worth is placed on an individual's ability to achieve. These performance oriented values induce many adolescents to judge their worth as students by the grades they receive”. (p. 178). Academic achievement is important and determining the future education of individuals and job opportunities for them. Educators and researchers try several ways and new methods to investigate academic achievement- which is considered very important for the future of generations in all age groups (Kocak et al., 2021, 456).

Huitt et al. (2009, 2), Donker et al. (2014,5), and Kanadlı (2016, 2062) mention that the categories of variables impacting student academic achievement are: home context variables, school-level context variables such as (school characteristics, school processes, school leadership and curriculum), classroom input variables such as (teacher characteristics and

student characteristics), and classroom process variables such as (teaching strategies, teacher behavior, student behavior and learning styles).

In addition, the most prominent problems facing the Iraqi university students are the low level of academic achievement. There are multiple reasons that depend on different factors, including the traditional environment that infuses and makes monotony in the hearts of learners because it relies on memorization and indoctrination. Therefore, the search for modern and varied teaching methods has become the focus of the educational process, so that the student, after passing through various experiences, can live in this complex and accelerating world (Al-Bahadli, 2020, 237) and (Al-Jiboury & Al-Shammari, 2019, 728-29).

The subject of Reading Comprehension (RC) for the second stage students in the Department of English, College of Basic Education which is implemented now, requires the instructor to add variety to his/her methodology of teaching this course and to take some points into consideration while teaching the material. Among these points are using technology (e.g. using smartphones and tablets) in the classroom and identifying factors relevant to the language teaching through interactive videos and android applications.

In spite of this importance of RC and the good efforts exerted to develop the academic achievement in this subject in Iraqi Basic Education Colleges, there is an increased percentage of second stage students and weakness in developing achievement in the most of Colleges of Basic Education (AlShammari & Alwan, 2021, 4). Therefore, there is a dire need to develop and improve academic achievement for those students.

Multiple Intelligence Theory (MIT) is more suitable for the study due to the more convenient number of intelligences, learning styles, and aptitudes when adapting course materials. This theory provides well-constructed and sound essentials from which it is possible to distinguish weak and strong student learning areas and take advantage of that information by adapting teaching materials to make them more appropriate to the student's preferences (Šafranĳ & Zivlak, 2018, 72).

Visual Intelligence (VI) is one of these intelligences that has been described as an ability to visualize or create an image which characterizes the spatial world. According to Haley visual intelligence considers the

ability to mentally reconstruct or modify the outlook of objects in space, concluding with the representation of ideas. Individuals with highly developed visual intelligence are also sensitive of colours, shapes, diagrams, posters, and forms. This kind of intelligence also includes the aptitude to graphically represent spatial or visual ideas (Haley, 2004, 178).

As a result of the advancement in communication and network technologies, more innovative instructional delivery and learning solutions have emerged in order to provide meaningful learning experiences for learners in academic settings. In recent years, there has been a growing interest in applying Augmented Reality Technology (ART) to create unique educational settings. So far, however, there is a lack of review studies focusing on investigation of factors such as (the uses, advantages, limitations, effectiveness, challenges and features of ART in educational settings). Personalization for enhancing, promoting, and strengthening a comprehensive learning using ART is also a growing area of interest (Bacca et al., 2014, 133).

Research on ART has also demonstrated its extreme usefulness for increasing the student motivation in the learning process. Gurjar and Somani (2016) add that “AR applications increase the ability of students to learn and also increase creativity. Student becomes more interactive to study. Response of students in education is increased.” (p. 654). From their point of view, it becomes easy to make students understand a hard topic in easy ways. Learning becomes more interesting with use of ART and this technology makes education easy to understand. ART may also increase learning capability and grasping power of mind.

Today, ART is one of the newest visualization technologies in educational environments. AR has been used in many fields for its visualization features in embodying and demonstrating abstract or invisible content. The use of ART, in educational settings, is growing rapidly because instructors believe that diverse delivery methods may significantly enhance learning outcomes as well as increase students’ satisfaction and academic achievement of the learning experience (Erbas & Demirer, 2019, 450).

Accordingly , it is clear for the researcher that there is a research movement to apply ART in the field of teaching various subjects and courses. Furthermore, some studies have confirmed that the use of ART in

the teaching process achieves the quality of the educational product, and this product is not memorization or indoctrination, but rather the knowledge that has meaning and value in the life of the learner, which helps him solve the problems facing him/her in his/her life. In addition to all of this, the educational Iraqi environment is in dire need of developing students' academic and scientific skills from this perspective, but the field is still barren.

Therefore, the researcher seeks developing academic achievement and visual intelligence skills which are neglected in most of the colleges in Iraq in general and in the College of Basic Education in particular (Obeid & Al-Sayegh, 2019, 423-24). By realizing how a proposed instructional program based on ART and visual intelligence skills can be combined, the researcher will do his best to find an effective way of teaching, employing attractive vibrant learning activities, and giving opportunities for students to practice visual intelligence skills in order to develop it.

Based on the explanation above, the present study deals with using ART in an attempt to develop academic achievement and visual intelligence skills which are so weak and neglected in reading comprehension course for second stage students at Department of English/ College of Basic Education.

1.2 Aims of the study

This research aims at:

1. Figuring out the effectiveness of a proposed instructional program based on ART on developing 2nd stage university students' academic achievement.
2. Figuring out the effectiveness of a proposed instructional program based on ART on developing 2nd stage university students' visual intelligence skills.

1.3 Value of the study

It is hoped that the present research would:

1. Contribute to develop 2nd stage university students' visual intelligence skills as well as their academic achievement in the subject of "Reading Comprehension".
2. Provide instructors, supervisors and curriculum designers with a list of visual intelligence skills necessary for 2nd stage university students to

be taken in consideration while planning and designing syllabi suitable for those students.

3. Enrich the research libraries with results about the applications of ART and its effectiveness on developing visual intelligence skills.
4. Draw 2nd stage university instructors' attention to the necessity of using ART on developing visual intelligence skills, and try to use this technology to develop other intelligences and language skills in the same stage and other different stages.

1.4 The Hypotheses of the study

It is hypothesized that:

1. There is no statistically significant difference at the level of significance (0.05) between the mean scores of the experimental group students who are taught reading comprehension using the instructional program based on ART and the mean scores of the control group students who are taught the same subject using the conventional method in the post-achievement test.
2. There is no statistically significant difference at the significance level (0.05) between the mean scores of the experimental group students who are taught reading comprehension using the instructional program based on ART in pre-post achievement test.
3. There is no statistically significant difference at the level of significance (0.05) between the mean scores of the control group students who are taught reading comprehension using the conventional method in the pre-post achievement test.
4. There is no statistically significant difference at the level of significance (0.05) between the mean scores of the experimental group students who are taught reading comprehension using the instructional program based on ART and the mean scores of the control group students who are taught the same subject using the conventional method in the post visual intelligence skills test.
5. There is no statistically significant difference at the level of significance (0.05) between the mean scores of the experimental group students who are taught reading comprehension using the instructional program based on ART in the pre-post visual intelligence skills test.
6. There is no statistically significant difference at the level of significance (0.05) between the mean scores of control group students who are taught

reading comprehension using the conventional method in the pre-post visual intelligence skills test.

1.5 limits of the study

The present research is limited to the following:

1. Sample limits: A sample of 91 2nd stage university students was chosen, the sample is randomly selected from Department of English Language, College of Basic Education, University of Babylon.
2. Time limits: The study was conducted during the second semester of the academic year 2020 – 2021.
3. Technical limits: EyeJack Creator Application and QR Code Reader Application were used on smartphones, tablets and iPads to activate ART.
4. Objective limits: Measuring the effectiveness of a proposed program based on ART on developing the necessary visual intelligence skills for 2nd stage university students and their academic achievement in the subject of "Reading Comprehension", Alexander's book entitled *"Developing Skills: An integrated Course for Intermediate Students"*, which is implemented now for those students.

1.6 Procedures of the study

The present research goes through the following procedures:

1. Reviewing the literature and previous studies which are related to:
 - A. Augmented reality technology (ART).
 - B. Academic Achievement (AA).
 - C. Visual Intelligence (VI).
2. Preparing a checklist of visual intelligence skills that suit the 2nd stage university students at Department of English in its first form, submitting it to a jury of specialists in methods of teaching to verify its validity, modifying it according to the suggestions and opinions of the jury members and setting the visual intelligence skills that suit the 2nd English department stage students in its final form.
3. Designing a pre-post test for visual intelligence skills, required for 2nd stage university students at Department of English, and verifying its validity and reliability.
4. Constructing the suggested instructional program based on ART in the light of the scheduled curriculum for the 2nd English department stage

students, and the list of visual intelligence skills that are chosen by the jury.

5. Designing the digital content of the assigned passages of the Alexander's textbook on Google sites, then making a private barcode for each passage.
6. Selecting a sample of 2nd stage university students at Department of English (n=91) randomly and dividing it into two groups: one acts as the control group (n=45), whereas the other constitutes the experimental group (n=46).
7. Administering the pre visual intelligence test and the pre achievement test to both the experimental and the control groups before the experiment.
8. Teaching the assigned passages to the students of the experimental group through using the suggested instructional program based on ART and to the control group through the regular method of instruction.
9. Administering the post visual intelligence test and the post achievement test to both the experimental and control groups after conducting the experiment.
10. The obtained data are statistically analyzed.
11. Presenting conclusions, recommendations, and suggestions for further research.

1.7 Definitions of the basic terms of the study

Effectiveness:

Effectiveness, according to Noesgaard and Orngreen (2015), is a “learning outcome that occurs when learners gain or acquire new understandings as a result of the learning process” (p. 281).

Wilson et al. (2018, 267) define effectiveness as the power to produce the desired result, i.e., effectiveness is often measured as the quality of the desired result.

In this study, the effectiveness is defined operationally as the ability of the instructional program based on Augmented Reality Technology (ART) on developing the achievement and the visual intelligence skills among Iraqi university students of the second stage, Department of English (the experimental group) in the subject of reading comprehension. In other words, the effectiveness is the statistically significant ratio of the change caused by the proposed program based on ART at the level of the dependent

variables (achievement and visual intelligence skills) through pre and post repeated tests.

Instructional Program

International Standard Classification of Education (ISCED, 2011) which was adopted by the UNESCO General Conference at its 36th session in November 2011, has defined the instructional program as coherent set of educational activities designed and organized to achieve pre-determined learning objectives or accomplish a specific set of educational tasks over a sustained period.

AL-Kenani (2020, 1-2) introduces a practical definition of the instructional program. He considers it as a constructive organization of educational activities. It means that the educational program is an organization of learning activities that are based on predetermined goals within the framework of a large entity that is the curriculum. So the “instructional program” is an entity of the curriculum and one of its components. Moreover, the school or university curriculum may contain many programs, and the formulas of which may differ according to its purpose and value, for example, enrichment programs, remedial programs, etc.

For the purpose of this study, **the instructional program** refers to an instructional activity that is designed and implemented to achieve an instructional goals, namely, some clearly defined changes in a selected group of 2nd stage Iraqi university students at Department of English, College of Basic Education. The primary criteria for determining the success or the effectiveness of the instructional program are these measures of changes in the selected group of those students. These changes can be affective, academic, or social,. The current instructional program is an organized set of learning activities designed to enable the students to develop knowledge, achievement, understanding, skills and attitudes relevant to the student’s individual needs. This means that the proposed instructional program based on ART, is an educational framework in teaching the course study of "Reading Comprehension" for the 2nd English department stage students (lessons of the selected passages), that includes a set of diverse strategies, activities, and evaluation methods designed in a manner that takes into account the requirements of Augmented Reality Learning (ARL).

Augmented Reality Technology (ART)

Carmigniani and Furht (2011, 3) state that AR is a real-time direct or indirect view of a physical real-world environment that has been enhanced/augmented by adding virtual computer-generated information to it . ART is both interactive and registered in 3D which combines real and virtual objects.

Li and Been-Lirn (2013,109) define Augmented Reality Technology (ART) as overlaying virtual imagery onto a physical world scene. Hence, it allows the learner to see the real world, with virtual objects superimposed upon or composited with the real world. Therefore, AR supplements reality, rather than completely replacing it.

In this study, **AR is defined operationally** as a simultaneous participatory technology of (images, multimedia, videos, audio recordings, and hyperlinks) that enriches students' senses and mixes printed and virtual environments, leading to a new, more informative and stimulating environment where the second stage university students can interact in real time. The process of combining virtual data with real printed-world data can provide those students with access to rich and meaningful multimedia content that is contextually relevant .

Academic Achievement (AA)

Kpolovie et.al (2014, 76) state that academic achievement can be defined “as excellence in all academic disciplines, in class as well as extracurricular activities. It is the outcome of education as it indicates the extent to which the student, teacher, curricular and indeed the educational institution has achieved the predetermined educational goals.”

Steinmayr (2014) cited in (Narvaez et. al, 2019,49) mentions that academic achievement mainly represents performance outcomes, which in turn, shows the level achieved by students towards specific goals set for different activities within instructional environments, i.e., elementary school, college or university. Thus, academic achievement should be considered a multifaceted assemble comprising different domains of learning.

In this study, the **academic achievement is operationally** defined as set of knowledge, concepts, skills, and facts, that 2nd stage university students at Department of English acquire in Reading Comprehension subject, measured by the degree (i.e., the average marks obtained by the

students in the final examination) that the students get through their response to the items of the prepared achievement test by the researcher for the purposes of the study.

Visual Intelligence (VI)

Nadrljanski et.al (2009, 783) introduce the concept of VI, in which they describe it as the ability of seeing things in the mind, i.e. it is an ability of visual perception of world that surrounds us. VI signifies colour, line, form and space sensibility in itself.

Šafranĳ and Zivlak (2018, 73) define VI as an ability to visualize or create an image which characterizes the spatial world. It considers the ability to mentally reconstruct or modify the outlook of objects in space, concluding with the representation of ideas. Individuals with highly developed visual intelligence are also sensitive of colours, shapes and forms. People prefer to use this kind of intelligence would rather draw a picture than write a paragraph.

Operationally, VI refers to second stage university students' ability to perceive a visual world and to think visually through pictures, maps, charts, drawings, and shapes. It is also represented in the students' ability to perceive the relationships between things and to form mental images that they use in solving problems. This type of intelligence requires elements that includes the capacity to visualize, to graphically represent visual or spatial ideas.

CHAPTER TWO

REVIEW OF LITERATURE AND PREVIOUS STUDIES

2.1 An Introductory Note

The present chapter presents the review of literature for the variables of the study. It is divided into four sections. The first section deals with Augmented Reality Technology (ART). The second section deals with Academic Achievement (AA). The third section involves developing Visual Intelligence (VI) skills and teaching them in EFL class. The fourth section of this chapter presents the previous studies in relation with Augmented Reality Technology , Academic Achievement, Visual Intelligence and the reflection on the reviewed studies.

2.2 Augmented Reality Technology (ART)

Technologies that are used today are becoming more ubiquitous and intelligently equipped day by day. In any aspect of life, isolation from this development is impossible. Improvements and new changes in the field of technology led curriculum designers, teacher trainers, language instructors, teachers and other people who take part in education area for adoption and update within themselves since learners of the 21st century are entirely different with their expectations and characteristic features (Pozharina, 2019, 38).

In the twenty-first century, the world is witnessing a series of rapid and successive transformations and challenges, and these challenges are represented in the great scientific and technological development in different areas of life, in addition to the communication and information revolution, which caused the doubling of human knowledge, foremost of which is scientific and technological knowledge in a short period of time. This led to a huge boom in satellite technology, multimedia, and e-learning (Smith & Cockburn, 2016, 68).

E-learning has emerged as a basic requirement and a real response to the information and technology revolution in the world, and since its inception, it is in rapid development and continuous updating of its concept, tools, forms and techniques. The philosophy of e-learning is based on an education with many advantages that made it the best compared to traditional education. Among these advantages, e-learning finds solutions to several problems such as the large numbers of learners in the classroom, in addition to the time and place constraints that it deservedly exceeded, which provided an opportunity for self-learning and continuous learning. E-

learning can achieve many goals, such as raising the efficiency of teachers and learners, facilitating the preparation of educational materials (written - visual - audio), introducing supportive services for education such as e-mail and educational platforms, and spreading technological culture in society through the use of some applications and educational electronic games. (Howard et al., 2005, 751-52).

In the past, e-learning was done through personal computers only, which restricted the user to place and time due to their weight and difficulty in transporting them. Now, learning has become available anytime and anywhere through smart (wireless) devices that are commonly used by different segments of people. Educational services have departed from the usual framework and traditional use because they are provided through platforms and websites that the user can join and view by smart devices (Watkins & Corry, 2013, xi).

Mobile Learning (ML) has become a catalyst for learning process, as it is no longer completely dependent on the teacher, but rather makes the learner controls the learning process as he wants. ML also makes the learner feels unique and involved at the same time. On the one hand, it provides the learner with a sense of ownership of the content and freedom of interaction, and on the other hand, it allows him to cooperate, participate and dialogue with other learners (El-Hussein & Cronje, 2010, 14-15).

Kabir and Kadage (2017) state that “ML is a form of distance learning, through which small and portable wireless devices such as mobile phones, Laptops, Personal Digital Assistant, Smartphones, and Tablets are used to achieve flexibility and interaction in the teaching and learning processes anytime and anywhere.” (p. 66).

Besides that, Johnson et al. (2014) as cited in Zainuddin et al. (2014,133) have emphasized that Technology-Enhanced Learning (TEL) research has increasingly focused on emergent technologies such as ART, mobile learning (m-learning), ubiquitous learning (u-learning), electronic instructional games and learning analytics for improving the satisfaction and experiences of the learners in enriched multimodal learning environments. These researches benefit of technological innovations in hardware and software for mobile devices and their increasing popularity among learners and people as well as the significant development of user modeling and personalization processes which put the learner at the center of the learning

process. In particular, ART research has matured to a level that its applications can now be found in both mobile and non-mobile devices. Research on ART has also proven its maximum benefit for increasing the learner's motivation and academic achievement in the learning process.

In this regard, ART is one of the techniques that prompted the efforts of researchers in the field of education to know its impact on the educational process. ART has emerged as a modern mobile technology extended from e-learning and mobile learning, and opened the door for learners to practice learning in the most enjoyable and best ways without being restricted to time or place (Al-Shami & Al-Qadi, 2017,126).

The different visual stimuli produced by ART (such as virtual images, animations and videos) play a prominent role in attracting the learner's attention and developing his mental processes through observing and distinguishing objects and knowing their visual properties.

ART is one of the most important technological innovations that are used in all fields, including education, medicine and shopping. It combines virtual information and the real environment to enhance the perception of the learner through the use of more than one sense such as hearing, touch, and vision. The term Augmented Reality Technology is simply defined as combination of real and computer-generated digital information into the user's view of the real world in a way that they appear as one environment (Los Ríos et al., 2014, 663).

Thus, ART is a type of mixed reality that enhances the user's experience by allowing him to see virtual objects superimposed or over laid upon a real-world scene in real-time. These virtual objects are computer-generated data in the form of text, audio, video, graphics and geo positioning data. In other words, AR is a technology that overlays digital information on a live view of the physical world to create a blended experience. Interactions in the real environment reflect into the virtual environment and vice-versa. When the virtual and real sensors are overlapped, the interactions in the two worlds are concomitant. Thus, ART can provide unique experiences and opportunities to learn and interact with information in the physical world.

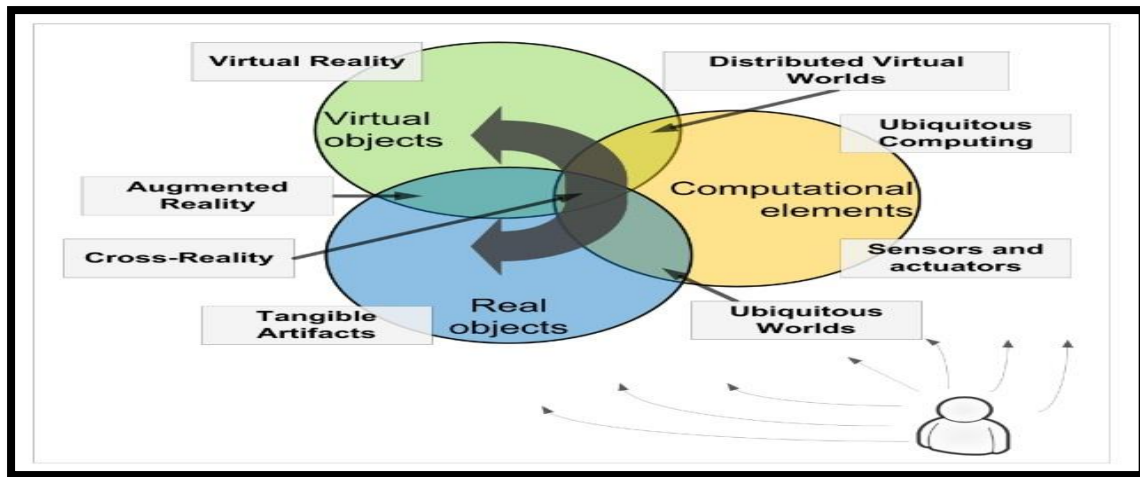


Figure (1): Overlapping real and virtual environments with ubiquitous computing, involving a network of real and virtual sensors and actuators, Kirner et al. (2012)

Azuma et al. (2001, 37) mention that for a system to be called an augmented reality system, it must contain three main elements: (the combination of real and virtual elements, interaction with the user at the same time, and the inclusion of 3D technology). Virtual objects are perfectly aligned with real objects within ART system. Grubert and Grasset (2013) also emphasize that ART is characterized by three main elements: it is a (three-dimensional system, simultaneous integration, and interaction). The third dimension constitutes an important part of image formation in augmented reality environments. Electronic devices integrate 3D digital content in front of the viewer. This is considered a key aspect of ART. As for simultaneous merging or integration: it means the ability to combine sound, image, video or text with real reality in a synchronized and regular manner without the need for registration, installation and montage later. In the third element "interaction", ART is characterized by interactivity, therefore, the user can move wherever he wants and at different angles with the continuity of enhancing reality with virtual objects.

Through the researcher's reference to a number of literature on the emergence of ART, including (Yuen et al, 2011, 122) and (Choi et al, 2016, 169), the historical development of this technology has been divided into four stages, which are as follows:

First: The stage of the idea emergence:

At this time, ART has emerged as a description of the idea. In 1957, a virtual reality machine, called Sensorama was developed by a famous cinematographer, named Morton Leonard Heilig. He was known as "Father of Virtual Reality". Sensorama can be described as a movie theatre with one seat, enabling the user to feel and act as if s/he was actually being in the movie (Van Arnhem et al., 2018, 6).

At this stage, ART has been used exclusively by many major companies for simulation, training, and other purposes. Some notes of ART at this stage are: large size, limited use, expensive, it has virtual reality features, and it is not widespread.

Second: The stage of limited spread:

At this stage, the idea was transformed from a fantasy to a reality, and the most prominent thing that took place at this stage was the crystallization of the term Augmented Reality Technology. Below, the researcher reviews the pioneer inventions of ART and their qualitative leap of it (Ibid, 6-7):

- 1960-1970: Ivan Sutherland from Institute of Technology (MIT) designed a device that provides sound and three-dimensional image, and the main difference between this device and computer graphics is that the graphics change based on where the user is standing, through a main sensor that measures the position and angle of the head. Accordingly, the system of virtual objects changes.
- 1974: Myron Kruger was a computer researcher and artist, built a laboratory at the University of Connecticut called 'Videoplace' that was entirely dedicated to artificial reality. He used tactile systems that serve ART which is connected to computers to implement a (VideoPlace). This allows the user to interact with the movement of a person's image synchronously.
- 1990: Tom Caudell and David Mizell used a digital display that guided workers as they work assembling electrical wires for the aircraft industry, by wearing a head-worn device, instead of the wooden planks that were used. This was a historical event for the concept of ART, as Caudell was considered the first to coin the term "Augmented Reality".
- 1992: Louis Rosenburg, a researcher in USAF Armstrong's Research Lab, created 'Virtual Fixtures', which was one of the first fully functional augmented reality systems (this system allowed military personnel to virtually control and guide machinery to perform tasks like training their US Air Force pilots on safer flying practices).
- 1994: Julie Martin, a writer and producer, brought ART to the entertainment industry for the first time with the theater production titled Dancing in Cyberspace.
- 1994: Azuma, in collaboration with a company working in research laboratories (HRL), developed a hybrid tracker that allows the user greater freedom of movement. It is considered an evolution in ART that forces the user to stay in a specific place. Azuma's technology was used

to display virtual text ads on buildings, and this technology is a first step for ART that has become universal in use.

At this stage, the researcher concludes that the term (Augmented Reality) appeared as a technology based on displaying of digital data in physical world, and the emergence of the term is attributed to Tom Caudell, the researcher at the giant aircraft production company "Boeing". Some notes of ART at this stage are: the emergence of augmented reality as an actual technology, it is still a complex technology, but it has become more sophisticated and widespread, limited in use, and its equipment is still expensive and large.

Third: The stage of rapid diffusion:

In the late nineties and the beginning of the third millennium, ART took many steps to become one of the computer technologies that met a wide and rapid spread, and the most prominent of these developments are:

- 1998: A number of conferences devoted to the study of ART began to be organized under the name of "International Seminars on Mixed Reality and Augmented Reality" ISMAR.
- 1999: NASA created a hybrid synthetic vision system of their X-38 spacecraft. The system leveraged ART to assist in providing better navigation during their test flights.
- At the end of the nineties, a number of projects and research appeared in Singapore and Germany, which focused on the development of ART.

Fourth: Augmented reality in the 2000s & today:

In this stage, Poetker (2019) explained how ART has developed :

- 2000: Hirokazu Kato developed an open-source software library called ARToolKit. This package helps other developers build augmented reality software programs. The library uses video tracking to overlay virtual graphics on top of the real world.
- 2005: The using of ART apps and games in smartphones. One of these apps was AR Tennis , a two-players AR game developed for Nokia phones.
- 2009: Esquire Magazine used ART in print media for the first time in an attempt to make the pages come alive.
- 2013: Volkswagen debuted the MARTA app (Mobile Augmented Reality Technical Assistance) which primarily gave technicians step-by-step repair instructions within the service manual.

- 2014: Google unveiled its Google Glass devices, a pair of augmented reality glasses that users could wear for immersive experiences.
- 2016: Microsoft starts shipping its version of wearable ART called HoloLens, which is more advanced than the Google Glass.
- 2017: IKEA released its augmented reality app called IKEA Place that lets you virtually place true 3D models in your very own space.
- 2018: MaxST is comprehensive platform that paves the way for a quick and easy AR app development process. This AR platform ensures that developers build apps quickly and easily without any hassle. Some of the key features include object tracking, image tracking, multi-target tracking, and QR/barcode scanning.
- 2021: WebAR allows users to experience AR content through web browsers rather than using a standalone app. In 2020, WebAR was compatible with more than three billion devices, nearly twice the combined installed base of ARKit and ARCore, according to ARtillery Intelligence. 8th Wall, Zappar, and Aircards enable WebAR experiences on browsers such as Chrome, Edge, Safari, and Firefox. Most WebAR applications are used for marketing campaigns run by companies such as Coca-Cola, Toyota, EE, Sephora, and Universal Pictures. In 2020, for example, Universal Pictures ran a WebAR campaign to promote the movie Trolls World Tour, allowing users to overlay a map of the troll's kingdom into their real-world environment and access face filters resembling characters from the film (GlobalData Thematic Research, 2022).
- 2022: AR smart glasses are wearable computer-capable glasses that add extra information, ideally 3D images and information such as animations and videos, to the user's real-world scenes by overlaying the computer-generated or digital information on the user's real-world. It can retrieve information from computers, smartphones, or other devices and can support WiFi, Bluetooth, and GPS. (Software Testing Help, 2022).

The third millennium, with the emergence of devices and smartphones, is considered a transitional stage for ART from limited use to spread, and accordingly, it has many fields of application.

Thus, ART witnessed many developments in the field of modern technology, especially with the emergence of new devices and smartphones with rapid and large spread and the multiplicity of areas of use. Some notes of ART in this stage are: devices are small, accessible to everyone, easy to use, multiple features and uses, more accurate and developed, more

widespread, it has become an indispensable technology in many fields, its educational platforms are numerous, and its applications are unlimited.

2.2.1 Theoretical Foundations for ART

In his 2019 book, *“Essential Learning Theories: Applications to Authentic Teaching Situations”*, Johnson argues that learning theories have differed in the interpretation of the learning process, due to its complex nature, which makes it difficult for a single point of view to realize the entire learning process, and provide a comprehensive framework for that process. As a result, the instructional designer must address a number of issues and questions, including learners’ characteristics, how they learn, the settings and environments that encourage learning, the appropriate techniques and procedures for learning, and how to evaluate it. All of these questions are crucial to the design process, and teaching and learning theories provide answers.

E-learning and mobile learning are closely related to learning theories, which aim to reach the principles and methods that achieve better learning for the learner in different situations. These theories also aim to help specialists and researchers in the educational field to find the best conditions to achieve effective learning (Keengwe, 2014: 67-68)

The application of ART in learning process depends on many educational theories that support and provide realistic foundations for the design and production of learning environments based on ART. The following are the most important theories on which ART is based in education (Weerasinghe et al., 2019, 3) and (Geroimenko, 2019, 5):

A. Behaviourism Theory:

Ahmad et al. confirm that by mean of learning theories advocated by behaviourism, learning can be defined as the mechanical process of relating stimulus with response, which further give rise to novel behaviour. This new behaviour is supported by reinforcement. Behaviourists like Watson, Thorndike, Skinner and Pavlov being the major proponents suggest that learning is a change in observable behaviour caused by external stimuli in environment (Ahmad et al., 2020, 20).

In the Psychology Dictionary, behaviourism is defined as a general view that emphasizes the role of observable behaviour (overt behaviour) and reduces the meaning of mental processes (Muhajirah, 2020, 38). This theory is concerned with preparing the educational situation and providing the learner with stimuli that push him/her to respond and then reinforce this response. ART seeks to create educational situations through its multiple

educational media that act as stimuli for learning and prompt responses according to the nature of the educational situation. Thus these educational situations work to enhance learning and increase its impact on the learner as a result of the continuous interaction of the learner with the ART environment.

Moreover, learning in the Augmented Reality environment is based on applications derived from behavioural theory. This theory is concerned with studying the change of the learner's apparent behaviour, where codes, images and icons act as stimuli that attract students' attention to the learning process in a rapid response using the smartphone camera. This response is reinforced by automatic transition to digital learning media which provide opportunities of practice and repetition for the learner (Ayres, 2015, 631-33).

B. Cognitive Theory of Multimedia Learning

Sommerauer & Müller (2018) explain that "Cognitivism is a learning paradigm that sees the mind as an information processor and focuses on internal cognitive structures to understand how information is received, organized, stored, and retrieved in the brain. Pedagogically seen, the processing and transmission of information can be executed through communication, explanation, recombination, contrast, inference, and problem solving, mainly to acquire external, existing knowledge." (p.4). In his book, Mayer (2009) presents three views of multimedia learning. The delivery-media view refers on the presentation of learning content using two or more devices for delivery. The presentation modes view focus on the presentation of material using two or more presentation modes. Finally, the sensory-modality view posits that two or more sensory systems in the learner are involved. On this basis, Mayer proposes twelve principles of multimedia design which are applicable on multimedia learning.

Furthermore, Cognitive Theory is one of the most important theories that is concerned with designing patterns for providing ART through three assumptions: Dual Channels, Limited Capacity, and Active Processing. The first assumption indicates that there are two separate channels for visual information and auditory information, through which information is received. This means that the content provided should be integrated between visual and audio. As for the second assumption, it indicates that both channels have the ability to receive and absorb a limited amount of information, so the amount of information provided through ART must be taken into account, i.e. both of these channels can only accommodate a limited amount of information at a given time. Lastly, the third assumption

is that learners are active individuals who need an active environment to practice learning, which is provided by ART, to allow the learner practicing various experiences and activities. This means that incoming information from the channels are processed by organizing them into coherent mental representations, and integrated to previously acquired knowledge (Santos et al., 2014, 48).

As discussed by Goff et al., much of the thought behind the outcomes associated with ART can be explained using the cognitive theory of multimedia learning proposed by Mayer (2005) as part of the program development process (Goff et al., 2018, 3-4). Sommerauer and Müller investigate this by arguing that well-designed ART specifically incorporates five specific principles that make up Mayer's cognitive theory of multimedia learning. The first principle, the multimedia principle, the multimedia principle states that people learn better from words and pictures than words alone. ART can implement this principle by overlaying printed texts with virtual pictorial content (e.g., integrating videos into a textbook) or, vice versa, by augmenting physical objects with virtual texts (e.g., displaying labels and measures when focusing on a technical object). This could include the addition of virtual text to pre-existing physical objects as well as the addition of virtual three-dimensional images onto a pre-existing text. The second, spatial contiguity, the spatial and temporal contiguity principles state that learning is enhanced when the space or time between disparate but related elements of information is minimized. ART can implement the contiguity principles by superimposing virtual content onto physical objects in real-time and thereby spatially and temporally aligning related physical and virtual information. The third principle, the temporal contiguity, facets work in unison to promote learning by noting that when space or time between learning elements is minimized, learning is again enhanced. ART programs can accommodate this theory by placing appropriate virtual information in coinciding spatial or temporal relation to the physical exhibit or object. The fourth principle noted, the modality principle, states that learners benefit more from spoken words than written text when learning with multimedia. ART can also be developed to account for this by providing learners with audible information throughout the learning experience. Lastly, the fifth facet of the cognitive theory of multimedia learning was the signalling principle. This principle states that learners show increases in learning when essential information in the learning process is highlighted, directly during the learning experience. ART can again be developed to accommodate this aspect of multimedia learning theory

through the enhancement of specific areas of interest with either virtual imagery or text (Sommerauer & Müller, 2014, 62-63).

These cues could then help guide the learner to what is most important about the topic and could thereby aid in making connections between key points in the lesson. Therefore, Multimedia Learning Theory can be extended to ART by doing two substitutions:

- a. The system of real objects replaces the picture.
- b. The virtual texts and symbols replaces the words.

It can be argued that the Cognitive Theory of Multimedia Learning shows that the use of printed texts with quick response as stimuli can be integrated and combined with Augmented Reality learning media via the smartphone to enrich content and help learners perform better.

C. Interconnection Theory:

The AR learning environment supports interconnection theory, which is concerned with the role of the learning surrounding environment, and it focuses on the quality of learning (how to learn), not the quantity. By applying to the Augmented Reality learning environment, this theory looks at the interaction levels within the electronic screen of the smartphone or computer, which create digital learning objects to enhance the real environment, as these levels represent the various sources of knowledge that are linked with each other. In order to complete the learning process, the learner must effectively access these links, associated information, and knowledge. There is also a correlation between what the learner knows and the formation of new scientific concepts that lead him to build his/her new knowledge, and thus enable him/her to learn independently (Vate-U-Lan, 2012, 891).

D. Social Theory:

Social learning theory is related to the experiences the individuals get from others or from the environment through observation. The emphasis of the social learning on the environmental factor is discussed in the context of the visual forms produced by humans. Learning by observing helps to achieve faster results and more satisfactory experiences than learning by reading or listening. Therefore, in the era of visual culture, the pace and direction of learning through visuals has improved. Especially the opportunities offered by technology, learning and observing from the visuals, makes the subject of learning valuable and important. For this reason, as an environmental factor in the research, the relationships between the experiences the learners have acquired

from the visual forms and their behaviours are examined in the context of social learning and visual culture (Yılmaz et al. 2019, 421) .

The applications of ART depend on the principles of social theory, where the learner builds his/her learning through interaction with the surrounding environment and with peers . Thus, the social theory is effective for conducting cooperative learning activities. Boyles adds that learning outcomes of ART involve the learners' abilities to actively participate in those activities successfully (Boyles, 2017, 4-5).

The applications of social theory in learning using Augmented Reality learning media, allow the learner to build his/her knowledge and concepts. Interpretations are provided to the learner through personal and social interactive activities that encourage learners to apply and build information in practical and social situations using Augmented Reality learning media, to facilitate personal interpretation of the learning content. Besides, this theory is an essential consideration for any social ART systems as it helps the learners better understand how the social context can both help and hinder learning within the individual (Scavarelli et al., 2021, 261).

E. Constructivism Theory

Qiu (2019) defines Constructivism as “a theory about knowledge and learning, which emphasizes learners' initiative. It holds that learning is a process in which learners generate meaning and construct understanding based on their original knowledge experience, which is often accomplished in the interaction of society and culture.”(p.1167). Constructivist learning theory emphasizes students as the centre, regards students as the main body of cognition, and is the active constructor of knowledge meaning. The basic content of constructivist learning theory can be explained from two aspects: the meaning of learning (that is, what is learning) and the method of learning (that is, how to learn).

Dunleavy and Dede (2014) discuss the relationship between constructivist theory and ART by saying:

“As a cognitive tool or pedagogical approach, ART aligns well with situated and constructivist learning theory as it positions the learner within a real-world physical and social context, while guiding, scaffolding and facilitating participatory and metacognitive learning processes such as authentic inquiry, active observation, peer coaching, reciprocal teaching and legitimate peripheral participation with multiple modes of representation.” (p. 737).

Additionally, some researchers state that there are three affordances of ART that are supported by existing theories like: multimedia learning theory, experiential learning and animate vision theory (Tezer, 2019, 157).

Through the previous presentation of the above theories, it becomes clear to the researcher that ART relies on these theories in its educational design, as ART, when used in education, can be included the diversity of digital content, the using of different sources to display content, and the using of peer learning and social participation.

2.2.2 How does ART work?

In their article, Leshko and Rykova present the algorithm of work of ART. It is shown in Fig.(1). Its essence is following: camera of mobile device reads image containing markers and transmits video signal to computer (smartphone, tablet). Special program processes received signal (recognizes markers) and overlays virtual object on screen of real object. Texts, sites, links, photos, three-dimensional elements, sounds, videos, and more can be used as virtual objects. The most common ART programs are Quick Response (QR) codes and AR browsers (Leshko & Rykova, 2019, 79).

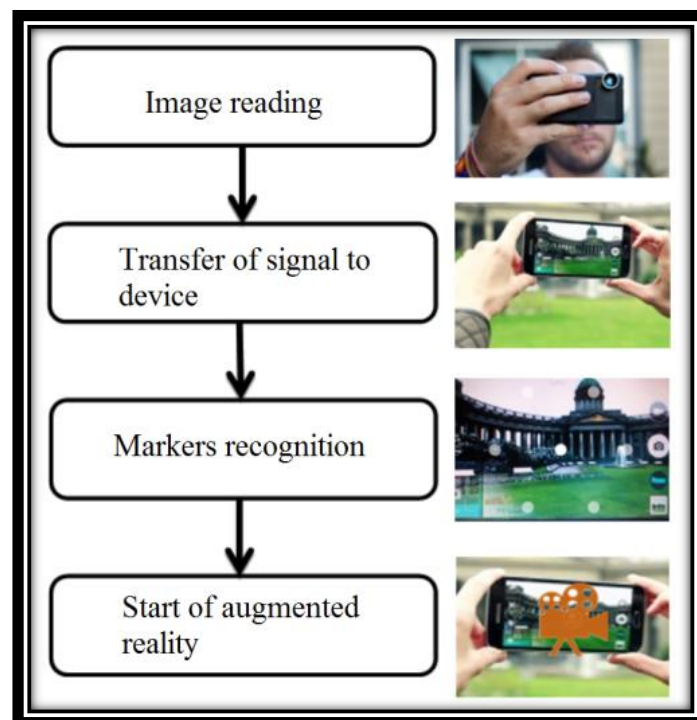


Figure (2) presents algorithm of work of ART
Leshko & Rykova (2019,79)

Additionally, Auer et al. discuss that it is possible to project digital information (text, sound, images, videos, graphics) beyond screens of devices and integrate virtual objects with the real world with ART. It helps

navigate in unfamiliar places and sometimes unknowingly change our appearance. Device processor, screen and its camera will be used to combine virtual objects and elements with real objects. Device must have a GPS sensor and an accelerometer. The learners just have to point camera at the right place and result will appear on the screen. It could be text, video, sound, animation, a 3D object, or something else (Auer et al., 2017, 570).

Pochtoviuk et al. (2020, 94) explain how ART works:

- a. The camera finds a real-world marker and then transmits information about it to a computer or smartphone.
- b. Computer program replace marker by virtual object (text, music, video, 3D model, etc.) and displays it on the screen.
- c. The camera then tracks the movements of the marker, and the program allows you to control the objects.

2.2.3 Categories of ART

McMahon explains that the digital content displayed in ART is registered in the physical world and designed to provide the user with this mixed view of reality. The ART applications are generally designed to perform this function in one of two ways, i.e., ART can be classified into marker-based or marker-less, depending on how the virtual and the real objects are aligned with each other (McMahon, 2014, 8). Koutromanos et al. (2015) discuss that “the augmented reality systems are divided into image-based and location-based Systems.” (p.3). The image-based augmented reality systems can be dividing into two categories: marker based and marker-less tracking. There are two types of ART, as mentioned by Boyles (2017, 2), Shushan (2018, 43), and Munoz-Cristóbal et al. (2018, 507), they are as follows:

- 1- Marker-based AR:** Some researchers also call it “image recognition”. It is the use of a predefined mark that we rely on to add virtual objects, and this mark can be images or QR code. The camera will scan and identify the mark and then it will show us the virtual objects i.e. whenever you scan a QR code or an image, and it comes to live (just like in iGreet cards), you are actually using a recognition based AR. This is how iGreet works – the ART app detects and recognizes something called AR marker. Once the app recognizes the marker, it replaces it with a corresponding object. Another type of recognition based ART is the one that translates words displayed through the camera. This type of ART also seems to be the most widely used one – along with the next one.

Marker-based AR is based on the recognition of physical objects via a device's image capture input and the appropriate placement of virtual content based upon these images (Wojciechowski and Cellary, 2013, 572). Typically, this relies on the recognition of a tag, like a quick response code (QR), in order to position virtual objects in the proper real-world environment i.e., the marker-based AR requires specific labels, such as Quick Response Code (QR), to register the position of 3D objects on the real-world image.

Moreover, Markus Wust asserts that QRC Reader is the most common type of Marker-based AR. This QRC is the simplest type of AR markers. When a smartphone having Marker-based AR, the QRC Reader scans a pattern such as a bar-code or a symbol through the smartphone camera, then the software recognizes it and superimposes a digital image on the screen. 3D or animated digital images are used for a better experience. The Marker-based AR approach is also called as Recognition-based. The below figure can effectively illustrate the working principle of Marker-based type of ART applications (Van Arnhem, 2018, 38).

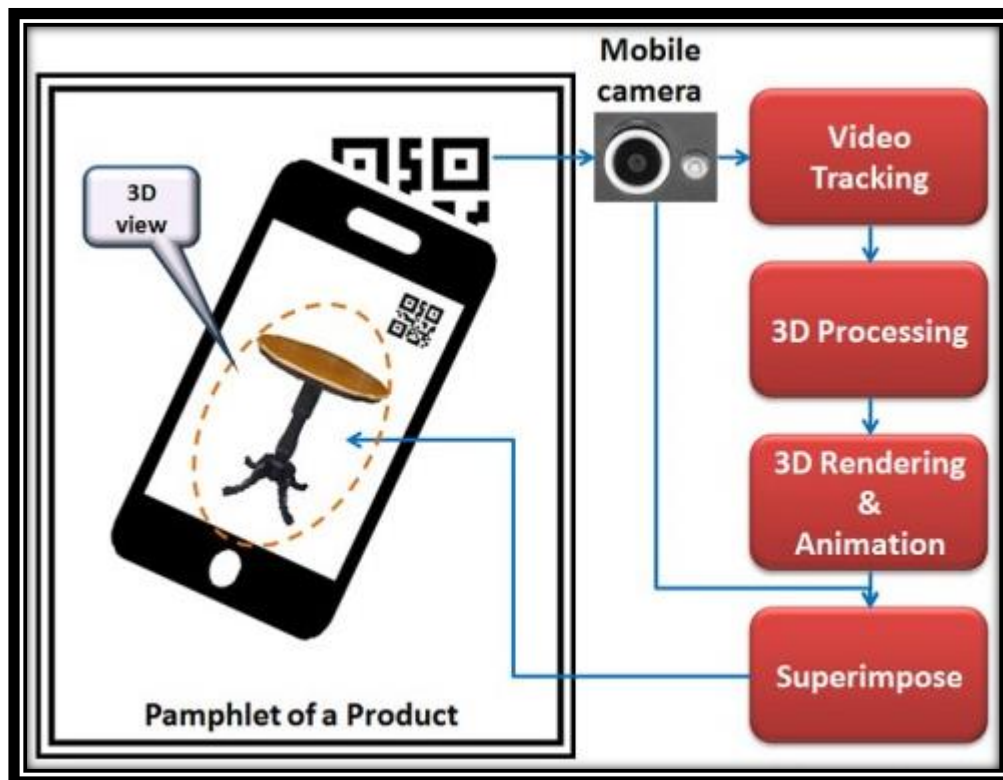


Figure (3): Marker-based Augmented Reality Application, Kumar (2016).

How does Marker-based AR work?

Saeed et al. (2021, 116) explain how this type of ART works:

- At first, the user needs a special visual object and a camera to scan it.

- Second, the object is exposed in front of the camera.
- Then information about the object is placed on the screen.
- Object recognition is based on the marker as it is replaced the on-screen marker with a 3D copy of the corresponding object.
- After the object is identified and recognized, the user has the ability to view the object with different angles and more details. The object can also be viewed in the format of 3D, animated image, video, text etc.
- For example, applications used on mobile devices allow the user to scan physical images and “markers”, and thus display and interact with a 3D model, photo, video or scene using your device.
- Apps like IKEA Place allow shoppers to see what a sofa or lamp would look like anywhere in the home so they can make sure it fits their space and aesthetic before buying.



Figure (4): An example of Marker based AR

Source : Apple Company,(<https://www.apple.com/lae/augmented-reality/>)

- 2- Marker-less AR:** In this type, the user do not need to use the marker. Instead, we use several ways to add virtual objects. Marker-less AR, by contrast, requires the aid of a location tracking system, typically GPS or Wi-Fi positioning, in order to place virtual objects that can interact with the physical environment (Koutromanos et al., 2015, 4). From here, Sinha (2021) argues that there are four different categories of marker less based ART: Location-based ART, Projection-based ART, Superimposition – based ART , and Outlining-based ART:
- a. Location-based ART:** It is used to immediately provide the user with guidance information. For example; the user can use a smartphone with GPS to determine his location, then put arrows on the screen that appear above the live image and indicate the direction of the place he wants to go (i.e., it is taking advantage of the smart devices’ location detection features. If the user is a traveller and s/he wants to discover new great places, this method will use his/her location by reading his/her smart device’s GPS, compass and accelerometer to give him relevant information about what s/he is looking for on your screen). This

technology can also be used to locate nearby public transport stations. It is found in smart devices, modern cars, and military vehicles. Software companies are still trying to develop this type of ART (Information Resources Management Association, 2018, 761).

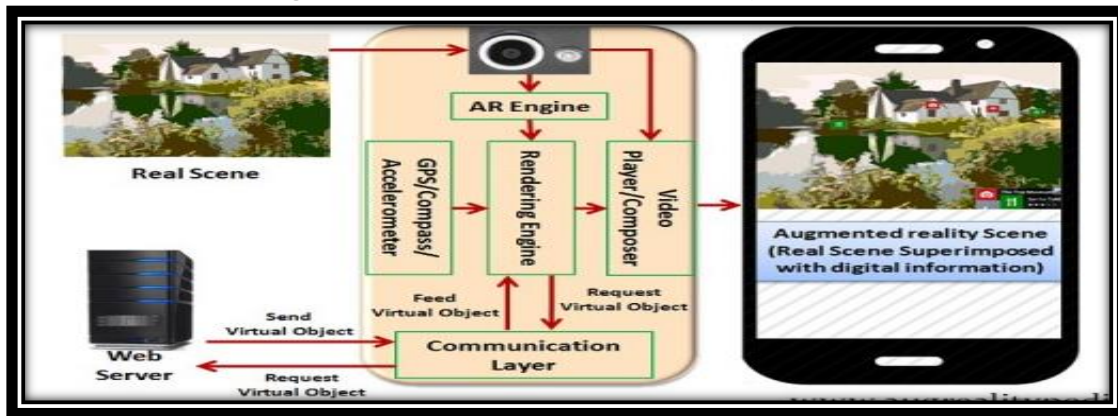


Figure (5): Location-based Augmented Reality Application
[\(https://www.augrealitypedia.com/\)](https://www.augrealitypedia.com/)



Figure (6): An example of location based- ART
 Source:(<https://mvclasses.com/ar-capstone-blog-special-problems-in-it-read/>)

- b. Projection-based ART:** Li et al. indicate that projection-based AR is one of the simplest types of ART. It is to project light on a surface. In this type, surfaces are scanned into the real environment and virtual objects are projected as light using a dedicated device i.e. projects digital images on physical objects in the physical space (Li et al., 2011, 211). Moreover, Dadwal (2019) states that “ projection-based AR functions by the projection of artificial light onto the surface of the real world. By transferring light onto the surface of real-world projection-based AR apps allow human interaction and sensing that interaction (i.e. touch) of that projected light.” (p. 292).



Figure (7): An example of projection based-ART (Poghosyan, 2019, 44)

- c. **Superimposition-based ART:** For the same object, with the newly augmented view, superimposition-based AR either fully or partially substitutes the unique view of an object. In this type, object recognition plays a dynamic role since the apps cannot change the original view with an augmented one if it cannot determine what the object is. In order to complete this process, the real environment and all of its elements are identified, and then determination the object to which the virtual object will be added (i.e. uses object recognition in order to replace an entire object or a part of it with an augmented view). For example, in medicine, a doctor can use this technology to superimpose an X-ray view of a patient's broken arm bone on a real image to provide a clear understanding of what the bone's damage actually is. (ibid.).

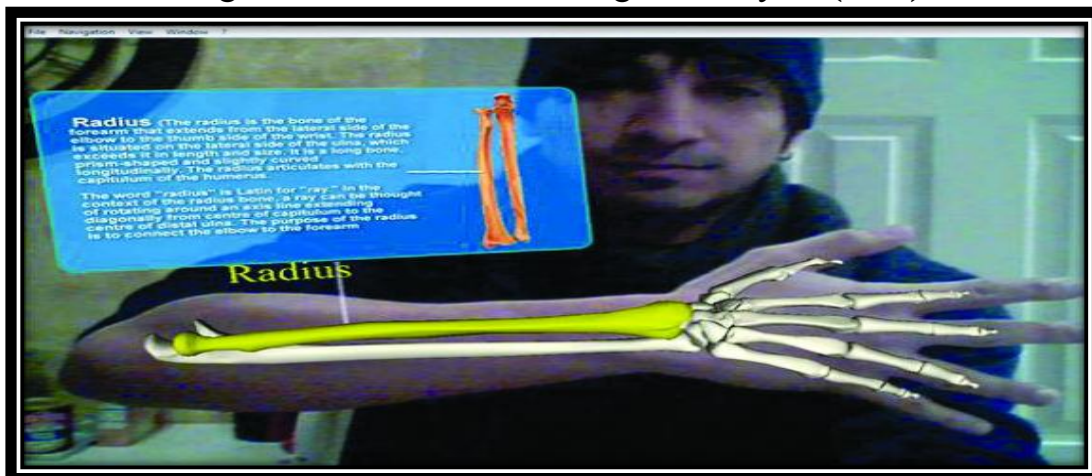


Figure (8): An example of Superimposition-based ART

Source: <https://www.digit.in/technology-guides/fasttrack-to-augmented-reality/different-types-of-augmented-reality.html>

- d. **Outlining-based ART:** It recognizes boundaries and lines to help in situations when the human eye cannot, (i.e., it uses object recognition to

understand a user's immediate surroundings by using a camera to outline things which otherwise could have been difficult to visualize with naked eyes. The most popular application of this type of AR is a car navigation system). When driving a car on a road in foggy weather, the boundaries of the road may not be very visible to human eye, leading to accidents. Advanced cameras tuned specially to see the surroundings in low light conditions can be used to outline the road boundaries within which the car should stay. Such a system would prove very useful in avoiding accidents (Simões et al., 2018, 76).



Figure (9): An example of Outlining-based ART

Several frameworks and platforms have been developed in the last years that can be utilized for the development of marker and marker-less ART for smartphones and tablets. For instance, there are platforms that can create books in augmented reality, markers of the pages, and position the models over book with animations, also create some interactions (Ramirez et al., 2013, 191), (Lytridis et al., 2018, 2) and (Sural, 2018, 567). Such platforms are, for example:

1. “ARTutor” (<https://www.arttutor.com>).
2. “Layar”(<https://www.layar.com>).
3. “Junaio” (<http://junaio.com>).
4. “Aurasma” (<http://www.aurasma.com>).
5. “Augment” (<http://augmentedev.com>).
6. “zappar” (<https://zapcode.it/>).

7. “catchoom”(<http://catchoom.com/>).
8. “metaio”(<http://www.metaio.com>).
9. “Vuforia”(<https://developer.vuforia.com/downloads/SDK>).
10. “EasyAR” (<https://www.easyar.com>),
11. “Wikitude” (<https://www.wikitude.com>).
12. “ARToolKit” (<http://www.artoolkitx.org>).

2.2.4 Augmented Reality Technology (ART) Vs. Virtual Reality Technology (VRT) Vs. Mixed Reality Technology (MRT)

Xiong et al. (2021) report that with rapid advances in high-speed communication and computation, augmented reality (AR) and virtual reality (VR) are emerging as next-generation display platforms for deeper human-digital interactions.(p.1). Gupta sees that VR and AR are technologies that can improve the learning and teaching processes by providing new ways to provide a digital context and feedback over a depiction of a real scenario. VR and AR technologies are based on the creation of a completely new scene that cannot be touched by the bare hand, but is sensually perceived through a combination of artificial visual and sound effects. In education, new technologies are used to improve the process of learning. The use of appropriate learning apps, as well as the rapid growth of technological innovations and society's adoption of smartphones, make VR and AR accessible to everyone (Gupta, 2022, 185).

Virtual reality makes it possible to teach in virtual environments that are impossible to visualize in physical classrooms, like accessing into virtual laboratories, visualizing machines, industrial plants, or even medical scenarios. The attractiveness of ART as a teaching tool is its ability to deliver a blended learning experience created from the mixing of the virtual and real environments or materials in the classroom. This allows students to learn in a variety of ways to mix didactic, experiential and kinaesthetic learning. The AR/VR technologies have the potential of being the biggest breakthrough of the education system in the 21st century (Tsoneva & Yankov, 2019, 437).

Virtual reality is a technology that merges reality with imagination, which formed a new breakthrough in the world of technology, and it has become the focus of attention for international companies specializing in technology and users alike, especially with the emergence of the low-cost

consumer VR headsets such as the Samsung Gear VR, Oculus Rift glasses, Google Daydream and Google Cardboard for virtual reality that have made digital realities more accessible than ever before. Moreover, according to Das et al. (2017), the use of AR through mobile devices has shown new educational possibilities and implications for different populations in various contexts. As a result, smartphone-based AR and VR technologies and applications have been drawn the attention of researchers and educators alike. (p.2).

In their study, Merchant et al. (2014) discuss that “VR and AR have been implemented in educational settings for years and empirical evidence demonstrates that both technologies help improve student’s learning outcomes and enjoyment in different contexts and subjects. ART and VRT have been widely applied to teaching, learning, and instructional design. AR is a technology that blends digital information with the information from physical-world environments, enabling users to interact with virtual objects and view the physical environment (usually through a camera of a smartphones or tablet) simultaneously.” (pp. 34-35).

In contrast, VR is a technology that creates a three-dimensional environment that surrounds the user and responds to his /her actions in a natural way, usually through displays attached to the user's head, and gloves are sometimes used to track the movement of the hands through the touch feature. VRT involves real-time immersive simulations completely through digital graphics. Therefore, ART integrates virtual objects into a physical space, whereas VRT blocks out information from the physical environment that subsequently transports users to a fully virtual world. In other words, VRT allows users to feel psychologically immersed in a virtual environment, whereas ART allows users to interact with both virtual and real-world objects (Doerner et al. (2022, 12). Moreover, Tezer et al. (2019) state that “ART is different from VRT because ART combines the real world with computer graphics, while virtual reality immerses the user in a computer-generated world. Consequently, the affordances of ART and VRT are fundamentally different.” (p. 155)

In brief, ART allows the user’s perception of reality to be combined with digital content that appears to be part of the real world. ART is the blending of the real and the virtual worlds in the user’s perception. It emerged as a defined simple concept around 31 years ago, when Professor

Tom Caudell coined the term while working on a research and development project for Boeing. The definition of ART has been evolving ever since. In the technology's early days, one of the pioneering ART researchers, Ronald Azuma, defined ART as 3D virtual objects integrated into a 3D real environment in real time (Azuma, 1997, 2). This definition reflects how researchers at the time were concerned primarily with visual augmentation. Today, however, ART has advanced to be able to include the fusion of any digital media formats, such as image, video, text, and audio. Thus, the researcher finds a more fitting definition is provided by Geroimenko (2012), who describes ART as “a real-time, device-mediated perception of a real-world environment that is closely or seamlessly integrated with computer-generated sensory objects” (p. 447). Along with, this technology attempts to bridge the gap between the virtual and the real world, blending the two environments into one in the user's perception. As shown in Figure (9), in contrast to virtual reality, where the user is immersed in a computer-generated vision and cannot see the real world, ART supplements reality, rather than completely replacing it. Ideally, it would appear to the user that the virtual and real objects coexisted in the same space (Azuma, 1997, 2).

Mixed Reality Techology (MRT) is a blend of physical and digital worlds. The term of Mixed Reality was introduced in a 1994 paper by Paul Milgram and Fumio Kishino, "*A Taxonomy of Mixed Reality Visual Displays*." Their paper explores the concept of a virtuality continuum and the taxonomy of visual displays. Haller claims that Milgram defined a continuum of real-to-virtual environments and called it Mixed Reality (MR). It includes pure Augmented Virtuality (AV), in which real objects are added to virtual ones, and Augmented Reality (AR), in which virtual objects are added to a real environment (Haller, 2004,1).

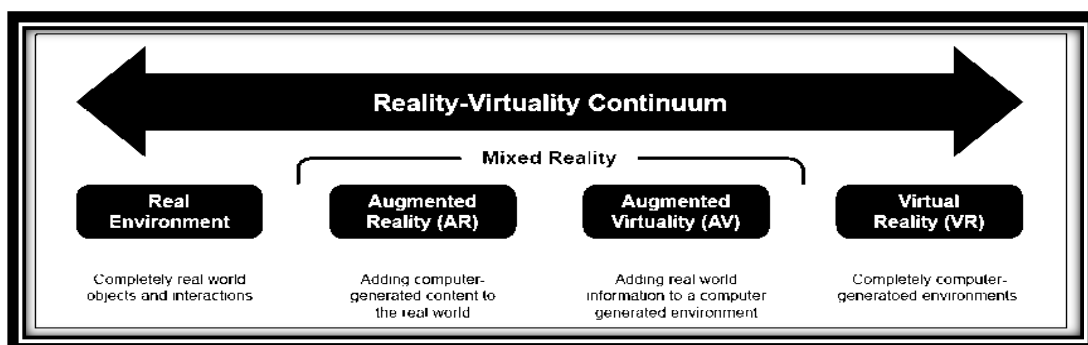


Figure (10) Reality-Virtuality Continuum.

Adapted from “A taxonomy of mixed reality visual displays”, by Milgram, & Kishino (1994).

The virtual reality, augmented reality, and mixed reality are ways of changing the principles by which we view the world through the use of technology. Sometimes, it is believed that Augmented Reality (AR), Virtual Reality (VR) and Mixed Reality (MR) are the same, but there are fundamental differences between them (Grant & Meadows, 2016, 293), so the researcher can clarify the features of each aspect of them:

Table (1) Comparison of Virtual Reality, Augmented Reality, and Mixed Reality

Virtual Reality (VR)	Augmented Reality (AR)	Mixed Reality (MR)
▪ The real world is hidden and the user is completely immersed in a digital experience. Creating a digital simulation of a real environment, i.e. virtual reality immerses users in a fully artificial digital environment. ▪ Complete immersion in the virtual environment. It offers freedom of movement in the digital atmosphere with sound effects. ▪ Special hand controllers can be utilized for the enhanced experience.	▪ Interactive objects are layered on top of the physical environment without the ability to manipulate the augmented objects. AR overlays digital information onto the real world, i.e. Augmented reality overlays virtual objects on the real-world environment. ▪ Digital content on top of the real world. ▪ Special AR handsets can be used wherein the digital content is displayed on a small screen. For example, Pokemon Go where people all over the globe rush with their smartphones in search of small virtual creatures.	▪ The capabilities of AR and VR are blended, bringing together the physical and digital world to produce an environment where physical and digital objects coexist and interact with real time, i.e. Mixed reality not just overlays but anchors virtual objects to the real world and allows the user to interact with the virtual objects. ▪ Digital content interacts with the real world. ▪ The user remains in the real world and digital content is appended onto it. For example, Microsoft Hololens.

2.2.5 Components of ART

Santos et al. (2014) explain that there are three factors affecting Augmented Reality Learning Experiences (ARLE) design. The factors may be hardware-related, software-related, or content related. All these are inter-related with each other from the point of view of an ARLE application (pp. 39-40). Besides that, Megahed (2014, 38-39), Kumar (2016), Ibáñez &

Delgado-Kloos (2018,109), and Raghvendra (2019) state that Hardware, Software and a Remote Server are the three major components of ART:

- **Hardware components of ART**

According to Ustundag & Cevikcan (2017), an ART system contains four hardware components; (1) a computer, (2) a display device, (3) a tracking device and (4) an input device. The computer is responsible for not only modelling augmentations and controlling all the connected devices but also adjusting the position of augmentations in the real scene with respect to the position of the user by using the information gathered from the tracking device. A display device is necessary to display the augmentations on top of the user's real vision. The choice of the display device depends on the type of interaction. The most widely used technologies are a see-through Head-Mounted Display (HMD), which the user wears on his/her head, a Hand-Held Display (HHD), such as a tablet or a smartphone, or Spatial Displays (SD), which is designed using several projectors. The tracking device is responsible for tracking exact position and orientation of the user, and then registers the augmentations properly to their desired positions. Using the tracking device, the computer provides assistance to the user by processing the user's movements, gestures and actions while the user interacts with the objects in the real world. The input device is used for enabling the user to interact with the system. Some examples of the input devices are microphone, touchpads, wireless devices, mouse and haptic devices (Ustundag & Cevikcan, 2017, 202). Chitra (2019) argues that the computational power and physical interface, including these components, are determined by the hardware. As an ART system, ARLEs mostly employ PCs or smartphones. The ART system needs the following devices: (processors, input devices, sensors and display devices). It also requires significant processing power that contains components like CPU, flash memory, RAM, GPS, GPU, Wi-Fi, and Bluetooth.

Sensors are located outside the Augmented Reality device and communicate the user's interaction with real world entities to the processor. These sensors can be mobile device's accelerometer, infrared or gyroscope.

Cameras of the smartphones are also placed outside the device that scan the surrounding area and collect relevant data. This information is taken by the devices that formulate digital models for determining the correct output

i.e. the input device is either the camera of a smartphone or a webcam connected to the internet. The display is either a monitor, handheld device, eyeglass or Head Mounted Displays (HMD). Nowadays, a smartphone consists of all hardware requirements of augmented reality.

- **Software in Augmented Reality**

The software design is about maximizing the computing power of the hardware, as well as managing content display and handling user inputs. Currently, there are many open-source and commercial AR development kits suitable for many types of platforms. Among those mentioned in ARLEs are: ARToolkit (FLARToolkit, NyARToolkit), Eyesweb, HUMANAR, Junaio, Opira Registration Library, Popcode, Wikitude, and Zooburst.

Software plays a major role in the functioning of Augmented Reality devices. Special 3D programs like “D’Fusion” are used for creating Augmented Reality based applications. 3D software is used for developing virtual images, that overlap the real world image. AutoCad3D, Cinema 4D and StudioMax are a few such examples.

- **Remote Server in Augmented Reality**

Apart from the software and hardware, a cloud or a web server is used in maintaining a database for the virtual images scanned. Upon request from the augmented reality applications, virtual images will be retrieved from the database and passed on to the requesting application. The below figure illustrates the key components of ART.

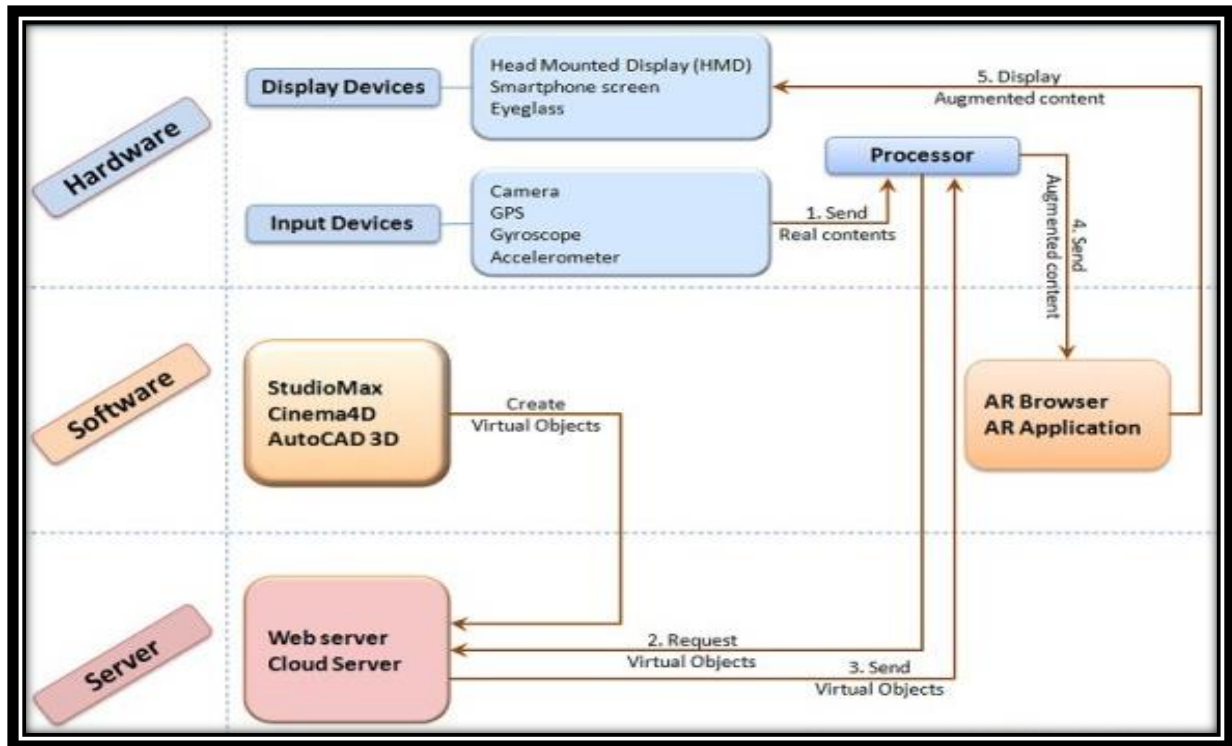


Figure (11): Key Components of ART ,Kumar (2016)

2.2.6 The Basic Characteristics of ART

As stated by Schmalstieg et al. (2011), the literature agreed and emphasized on three important characteristics. These characteristics are blending of real and virtual worlds in a real environment (combines real and virtual, i.e., overlay of real and digital world), real-time interaction (Interactive in real time), and accurate 3D registration of virtual and real objects (registration and Alignment in 3D).

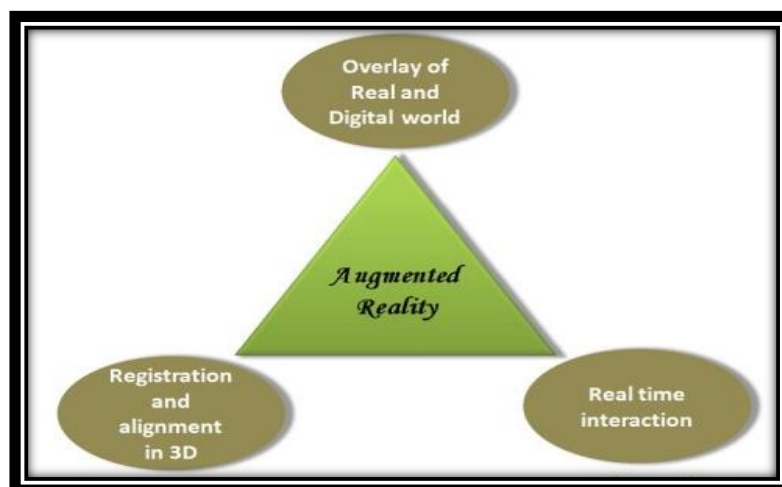


Figure (12): Three Basic Characteristics of ART

AR systems are characterized by three properties (Di Serio et al., 2013, 587):

- Combination of real and virtual objects within a virtual environment;
- Mutual alignment between real and virtual objects; and
- Interactive implementation in real time.

Anderson & Liarokapis (2014, 2) add the following characteristics:

- ART provides clear and accurate information.
- ART has the ability to enter information in an easy and effective manner.
- ART provides powerful information despite its simplicity of use.
- ART makes complex procedures easy for users.
- ART is easily expandable.
- ART is inexpensive.

Equally important, Chicaiza et al. discuss that ART is a system that fulfils three characteristics: first, it combines the real and virtual world; second, it allows interaction in real time; third, align real objects or places and digital information in 3D (Chicaiza et al., 2018, 675).

The researcher believes that among the characteristics of applying ART in the classroom are:

- ART makes the procedures between the teacher and the learner clear.
- ART enables the teacher to develop his/her information and ideas; and communicate it to the students in an easy way.
- ART gives the educational situation a lot of dynamism and activity.
- ART combines between the actual explanation of the teacher and the digital object.
- ART provides the possibility of enabling learning content in 3D perspectives.
- ART provides the possibility of promoting ubiquitous, collaborative and situated learning.
- ART provides a sense of presence, immediacy and immersion of students.
- ART can visualize the invisible.
- ART increases the students' activity and motivation, especially students with low achievement.

- ART does not need a specific learning environment, as it can be applied in the classroom easily.

2.2.7 ART in Education (ART in Educational Contexts)

Many studies have confirmed that some students tend to learn with modern technologies instead of traditional learning in the classroom, which requires teachers to modify their teaching methodology. The results of these studies showed that teaching with ART led to a significant increase in comparison with conventional instruction method (Pitler et al. , 2012, 3). Furthermore, Zheng (2020) adds that, “because of its advanced spatial visualization and ability to provide learners with multiple sensory modality inputs, ART is an evolving learning tool in educational institutions. Thus, there is a need for more research in this field to validate ART using digital mobile devices, as this topic is important in the field of education because it may help educators understand how students learn and can also change the way students are taught” (p.52).

ART has become one of the fastest growing technological fields. It is used to expand the real world’s perception with virtual objects. ART provides great benefits to human, affects many areas, and makes life is easy and enjoyable. Among these areas is the education, there are many ways to use ART in education and improve the learning process, as the integration of ART in lectures and classrooms attracts students' attention. ART has many possibilities that make it affect the traditional learning process, including the ability to change the place and time of study, and introduce new and additional methods. This makes the classroom a more attractive place, and the information more understandable. This growth of ART has prompted to use it in various fields of human activities, and the most common for its remarkable growth is in education (Geroimenko, 2020, 186).

Some justifications of using ART in education were determined by Radu (2012, 313) and Yoon & Wang (2014, 49) , they indicate that among these justifications are the following:

- Easiness of displaying content in an interesting way. AR can be used to enhance content and instruction within the traditional classroom.
- Availability of learning at all times and from anywhere.
- Developing the participation and cooperation between the learners.

- Increasing learners' understanding of educational content through software-related support such as images, videos, graphics, and three-dimensional shapes.
- Retaining information in memory for a longer period, as what the learner acquires through ART applications lasts in memory more than what is gained by traditional methods.

Wu (2013) states that the educational value of ART is closely linked to the way in which it is designed, implemented, and integrated into formal and informal learning environments. An important consideration is how ART supports and affords meaningful learning. Considering ART as a concept rather than a certain type of technology would be productive for educators. The involvement of educators is important to facilitate the development of favourable AR applications for teaching, which increases the potential for ART to be incorporated in education. ART applications have been developed for many areas of education (Khan et al., 2019, 2).

One of the key aspects (ingredients) of ART is that the AR experience is interactive, that is, a person can receive the information and make changes to that information if desired. The level of interactivity can range from simply changing the physical perspective (e.g., seeing it from a different point of view) to manipulating and even creating new information. When considering ART in education, the key aspects of this technology are extremely relevant to why ART can be useful in the classroom. Most important for education may be the above mentioned aspect. Huisinga moves further by saying that ART experiences go beyond simply consuming content. Students must first use physical objects or the environment to access the digital content. They can then manipulate the digital content by moving around in the environment, and in some cases, they can edit or change the digital content. Learning through an experience and interaction will allow the learner to correlate an experience with new information, thus strengthening the ability to recall and retain the information (Huisinga, 2017, 27).

Along with many studies of ART and its application in education, there is no insufficient coverage of the issues of using ART through the perspective of Reading Comprehension (RC) in the light of the digital transformations of education. As Tobar-Muñoz et al. note, the use of ART in

education raises a number of questions: how the advantages and properties of this technology can help the teacher implements his/her reading comprehension activities, how can the use of ART in the classroom benefit students in terms of performance and motivation, what norms must be observed when using ART, what are the requirements for the forms of organization of the educational process, how to choose the reading comprehension content, methods, and activities to achieve the learning goals (Muñoz et al., 2017, 901-04). Consequently, reading comprehension is one of the norms and main provisions that guide the learning process towards effective achievement of learning goals.

According to different studies, ART and teaching some subjects are two factors that work really well together because ART offers an integral way of teaching to all kinds of learners; therefore, it allows students to blend the virtual and physical worlds in real time. Moreover, it allows to overlay digital content on the physical world through the use of mobile devices, and it can be used in the classroom to supplement physical materials and add new dimensions to classroom learning.

The use of ART in the classroom has repeatedly been shown to increase student's motivation and achievement. Importantly, it has also been shown to contribute to students' learning outcomes. Furthermore, the use of an ART system had a small, yet positive effect on some students' learning attitudes and contributed to their perception of the relevance of their learning to their everyday lives (Jerry & Aaron, 2010, 1 - 2).

According to researchers such as Yen et.al (2013, 172-173); and Estapa & Nadolny (2015,46), ART has positive impacts on students' learning, achievement, motivation and socialization. ART was found effective in the development of creativity and problem-solving skills of both instructors and learners. Due to its interactive nature, ART helps the instructors understand the mental level of the learners. Findings are very successful if the instructor and learner are engaged in collaborative work and meaningful activities under planned and structured program. Moreover, ART is advantageous for students, as it provides opportunities for discussion which lead to learning in an affable environment. In the same way, ART builds up confidence and enhances cognitive levels of introvert students because it gives confidence to shy students which may enable them to express themselves in front of the class or other gatherings.

Equally important, some studies of ART applications have been used in educational process, to improve the effectiveness of student projects and increase their educational motivation, critical thinking, and self-effectiveness of the group i.e., various studies have shown the utility of ART, especially in the field of education, where it has been observed that learning results are improved. Research by some scientists from different universities and educational institutes, led by professors and researchers, is devoted to the study of educational effects associated with the AR use. Research has found that ART affects student learning motivation and contribute to improved academic achievement. Similarly, many studies have emphasized the importance of further research on the learning efficiency consequences of ART use. Gopalan et al. (2015) tested the impact of AR enhanced science textbooks on lower secondary school students in Malaysia. Coimbra et al. (2015) tested three-dimensional technologies, such as AR, enhance the teaching and learning of mathematics in the Portuguese polytechnic higher education. Chiang et al. (2014) tested the use of an AR-based mobile learning system for natural science inquiry activities on fourth-grade students in Taiwan. The system guided students towards target ecology areas and displayed the corresponding learning tasks or related learning materials. Furthermore, the study discusses trends and the vision towards the future and opportunities for further research in augmented reality for educational settings. Chen et al. (2017) tested the use of an AR-based blended learning (ARBL) approach to evaluate the learning usability of elementary students in Taiwan. Moreover, the results of the experiment showed that students could enjoy the learning activities and they were interested in learning process .

Mekni and Lemieux (2014) confirm that new possibilities for teaching and learning provided by ART have been increasingly recognized by educational researchers. The coexistence of virtual objects and real environments allows learners to visualize complex spatial relationships and abstract concepts, experience phenomena that is not possible in the real world, interact with two and three dimensional synthetic objects in the mixed reality, and develop important practices that cannot be developed and enacted in other technological-enhanced learning environments. These educational benefits have made ART one of the key emerging technologies for education over the next years (Mekni and Lemieux, 2014, 210)

2.2.8 The Benefits of Using ART in Education

Pochtoviuk et al. (2020) confirm that “ART implementation in various spheres has many advantages: realism, clarity, information completeness, interactivity etc. The use of ART in various fields (technology, entertainment, science and medicine, education, games, etc.) should be well thought out and pedagogically appropriate.” (p. 104).

The use of ART in the classroom can transform an ordinary classroom into an engaging and enjoyable experience. It provides virtual examples to support textbook materials. As a result, the classes became more interactive. ART helps students remember information they have just learned. The following is a set of benefits of ART in the educational process, as mentioned by Diegmann & et al. (2015, 1547):

- 1- **Increases Motivation:** Dünser & et al. (2012) explain that by “increased motivation, they can refer to learners being more eager, interested, and engaged to deal with new technology as well as teaching and learning content compared to non-AR (NAR) methods. ART successfully enhances intrinsic motivation towards the self-learning process. The students who use the ART books appear much more eager at the beginning of each session compared with the NAR group”(p.112).
- 2- **Increases Attention:** This benefit is about the attention learners pay to the technology and thus to the teaching and learning content. Attention may be grabbed through a variety of methods including: participation, humour, conflict, variety, and real-world examples. The attention factor is the most important as it initiates the motivation for students. Once interest has been created, students are usually willing to invest their time and pay attention.
- 3- **Increases Concentration:** This benefit concerns learners’ concentration while using ART applications. The learners need to be actively involved in the concentration process by consciously focussing his/her attention on the stimulus and the material being taught and then attempting to link this new material with pre-knowledge in order for learning to take place and for the new material to be acquired and remembered.
- 4- **Increases Satisfaction:** It means that learners experience higher satisfaction regarding the learning process or their educational progress, that is, regarding the learning process. This benefit is also mentioned by Redondo et al. (2013, 60) as they state that the learners were quite

satisfied with the ART tools, methodologies and applications used to learn.

5- **Increases Student-centered Learning:** Student-centered learning refers to a wide variety of educational programs, learning experiences, instructional approaches, and academic-support strategies that are intended to address the distinct learning needs, interests, aspirations, or cultural backgrounds of individual students and groups of students. In student-centered learning approaches, students are more self-responsible for their own progress in education, and educators act as facilitators who enable the students to learn independently and individually. Some studies report that using ART enabled an increased student-centered learning in the regarded learning environment. One of these studies is Kamarainen et al. (2013, 455), it emphasizes that:

- ART provides ways of individualizing instruction in a group setting.
- ART supports independence in the educational process.
- ART frees the teacher to act as a facilitator.
- ART improves the ability to explore and absorb new knowledge and solve problems.

These studies show that ART can support a student-centred learning approach by providing educators with new possibilities to individualize their lessons according to students' capabilities and by enabling students to learn more independently from educators.

6- **Improves Collaborative Learning:** In their study, Wang et al. report that ART applications improved collaborative learning by providing new ways of communication and cooperation. Moreover, they regard their ART application as an effective environment for conducting collaborative inquiry learning activities (Wang et al., 2012, 57).

Furthermore, the role of ART in education can be clarified as indicated by Lee (2012,19) in the following points:

- ART supplies an innovative learning space by integrating digital learning materials with various forms of educational means and tools, which are direct parts of physical environment, therefore creating an opportunity for learners to enjoy with so-called the situational learning.
- ART goes hand in hand with constructivist learning concepts, which leads to students gaining greater skill and knowledge.

- ART is able to bridge the gap between theoretical and applied education, and focuses on the way in which the virtual and real worlds can be integrated together, thus achieving the various goals and requirements of e-learning and blended learning.
- ART adds a new extra dimension to teaching concepts compared to other teaching methods. It achieves tangible results in collaborative and experiential learning processes, and the methods provided by AR in education include: physical cognition, embodied cognition, situational learning, and mental work.
- ART can motivate students to participate because it combines fun and knowledge at the same time, and this would motivate them to discover more in the instructional content.

Goff et al. report that there are many beneficial outcomes of using ART in educational settings, such as higher levels of academic performance, motivation to learn, enjoyment, interest in the subject, content engagement, and content retention (Goff et al., 2018, 443).

It can be said that employing ART in education is considered one of the important and contemporary issues, because of its effectiveness in the process of teaching and learning. Educational ART applications can transfer the learner to the world of educational information, to test its foundations and causes by himself in a stimulating and interesting realistic experience, instead of dealing with this information in a fixed text template. The use of ART is not limited to a specific age group or educational level, as it can be used equally at all levels of education; from preschool education to college, or even at work.

2.2.9 Challenges of Using ART in Education

There are some challenges facing the application of ART in education, Lee (2012, 40) mentions the most important obstacles of ART as follows:

- Lack of availability of specialists and experts in ART.
- There is no conviction by universities and schools concerning the effectiveness of ART compared to traditional methods.

Radu (2012, 314) adds the following to the previous obstacles:

- Inability to obtain financial resources to start a project using modern technologies.

Rabbi & Ullah (2013) explain that some of these challenges can be categorized as “performance challenges, alignment challenges, interaction challenges, mobility/portability challenges and visualization challenges” (pp.33-34).

In the same manner, Khan et al. (2019, 3) point out some of these challenges:

- Usability: It refers to (the use of ART within a learning environment requires multitasking, as students need to engage with large amounts of information and various technological tools and devices to accomplish complex tasks. Moreover, the combination of virtual and real objects may cause confusion as learners may encounter difficulty navigating between fantasy and reality).
- Stability of mobile ART is not guaranteed, and difficulties may be encountered if the technology lacks well-designed interfaces and guidance as this may result in the technology being too complicated.
- Learners may also need time to get familiar and comfortable with ART.

From the researcher’s point of view, the most prominent obstacles to use ART in education are the following:

A. Obstacles related to teachers:

- The lack of moral and financial incentives that limits teachers' desire to use ART applications in the classroom.
- Facing difficulty in employing ART applications due to the lack of workshops and training courses in this field.
- The lack of specialists in designing and producing Arabic ART applications which limits its use in students' learning.
- Fear of changing the traditional educational techniques currently used with students and replacing them with modern technological techniques.

B. Obstacles related to learners:

- The limited electronic skills of some learners do not support the use of ART applications.
- Students' low motivation that limits effective participation to use ART applications.
- Using ART may not be an effective instructional strategy for students.

C. Financial and technical obstacles:

- Poor internet infrastructure impedes the use of ART applications.
- The need for a high budget to create ART applications which limits its use in students' learning.
- Content portability: user-created AR application needs to work in parallel with all platforms and devices. In practice, it is impossible to have the same quality of AR content on any device.
- Using AR in the classroom requires a certain resource base, for example, not all students have smartphones capable of supporting AR applications.
- Technical issues with tracking the appearance of digital content, objects not displaying correctly, visual distortion, etc.

2.3 Academic Achievement

Since ancient times, societies and educators have attached great importance to achievement, and it is still considered the standard by which we infer what the individual has of mental abilities and intelligence, so academic achievement has become the focus of everyone's attention, starting from the family, society, teacher and student himself. It has become the basic standard on which we rely to find out the individual's IQ and superiority (Sikhwari, 2007, 521).

Student's academic achievement is the main purpose that educators seek. The student himself is the center of the educational process, and he is the promising hope that high-end societies aspire to, so it is necessary to shed light on the rate of scientific expertise and competencies that the student acquires while passing the educational ladder in our educational institutes. As a result, academic accomplishment is at the top of the priority list for graduating scientific brains capable of creativity and invention, as well as meeting the challenges and issues of the day. Academic Achievement is the core of the wider term "Educational Growth" which means growth in all aspects. It represents the amount of knowledge obtained by the students in different subjects of study. It encourages the students to work hard and helps them to know where they stand. It generally refers to the degree of achievement of competence acquired in specific subjects related to academic work. This shows what an individual has learned or acquired in a particular area. (Sharma, 2009, 14-16).

Preeti (2013) defines academic achievement as “the outcome of education –the extent to which a student, teacher and institution has achieved their educational goals”. (p. 9). Steinmayr et al. add that academic achievement represents performance outcomes that indicate the extent to which a person has accomplished specific goals that were the focus of activities in instructional environments, specifically in school, college, and university (Steinmayr et al., 2014, 1). According to Gilar-Corbi et al., academic achievement is the product of a set of psychological, social, and economic factors that lead to the proper development of students (Gilar-Corbi et al., 2020, 2). Moreover, Viljoen as cited in Sefotho & Ferreira (2020) confirms that academic achievement is “the extent to which learners perform or achieve the knowledge and skills required/prescribed by the curriculum.”. (p. 6).

In our Iraqi educational institutions and society, academic achievement is taken as a key criterion and ultimate goal to evaluate one’s total potentialities and capabilities. It occupies a very important place in teaching and learning process. For every student, who is under the process of acquiring education, academic achievement is very essential because it helps to increase the successful development of young learners in contemporary society (Raja & Sajit, 2018, 140).

Academic achievement is important and determining the future education of individuals and job opportunities for them. Educators and researchers try several ways and new methods to investigate academic achievement- which is considered very important for the future of generations in all age groups (Kocak et al., 2021, 455-456).

The researcher believes that academic achievement is all the information and skills the student learns in school or university during his/her study and what s/he perceives of the relationships between this information and the facts. These information and facts are reflected in the student's performance on a test that is set according to rules and criteria enable him/her to assess his/her performance quantitatively, which is called achievement scores. Academic achievement refers to the extent to which learners acquire the knowledge, skills and proficiencies that the instructor seeks to teach or assign.

2.3.1 Factors Affecting Academic Achievement

Academic achievement is one of the most important indicators of learning and understanding in all educational systems. Students with higher academic achievement are more likely to finish their study and succeed in their future academic and professional lives. The importance of academic achievement and its role in students' future have enticed the educators to determine the influential factors and subsequently present different variables.

Joseph (2017) explains that in measuring learner's ability, “the tests on achievement have gained significant importance. To measure nature and extent of students learning in a particular subject, an achievement test is used. Various factors and conditions can affect the student’s achievement. Students' performance, teachers' methodology of teaching, socio-economic conditions and family set up and some other psychological factors can also affect directly or indirectly on academic achievement.” (pp.1-2).

Over the past four decades, researchers have identified a large number of variables that predict increases in student achievement. The large number of variables related to learning process is an important issue that must be considered when attempting to utilize research for education reform. For example, in a review of 800 meta-analyses, Hattie (2009) identified 138 variables significantly related to academic achievement. Moreover, he developed a framework that can help identify some of the variables affecting achievement: home context variables, school-level context variables, classroom process variables, and classroom input variables to show how they are interrelated (See Figure 13):

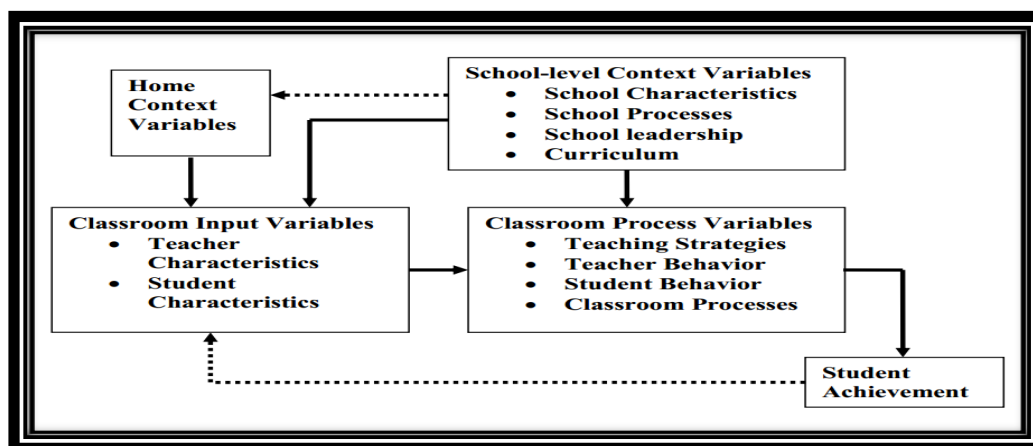


Figure (13): Categories of Variables Impacting Students' Academic Achievement

Taslidere (2020) claims that factors affecting student's achievement are: "cognitive, affective, personal, cultural, and socioeconomic characteristics." (p. 1385). Sharrma (2009) adds that academic achievement is a multidimensional phenomenon. Many factors that influence academic achievement are such as family environment, heredity, learning, skills, interests, school experiences, parental socioeconomic status and family environment (Sharrma, 2009, 12-18). Saritas and Akdemir (2009, 29-31) and El-Omari (2016,11) conclude that factors affecting students' achievement are:

1. **Individual factors:** They are related to the individual himself. They are as follows : a) cognitive such as learning ability, cognitive styles, intelligence, creativity, etc. b) Non-cognitive such as attitude towards oneself and others, perceptions of school, level of aspiration, study habits, personality interests, motivation, selfesteem, and attitude education,.
2. **Environmental factors:** They are related to the environment of the individual. These include socio-economic status; educational system, assessment system, family traits and society, teacher effectiveness, training and teaching methods, school environment, home environment, and peer groups.
3. **Psychological factors:** They are related to the individual himself,: intelligence, learning ability, motivation, self-efficacy, learning style, study skills, creativity, aspiration level, concept of self, and interest.

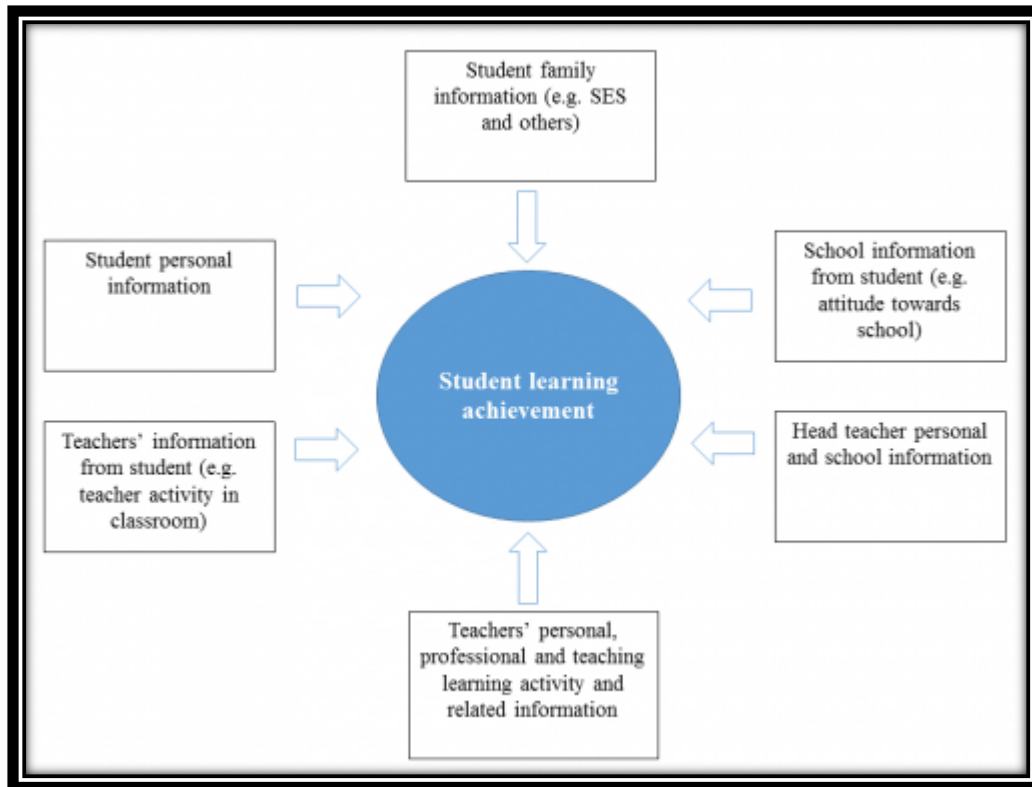


Figure (14): Factors related to students' learning achievement, UNESCO Bangkok (2018)

Beliefs of students' self-efficacy as well as teachers' self-efficacy have been linked to student achievement. Moreover, Bandura (1993) provides evidence that (educational institutions have a sense of collective efficacy, which correlates positively with student's achievement. It was concluded that the relationship between collective efficacy and achievement was stronger than the relationship between student self-efficacy and student's achievement).

In line with what has been mentioned, the researcher can add many factors that affect the academic achievement of the learner, which must be recognized and evaluated constantly, and appropriate solutions are found to treat them so that the learner can improve his/her abilities and obtain the highest levels of performance in the classroom. These factors include (health, mental problems, mental disorders, attention deficit hyperactivity disorder, the nature of the school environment, the presence of learning difficulties, IQ and mental abilities, age, gender, geographical belongingness, socioeconomic status (SES), parents' education level, parental profession, language, and income).

2.3.2 Basic Assumptions of Academic Achievement Measurement

Since learning is the mainstay for the progress of nations and the means of renaissance for various aspects of life, whether social, economic or cultural, it is a means through which an integrated citizen is prepared, capable of bringing about fundamental changes of public benefit of society. This is achieved by measuring knowledge and skills acquired by learners in different fields of study, as well as measuring skill levels in training fields for those who work in all educational institutions. The interest, in such cases, is based on measuring individuals' gains at the end of a specific study period through which a set of organized experiences are provided.

Steinmayr et al. explain that because the field of academic achievement is very wide ranging and covers a broad variety of educational outcomes, the definition of academic achievement depends on the indicators used to measure it. Among the many criteria that indicate academic achievement, there are very general indicators such as procedural and declarative knowledge acquired in an educational system, more curricular - based criteria such as grades or performance on an educational achievement test, and cumulative indicators of academic achievement such as educational degrees and certificates. In developed societies, academic achievement plays an important role in every person's life. Academic achievement as measured by the GPA (grade point average) or by standardized assessments designed for selection purpose such as the SAT (Scholastic Assessment Test) determines whether a student will have the opportunity to continue his/ her education (Steinmayr et al., 2014, 1).

Standardized achievement tests are also important indicators of academic achievement because they provide more objective ratings of academic achievement than grades and can be viewed as more of a "pure" indicator of academic knowledge. Thus, they are used in many countries as college entrance tests that are good predictors of success in tertiary education. (Ibid, 5).

Academic achievement is commonly measured by examination or continuous assessment but there is no general agreement on how it is best tested or which aspects is more important procedural knowledge such skills or declarative knowledge such as facts (Preeti, 2013, 9-10).

The measurement of academic achievement is based on some basic assumptions so that the results of the measurement are consistent, honest and unbiased (Allam, 2000, 309-310). These basic assumptions are as follows:

1. The test measures a range of behaviour that can be accurately identified. The achievement test should be based on educational goals that can be formulated in a specific behavioural formulation so that they can be measured.
2. The test measures objectives related to the study subject or the content of the instructional program, and it does not measure accidental or unimportant objectives. This means that the achievement test should be honest in its content. If a test is designed to measure the student's skill in drawing geometric shapes, for example, it must include test items that measure this skill, not verbal skill.
3. The educational treatment must be appropriate for the learners to whom the test will be applied, taking into account the individual differences between them, and allowing them to learn the field measured by the test. Despite the possibility of these conditions in the classes that the teacher examines with tests prepared by him, the inequality of these educational opportunities and experiences is a problem in the case of standardized achievement tests due to the variation of the educational content measured by these tests from academic level to another or from one educational institution to another .

2.3.3 ART and Academic Achievement

As an emerging technology, AR is expected to achieve widespread adoption in teaching-learning processes. Hence, a clear need accrues in how ART applications are being adopted within teaching-learning processes. Some researchers emphasize that except supplementing a wide variety of sensory modalities, there is a vast amount of research on revealing the potential benefits of the use of ART in education, such as, improving students' academic achievement (Estapa & Nadolny, 2015, 40; Lu & Liu, 2015, 535), motivation, knowledge retention, and engagement (Bressler, & Bodzin, 2013, 505). To achieve such critical learning outcomes during the teaching-learning processes, Thornton et al. (2012) suggest that "teacher must constantly utilize contemporary and cutting edge technological applications, one of which is ART." (p.18).

Saltan & Arslan (2016) view that “ART has gained so much support in the field of education as it is viewed having numerous potentials to change educational settings, such as, enhancing progressive pedagogies, instructional strategies, and the arrangement and delivery of content.” (p.505). Furthermore, the use of ART applications is considered to improve students’ cognition and interaction which results in more effective learning (Lu & Liu, *ibid*, 538).

By using ART applications, educators should also take consideration into the idea of how such applications might be integrated with instructional strategies or pedagogical approaches in higher education. Studies revealed that the use of ART in higher education might enable educators to combine those applications with various pedagogical approaches, such as, self-learning , learning by discovery, inquiry-based learning, learning by modeling, blended learning, and flipped learning.

With advancements in technology and support, the development of ART systems has become much easier. ART is being applied to education, and has led to impressive results. Research on the use of AR in education has increased steadily and offers great insights into learning and teaching (Diao & Shih, 2019, 2).

Moreover, some researchers have been interested in investigating the impact of ART on the educational process, and specifically the academic achievement of learners. Numerous studies such as El-Sayed (2011), Yen et al. (2012), Pérez-López & Contero, (2013), Chiang et al. (2014), Kucuk et al. (2014), Gün & Atasoy (2017), and Erbas & Demirer (2019) have indicated that ART can assist learners to better acquire classroom knowledge, improve learning outcomes, boost motivation, and enhance learners’ performance on academic achievement .

Based on the foregoing literature, the researcher of the current research can conclude the following:

- 1- By using ART, some results of the above studies indicated that students were satisfied with the learning activities and achieved the target knowledge.
- 2- Some results showed that ART affected students’ learning and views positively.
- 3- By using ART, students enhanced their thinking skills and developed positive attitudes towards different subjects.

- 4- It is found that ART increases students' achievement levels and decreases their cognitive load levels.
- 5- Some findings show that ART increases students' spatial thinking levels.

In light of the foregoing positive results of ART on academic achievement, the importance of measuring academic achievement in reading comprehension course using ART becomes clear, as it is an indicator of the success of the educational process.

2.4 Visual Intelligence (VI)

Freire (2018) critiques that the success of the educational process depends primarily on developing the skills of the teacher and enabling him of his specialization. The teacher must transcend the traditional methods of the teaching process, which makes him a communicator and the student a recipient. In addition, the student should have the largest and most active role in the educational process in the classroom. The use of advanced modern methods of teaching would increase the excitement of the student's thinking and involve him in the process of searching for information, inference, and developing positive relations among the students themselves (Vaughn, 2019, 204).

According to recent brain research, efficient teaching strategies have emerged. People ways of learning are different, some of them prefer to see the information (visual learners), and some learn effectively if they hear (auditory learners), and others learn effectively if they work, try or touch (kinesthetic learners). Creativity in learning is the combination of all these methods. The regions of the human brain differ according to the way information is preserved in one type of memory: systematic memory (linking to action), sequential memory (linking information to emotion), semantic memory (meaning relevant to facts), and sensory memory, and sensory memory (Mulholland & Turnock, 2013, 25) and (Norton, 2014, 79).

One of the main factors influencing mental development is intelligence (Eberle, 2011, 21). In order to explain intelligence, scientists like Gardner, Armstrong and Hoerr, conducted numerous researches. Until early 1980s, standard intelligence tests were developed by various studies to determine the intelligence levels of individuals. In his book "*Becoming a Multiple Intelligences School*", Hoerr (2000) mentions that predominating

view in this era was that intelligence could be measured objectively and could be stated with a single number called intelligence quotient (IQ).

Cherry (2021) states that the concept of intelligence differs from scientist to another, but they agree that intelligence is a general innate ability, a person is born and equipped with it and continues with him throughout his life. Intelligence can be defined in several unique ways. Heming (2008) defines it as “the potential for finding or creating solutions for problems, which involves gathering new knowledge the ability to create products and to provide valuable services and bio psychological potential to process information that can be activated in a cultural setting to solve problems that are of value in a culture”. (p.4). Intelligence is the ability to understand, innovate, and create purposeful guidance of behaviour and self-criticism. Hence, it is the ability to learn and achieve. This definition is the most common and widely used.

Howard Gardner, a professor at Harvard University who specializes in basic cognitive research in the field of development and learning, and a researcher at the Nervous Center in Boston, in cooperation with neuroscientists, presented his new theory in the field of educational reform in his book "The Unschooled Mind". In 1983, Gardner proposed the “multiple intelligence theory” and he brought a new perspective to the intelligence issue. According to Gardner (1993), intelligence accommodates many abilities and that it has a multifaceted nature that could not be stated with a single number. Gardner defines abilities that are found in different amounts in each individual as intelligence areas or “modalities”. He names those intelligence modalities as follows; (Verbal - Linguistic, Mathematical – Logical, Visual – Spatial, Kinesthetic – Bodily, Musical – Rhythmic, Social – Interpersonal, Reflective – Interpersonal, and Environmental – Natural). So, he emphasizes that people differ in the extent to which they have each type of intelligence in learning and performance.

In the educational field, Gardner’s Theory has emphasized that the differences in the intelligence profile create a different learning style among students. Thus, they must be educated differently. This means that instructors should teach students in ways that they can learn, evaluate, and allow them to show what they have understood. With such remarks, it is clear that effective teaching must be colored with different teaching strategies that will help students to develop their strengths, and strengthen

their weakness in each area of intelligences. Therefore, it is important to determine the students' intelligence profile before teaching and learning activities. Such information will guide teachers to strategize teaching activities with different styles that are compatible with students' intelligences (Budin et al., 2016, 3054).

The most important source for us to get information about the world is the sense of sight (Yenilmez, & Kakmaci, 2015, 190). In other words, the individual can get information about many objects by looking at their images, and this is achieved through the use and develop of visual intelligence.

Diezmann & Watters (2000) highlight their thinking processes in the following reflection: "Visual Intelligence (VI) can be inferred from the ability to invoke and use particular representations and reasoning".(p.4). In addition to imagery, visual representations include diagrams, drawings, maps, and models. Reasoning with visual representations differs substantively from the sequential reasoning used with linguistic representations, such as text and involves cognitive interaction with visual information to solve problems. VI includes an ability to perceive and represent the visual world accurately and to form and manipulate mental images. Visual intelligence is the capacity to think in images, drawings, maps, and diagrams, to visualize accurately and abstractly.

According to Sadeghi & Farzizadeh (2012), VI has been described as "an ability to visualize or create an image which characterize the spatial world. It considers the ability to mentally reconstruct or modify the outlook of objects in space, concluding with the representation of ideas. Properly, moreover, individuals with highly developed visual intelligence are also sensitive of colours, shapes and forms." (p. 137).

Similarly, Šafranj & Zivlak (2018) discuss that VI is "the ability to visualise space and objects within the mind's eye. People who prefer to use this kind of intelligence would rather draw a picture than write a paragraph. They notice colour shapes and patterns and how light falls on the object, and comprehend mental models." (p.72).

Besides that, VI is the ability to see an object in a great detail, and remember it for a long time. Someone who has VI tends to be more creative. It is the capacity to perceive the visual world accurately through

transforming, modifying and recreating the aspects of one's individual real world. Mental imagery, graphic skills, and imagination are all part of visual intelligence. It deals mainly with the concrete world, and is considered the ability to think in three dimensions (Rahmatunnisa & Fauziah, 2019, 172).

2.4.1 Best Career Options For Visual Learners

Traditional teaching methods rely heavily on spoken instruction. Although this type of instruction may be helpful for some learners, it is not helpful for all. A subgroup exists that does not easily associate meaning with spoken language and therefore may fail to notice opportunities for learning in this type of environment. This can lead to a failure to communicate or understand language. This subgroup is known as visual learners (Tissot & Evans, 2003, 430).

Careers that use visual intelligence range widely. All of painters, map topologists, sculptors, sailors, navigators, architects and engineers use visual-spatial intelligence. Chess players and grocery store baggers are also said to have a high spatial intelligence. Jobs such as navigators and tour guides may also possess a high level of spatial intelligence. Artists like Claude Monet and Edgar Degas are known for their visual-spatial intelligence. Students with extreme levels of this intelligence may be caught doing mazes, puzzles, or just drawing and daydreaming. Visual learners enjoy rearranging their desk, watching music videos, and creating art. Graphic organizers such as a Venn diagram help these students learn because all the information is organized in a specific way (Heming, 2008, 6-7).

This kind of intelligence also includes the aptitude to graphically represent spatial or visual ideas. People with highly developed visual intelligence are often designers and architects. It is also the ability to comprehend mental models, manipulate and shape them spatially and draw them in detail. Thus, specifically, people with highly developed spatial-visual intelligence (Ibmian & Hadban, 2013, 294) are known to: have good sense of direction, be good at puzzle building, think in pictures, be good at reading, writing and understanding charts and graphs, have good sense of sketching and painting, enjoy watching videos and movies, have good sense of interpreting visual images, create mental images due to retain information, and enjoy looking at (maps, charts, pictures).

2.4.2 Key Characteristics of Visual Learner

Learners with high visual intelligence process information best using pictures, drawings, visuals, and imagery. They have a sense of direction and an ability to think and plan in three dimensions. They are able to create complex mental images, possess active imagination. They are able to find their way mentally and physically around environment. They can see the physical world accurately and translate it into newer forms. They have the ability to see things in relationship to others and use 'mind maps' extensively. They use imagery and guided visualizations. They have preference to visual support (video), pictures, photos, charts, posters. They organize space, objects, and areas (Tamilselvi & Geetha, 2015, 4).

The visual learner is the "seeing-is believing" student Haggart (2011, 10-11). The visual learner is a natural at:

- Remembering details and colours of what he or she sees.
- Reading, spelling, proofreading.
- Remembering faces of people s/he meets (forgets names); remembering names seen in print.
- Quietly taking in surroundings.
- Creating mental visual images.
- Dressing well, putting outfits together easily.
- Creating mental visual images.

Haggart adds that the visual learner solves problems by:

- Reading information and listing problems.
- Preparing graphic organizers to organize thoughts.
- Using flow charts.
- Seeing if a solution works graphically or concretely on paper or by visualizing it in the mind's eye.

Shaffiei et al. have identified a number of key characteristics of this type of visual learner (Shaffiei et al., 2014, 78-79):

- They are the kind of learners who learn through seeing pictures, animation, teacher's body language, facial expression and visual content of the material that had been used by the teachers.

- They are whole-picture thinkers who grasp a concept all at once and see the whole before acknowledging the details. They are whole-part learners who need to see the big picture first before they learn the details.
- They have vivid imaginations and are often good at coming up with unusual or unexpected ways to solve problems.
- They learn more easily when presented with visual rather than auditory information. They have a different brain organization than auditory sequential learners.
- They may seem disorganized.
- They neither learn in the step-by-step fashion that is common in the classroom nor learn well from drills and repetition. They are non-sequential, which means that they do not learn in the step-by-step manner in which most teachers teach
- They struggle with showing the sequence of a process. For example, when the teacher asks them to show their work, they cannot easily do that, since they see the task as a whole, rather than a product of several steps. Despite that, they are able to work on complex tasks and may be classified as systems thinkers.
- They think in pictures rather than in words.

Rahmatunnisa, & Fauziah (2019,172) state that people who have high visual intelligence usually:

- Have a sharp memory.
- Can develop high thought patterns and skills in problem solving.
- Receive awards for performance.
- More able to express emotions and feelings.

Accordingly, visual learning style may be defined as a style of learning in which the learners are found to be eye minded, i.e., showing the preference for utilising their sense of vision in learning or acquisition of a piece of knowledge or skill related to one or the other subject areas or tasks. In general, the learners performing the style may be characterised with the abilities and behaviours as below (Mangal & Mangal, 2019, 192):

- Visual learners are good watchers. They are often attracted to lights, colours and movements.
- Visual learners are benefited much through visual presentation of reading or study material. As a result, they learn the best by looking at graphics, watching a demonstration or reading.
- For the visual learners, it is always good and easy to learn and focus on the blackboard summary or diagram drawn by the teacher in the class, maps pictures or charts shown, or models demonstrated but they may have little interest or may feel difficulty in focusing while listening to an explanation or verbal talk of the teacher.
- Visual learners are found good at reading and writing language as both these skills are very much linked with their visual abilities and preference for learning.
- A visual learner in the class may be properly identified in case (i) he is found to learn the best and take notes when visual information is being presented and (ii) create his own visual material—charts and graphics while learning.
- Visual learners are seen to be quite good in terms of spatial awareness. They have better sense of directions and understand what things fit into a space in relation to other things. Their ability to draw and understand map reading, designing, drawing, thus may be easily utilised in making them learn and understand the things related to their studies and applications in life.

Likewise, Masela mentions some characteristics of visual intelligence learners Masela (2020, 260-262):

- Visual intelligence learners can access information by thinking in pictures and understanding from body language.
- When visual learners are describing or recalling subject or event, they prefer to use hand movements to help them recall the information.
- As visual learners rely on visual information, they have their attributes in their learning process that support them in obtaining the information. Attributes such as pictures, graphs, charts, diagrams, and videos are used in learning because the visual presentation is interesting and it can stimulate them into what they learn.

To conclude, the visual intelligence learner is characterized by his/her ability to do the following:

- Visualizes shapes or ideas using his/her mental ability.
- Describes the visible images that are clear to him in his imagination.
- Imagines how inverted things would look like if they were adjusted in their correct position.
- Dreams more than his peers and often sees vivid visual images if he closes his eyes.
- Uses pictorial models such as flow charts, visual maps, Venn diagrams, and timelines to connect new material to known information.
- Has vivid imaginations and is often good at coming up with unusual or unexpected ways to solve problems.
- Enjoys visual and expressive arts such as watching movies.
- Enjoys activities that require visual memory and imagination.
- Takes notes using concept mapping and mind mapping.
- Translates his thoughts and feelings into visual expressions.
- Enjoys artistic activities such as drawing, coloring, sculpting, and shaping.
- Likes to disassemble, assemble, and build and create things easily.
- Enjoys making puzzles and builds fun 3D structures.
- Imitates other people's drawings and design his own.
- Likes to use the camera to capture what s/he sees around him.
- remembers places that s/he visits and can reach anywhere easily.
- Distinguishes details and pays attention to pictures more than words while reading.
- Prefers videos and pictures to using words.
- Makes illustrations and uses color in an orderly fashion.

2.4.3 Visual Intelligence Teaching (VIT)

The interpretation and use of visuals is one of the most overlooked areas needing attention by teachers across content areas. Students live in an overwhelmingly visual world, information is conveyed through a variety of types of images. These include photographs, cartoons, drawings, maps, charts, graphic representations, and three-dimensional figures (Newman & Ogle, 2019, ix).

In visual intelligence teaching, Hawkins mentions that learners are taught with diagrams, pictures, and other visual information. Visual learners have strong memory. Instead of learning through lectures, they perform

better when taught with pictures. Visual learners tend to think in pictures and learn best from visual displays including diagrams, illustrated books, videos, and checklists. Visual learners require special effort and care to teach them. Once you realize their needs and requirements, you can teach them without any issues. All the instructor needs to understand is that they cannot learn via traditional methods. The instructor needs to provide them with visual data, as they grasp visual information immediately (Hawkins, 2004, 178).

As reported by Mohnsen, when teaching, check for understanding before sending students out to practice the skill. Many teachers are unaware that students do not understand their directions until the students try to demonstrate the skill or implement the activity. Check understanding through a variety of techniques: signalled answers, choral responses, or sampling individual responses. Signalled answers refer to asking students true-false questions and requesting a thumbs-up or thumbs-down response to indicate their understanding. For a choral response, students call out the answer to a question. Both the signalled answer and choral response are quick ways to check for understanding, saving time and frustration later in the class period (Mohnsen, 2008, 136).

The instructor can also call on individual students to check understanding of the task and skill and then generalize the understanding of a few students to the entire class. One alternative to sampling individual responses is a cooperative learning technique in which you ask the question, give partners time to discuss the answer, and then call on a sampling of students to ascertain the level of understanding. This approach gives all students an opportunity to discuss the question and learn from one another. Follow these effective questioning steps when asking for individual student responses (ibid):

1. Ask the question.
2. Wait at least 30 seconds (some students require more time to process).
3. Call on one student.
4. Affirm or correct the student's answer (this indicates to the students that you are interested in the response).
5. Follow up with a second or third question when you receive an incorrect answer to clarify student understanding.

Educators use a variety of methods to reach visual learners. Providing students with the opportunity to draw table or map, use charts , use pictures, make graphic organizers, and use videos, allows them to use their visual intelligence. Visual learners thrive when the right hemisphere is activated through color, humor, imagery and visualization, and hands-on activities. Verbal instruction is enhanced by visual aids, such as pictures, models, drawings, and objects (Hindal et al., 2009, 190).

There are several ways to teach the visual learners. The ways to teach the visual learners is by using pictures, videos, and colours; creating pictorial models, and using visual resources from the internet. Besides that, teachers should show the visual learners something that they can imagine in their mind and do not just tell them (Shaffiei et al., 2014, 79).

The educator can play a prominent role in applying teaching strategies consistent with the visual intelligence that s/he seeks to develop or improve to his/her students. They show their learning by focusing on problem-solving activities that are based on this type of intelligence, as these educational strategies encourage them to build visual knowledge and the experiences that are stored in their knowledge structures to learn new skills (Tileston, 2005, 22).

By incorporating instructional strategies that engage visual learners, all the students in the classroom are more effectively reached and benefit. Moreover, Golon adds, the educators can no longer ignore the importance of visual skills for current and future generations of students. They must nurture them in those students who were born with these skills and cultivate them in the others. Instructors can no longer afford to teach only the fundamentals of reading, writing, and math; today's students will enter a work market that is entirely different from ours (Golon, 2008, 14).

Visualizing and using the mind's eye to create images is an important way or strategy to help understand and remember what the students are reading. To be good readers, the students need to know how to create images throughout the entire reading process. They need to learn how to use their knowledge of language to make connections and to use the descriptive words from the text to create vivid mental images. Here, the instructor can model for his/her students how to create images and give them lots of

chances to try it out while reading the text or passage (Diehl & Nettles, 2010, 112).

Rakes et al. report there are many learner-generated visuals strategies and teacher can use it, in several ways, to develop visual intelligence skills in reading comprehension subject (Rakes et al., 1995, 47-51):

A. Visual Before Reading Strategies

- ***Build Prior Knowledge:*** Prior knowledge means using previous experiences to connect or predict upcoming events.
- ***Predict:*** Use prior knowledge to talk about what is going to happen in the story or text, for example, while looking at the image of the book below, what do you think is going to happen in the story?
- ***Picture Walks:*** Going through images only from the text to familiarize the student with the story's contents.
- ***Vocabulary Identification:*** Have students go through the text and identify the unknown vocabulary. Students can then create pictures to illustrate the meaning of the vocabulary before they read. Example: Students illustrate science vocabulary words to help them with the meaning.

B. Visual During Reading Strategies

- ***Highlight Important Facts:*** As students read, have them underline or highlight the important facts of the text . They can highlight the story elements, important vocabulary , and main topics of the text under each heading.
- ***Creating charts and graphs (graphic organizer):*** Using graphic organizers and charts can help students sequence and organize thoughts about a story as they read it.
- ***Picture Cues:*** As the student is reading, have them look at the pictures to help them understand what is going on in the text.
- ***Using internal visual images (Stop and Check with Visualization):*** Have students read a sentence and describe what it looks like in their

mind. Example, a student stops while reading his/her story to picture the words as images in his/her mind.

C. Visual After Reading Strategies

- **Sequencing** : Have students create visual drawings or story maps of what occurred during the story after they have read it.
- **Using illustrations to summarize text**: After students experience the drawing strategy, teacher can ask them to draw pictures of the most important events in a selected text or to evaluate the illustrations created by their peers . Simplicity or lack of artistic quality does not interfere with the effectiveness of the strategy. Therefore, too much detail may actually divert attention away from the text. It is important for students to understand that they are not evaluated on the quality of their drawings and that the process is more important than the final product.
- **Readers Theater**: Students role play events from the text by creating the images they "see" while reading. Example, the students can role play the events from a story they just finished reading.
- **Response to text or story**: Visual clues to help learners make connections from the text to themselves, real world, and the text.

Moreover, Epçaçan et al. (2010) suggest some of the visual strategies considered to enhance reading comprehension and meaningful learning are: “making narrating texts visual with pictures, composing intellectual indicators while reading, using pre-learning including visual indicators, using map chart summarizing written texts like picture and chart with visual objects, using concept maps, and supporting lesson activities with caricatures.”(p.1668).

Among the teaching strategies of visual intelligence are the following (Al-Ansari ,2018, 25):

1- Visual Imaginary Strategy:

This strategy helps retrieve information and remember it easily. The Visual Imagery Strategy is a strategy for creating mental movies of narrative passages. Students visualize the scenery, characters, and action and describe the scenes to themselves as they read each sentence in a passage. Students use the strategy to improve their understanding and recall

of specific facts and sequences. Learners' imagination can be developed according to gradual stages, as follows (Rif'a, 2018, 76-77):

- This strategy is based on translating the text or passage into a mental image through imagination.
- The teacher asks his/her students to close their eyes.
- The teacher presents a specific topic to students to begin the process of imagination.
- As if s/he asks them for example, to imagine the falling of heavy rain in the village in which they live and consequences of that.
- The teacher asks students to show what they have imagined.
- Students begin to narrate the movie they have imagined, whether in writing or alphabetic words or drawing.

2- Colour Alerts Strategy:

- This strategy is based on the use of colours as a tool for teaching students.
- The teacher uses specific colours for everything. For example, s/he uses the red to write the concepts , the green to write the definition, the blue to make drawing, and so on.

3- Pictorial Metaphors strategy:

- It is a method that uses a specific thing to compare it to something else metaphorically only.
- As if the teacher compares, for example, the human heart to a car fuel pump. This strategy helps students easily understand and remember .

4- Concept Drawing Strategy:

- One of the most famous pioneers of science who based their discoveries on drawing the idea are Thomas Edison and Henry Ford.
- The teacher asks his/her students to draw the key point or idea that revolves in their minds about the subject.
- These drawings are then discussed with the students without the teacher's intervention in order to see the diversity of their ideas.

According to Brokaw visual learners are encouraged to create mental images for recall and comprehension. Incorporating images by drawing, using a diagram, or mentally creating an image into new material being learned will increase the likelihood students will retain new information permanently. Visual resources such as photographs, slides, films, charts, video, paintings, drawings, cartoons, prints, designs, three-dimensional, Webs, concept maps, story maps, graphic organizers, Venn diagrams, and

pictures or documentary record or any other visual materials, are effective teaching tools due to the fact that they implement visual chunking to process and remember information (Brokaw, 2012, 10).

Equally important, Epçaçan et al. range the contributions of visual strategies in learning, like that: they provide a conscious interaction between reader and text, they redound learner's attention, they can be carried out and individualized, they strengthen describing and remembering words, they motivate learners, provide quick learning in order to complete a subject or duty, rescue from dependence in learning and increase to be independent learners, and they provide learning by describing subjects step by step (Epçaçan et al., 2010, 1667).

In the same manner, Kennedy & Chinokul (2020) confirm that “visual-based formats and strategies help scaffold reading comprehension because the visuals enable students to connect more immediately with written text. They are an alternative learning tool that allows language learners to think critically and analytically.” (p. 158). Furthermore, Hameed (2020) concludes, as a result, “the students become more aware of the significance of using these strategies while comprehending the reading process.” (p. 3756).

Based on what is mentioned above, students can remember information better when it is represented visually. These visual strategies help students of all ages to better manage learning objectives and achieve academic success. The various visual strategies like the vocabulary-related strategies, activating the background knowledge, rereading, inference, monitoring comprehension, self-questioning, identifying the main ideas, summarizing and drawing conclusions, can help the students understand the texts or passages. Visual strategies can also contribute to students' learning meaningfully by reconstructing a text with visual shapes.

2.4.4 Instructional Activities of Visual Learners

Stimulating the brain with adequate difficulty levels promotes learning. Each person uses both brain hemispheres in different measures. Silverman (2002) states, “Individuals who have enhanced right hemispheric development, perceive and organize information in a different manner from those who have greater left-hemispheric development” (p.16). Visual Intelligence (VI) might focus on the right hemisphere of the brain. The right

hemisphere enables the learners to see the “big picture” as their mental video camera.

Visual intelligence represents the ability to understand and read shapes, pictures, and graphic charts. It is the main function of the right side of the brain that works to solve puzzles and understand maps. It does not include vision only, but rather embodies theoretical and analytical capabilities more than it is an abstract vision of images, through perception of images and knowledge of their relationship with the surrounding objects in addition to displaying the organizational structure of ideas.

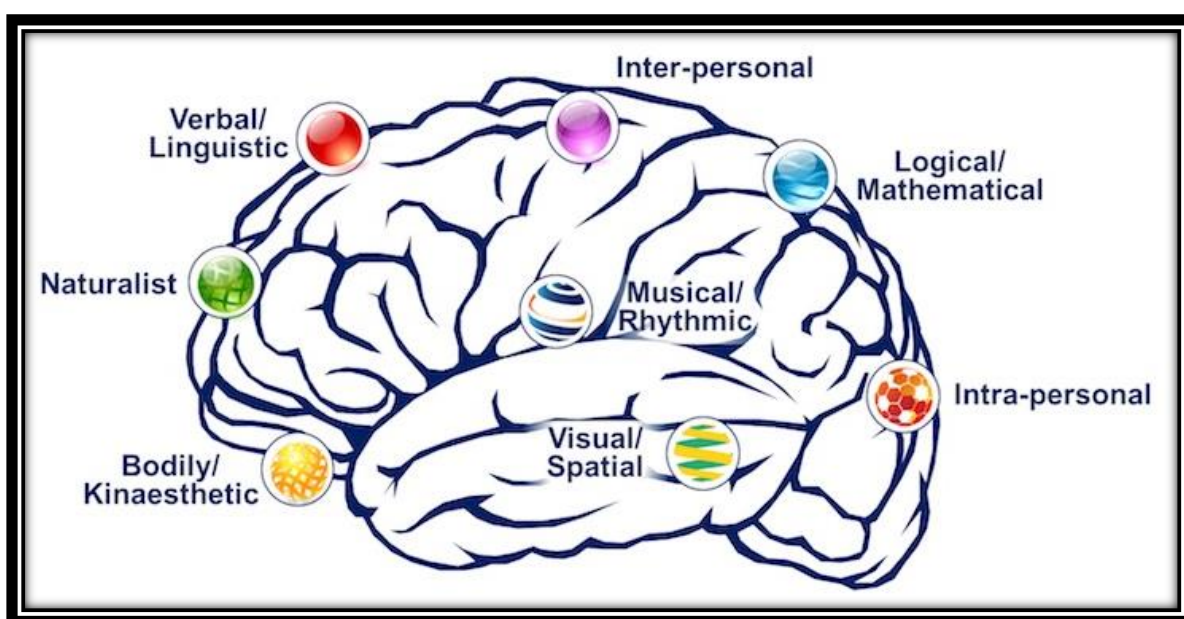


Figure (15): Multiple intelligences and brain hemispheres

Jackson et al. (2009) state “to actively engage diverse learners in higher education, the instructor should have a good understanding of the overall nature and purpose of the group, as well as the ability to interact well within the learner’s unique world. The instructor must also be able to structure learning activities to meet their learning needs.” (p.1). The use of visual intelligence, coupled with an understanding of how effective technology (Augmented Reality) can enhance the learning community, can meet the diverse learning needs of all students.

A satisfactory success can be achieved by thinking reading comprehension as ‘problem-solving process’ at Iraqi educational institutions and universities, planning the content of the lessons in accordance with the visual intelligence, enriching the content of the lessons by using materials

and activities which help to concretize abstract concepts that students have difficulties to understand, emphasizing the fact that the topics of reading comprehension exists in everyday life rather than being just a lessons and supporting the curiosity of students and their efforts to discover by correlating the examples with everyday life.

Visual materials have the benefit of making learning more accessible for those who struggle with reading and provide a wealth of engaging and accessible approaches to support understanding the material, either through direct engagement with visual sources or through approaches that scaffold learning and turn it into digestible and memorable chunks. Diagrams, cartoons, pictures, tables, presentations and so on are more likely to succeed with pupils who may struggle with a large body of text. Following is a list of possible ideas that draw upon visual approaches to learning; obviously there are many more ideas that can be utilised and the instructors' choices will depend on the needs of their students (Harris & Luff, 2017):

- **Pictures** - Get learners to summarize ideas into some sort of a picture rather than into written notes.
- **Draw/model a concept** - Ask learners to demonstrate their understanding of a concept, such as the peace, by drawing it or making it.
- **Modified visual sources** - Get learners to demonstrate how something has changed. Use an image of the situation prior to an event, then get the students to redraw it after the event; for example show a scene in a bridge prior to the reform acts, then redraw the scene following the reform acts.
- **Comparison of visual sources** - Compare visual sources from different times to create a sense of similarity and difference, change and continuity.
- **Graphs** - Convert information into graphs, and get the learners to then explain what patterns the data shows.
- **Timelines** - Construct timelines that use visual images to show developments across a period. This can be extended by the use of parallel timelines, for example; timelines showing developments in transport from 1750-1900, can be put alongside a timeline of agricultural changes, and developments in the iron industry, oil industry and so on . Students can then be challenged to make links between the timelines.
- **Tables** - Large chunks of text can be easily broken down and put into sections of a table.

- **Diagrams** - Flow diagrams are another way to make chunks of text more manageable, as learners can break the story down into the essential steps. Causes and consequences of events such as the Agricultural Revolution can be summarized succinctly.
- **Storyboards** - Learners can convert a piece of text into a storyboard sequence or explain what they think has happened prior to the event in a picture, and what they think happens after the picture.
- **Use of technology** - Computer programs like Movie Maker and iMovie enable teachers and students to create powerful visual materials, while sites such as YouTube open up a vast array of easily accessible material to be used in the classroom.

The instructional activities that cater for visual-spatial intelligence on students' learning achievements are as follows (Šafranĳ & Zivlak, 2018, 75):

- **Visualization:** Learners can close their eyes and picture what they have just read or learnt and then explain it to the whole class or draw if possible.
- **Colour cues** are innovative approaches to use color as a learning tool. Students utilize colour pencils to do their tasks.
- **Sketching ideas:** Drawing the main idea, core concept, central theme, or key point that has been taught is an example of sketching ideas; it is also used to understand some concepts, events, or ideas in the passage. Students can make fast drawings that express central ideas and main events.
- **Graphic symbols** are used to address different learners by drawing or depicting concepts or ideas; for example, showing three states of matter by drawing a solid mass (heavy mark), a liquid mass (curvy mark), and a gaseous mass (tiny spots).

Learning with visual intelligence activities is a teaching and learning style that relates ideas, concepts, data, and other information to images, posters, videos, diagrams, and graphics organizers. So, these activities are visual representations of knowledge, events, concepts, ideas or opinions. By representing information visually (with images), students are able to focus on meaning, and easily identify main ideas and important events, that enable them to make better use of their visual memory. In other words, by applying visual activities in the classroom, it allows new creative possibilities for both

teachers and students. Visual activities help in breaking teaching routines and enhances learning (Kędra & Žakevičiūtė, 2019, 2).

2.4.5 Visual Intelligence Skills (VIS)

Visual skills can be learned. They are not usually isolated from other sensory skills. Teachers should provide appropriate learning environments and materials to allow students to create their own visual messages (Gangwer, 2009, 4).

The term of “Visual Intelligence Skills” appeared when the professor of psychology Hans Furth introduced the concept of visual intelligence as an aspect of intelligence. He suggested that intelligence could be dynamically developed by combining visual activities with an emphasis on cognitive perception (Coulter, 2014, 212).

Daniels (2018) states “over time, our visual skills-observing, looking closely, analysing images, imagining, and otherwise depicting-can sometimes diminish as our focus turns to other forms of communication (verbal and written). But, on the other hand, the demands of the new century and the advancements of technology suggest we need to integrate opportunities to learn, teach, and interact visually within education contexts. This will help educators reenergize and build upon these skills and abilities in both themselves and their students.” (p.3).

When reviewing studies on visual intelligence, it is noticeable that there are several classifications of its skills. Perhaps the reason for this is that the skills of visual intelligence work in an integrated systemic format, but their order varies from one task to another, so that one of the skills is dominant in a particular task, while the same skill is subordinate to another task, and roles are exchanged between skills according to the goal and the purpose. This was the reason for the different classifications of visual intelligence skills. In this regard, educational studies have varied in the inventory of visual intelligence skills in terms of totality and detail, some of them summarize them in three major skills, from which the rest of the skills are branched, which are represented in vision, imagination and drawing (Sibbet, 2008, 120-122). On the other hand, some separate them into six skills represented in: representation, interpretation, analysis, linking relationships, visual discrimination, and drawing conclusions (Ali, 2014, 1). While some make it five skills, represented in: the skill of recognizing and

describing the shape, the skill of interpreting information, the skill of analysing the shape, the skill of linking relationships, and the skill of inferring meanings.

Mahdi's study (2006) and Dabour's study (2016) indicated a set of skills and steps that lead to the mechanism of teaching with visual intelligence by integrating visual perceptions with cognitive perception, to reach an integrated mental language, these skills include:

- **The skill of visual discrimination:** It is the ability to recognize visual forms (their nature and dimensions), and distinguish them from other forms. Whether it's a symbol, picture, graph, or map, the visual form reflects the information for which it was created.
- **The skill of perceiving spatial relations:** It is the ability of the learner to link the visual stimulus to the reality surrounding that stimulus and to understand the relationship between them.
- **The skill of analysing:** It is the ability to:
 - ✓ focus and pay attention to the details and dimensions of visual forms.
 - ✓ see the relationships between these forms as a total structure.
 - ✓ segment the visual form into its basic components.
- **The skill of interpreting the visual form:** It is the ability to interpret, analyze and understand each part of the visual form. Paglia (2004, 3) as cited in Metros (2008, 104) proclaims, knowing how to 'read' images is a crucial skill in this media age.
- **The skill of extracting (inferring) meaning:** It is to arrive at new concepts, principles and meanings through the visual form, taking into account the inclusion of this skill with the previous skills.

To conclude, the skills of visual intelligence are necessary because they involve a high ability to perceive, create and re-invent mental images that contribute to the development of several aspects of intellectual capabilities, which include memory, cognitive capabilities and thinking. Among the most important skills of this intelligence are converting words and impressions into mental perceptions, thinking based on the use of visual images, the use

of reading maps, shapes and images, and converting data into drawings and images.

2.4.6 Developing Visual Intelligence Skills of the Learners

As a teacher of English for more than fifteen years, the researcher notices that education depends on the verbal aspect without the other aspects, which leads to neglect other non-verbal mental abilities and focusing on acquiring language skills. Furthermore, most teachers use teaching methods that depend on memorization and retrieval, despite the development in modern teaching strategies, which emphasizes the activation of all senses, especially the sense of sight because of its role in learning through the use of pictures, colors, maps in multiple forms, models and graphic shapes. According to Dr. Lynell Burmark, education consultant who writes and speaks about visual literacy: "...unless our words, concepts, ideas are hooked onto an image, they will go in one ear, sail through the brain, and go out the other ear. Words are processed by our short-term memory where we can only retain about seven bits of information (plus or minus 2). Images, on the other hand, go directly into long-term memory where they are indelibly etched."(Achieng’Ndede, 2020, 4). Therefore, it is not surprising that it is much easier to show a square than describe it.

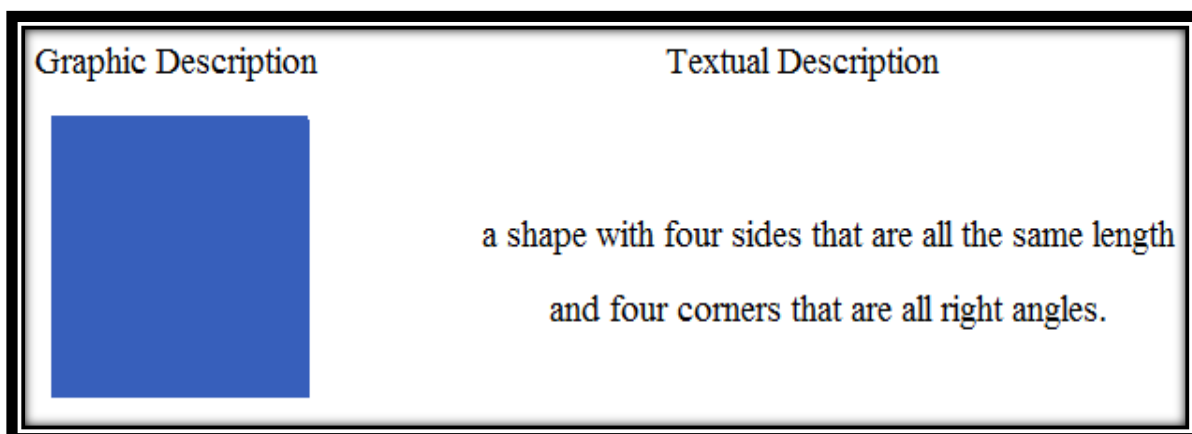


Figure (16): Graphic description vs. textual description

A study by Mason et al. showed that an illustrated text was nine percent more effective than a text alone in reading comprehension test (Mason et al., 2013, 361). Kaputa (2016) confirms that "the most powerful way to influence others and create positive perceptions is with visuals." (p.98). That is because visual images burn into the mind better than words do. She reports that a study of both images and words found that after three days,

people retained almost 65 percent of the visual information and only 10-20 percent of written or spoken information. Moreover, learning through sight constitutes (65%) of what students have learned, and that this type of learning gives students realistic sensory experience, and sensory experience is more stable in memory (Mohammed, 2007, 53).

In this regard, Grigg, & Lewis (2018) assert in their book “*Teaching creative and critical thinking in schools*”, that using visual images can be a powerful technique. They mention that Lynell Burmark, an education consultant, suggests: “unless our words, concepts, ideas are hooked onto an image, they will go in one ear, sail through the brain, and go out the other ear. Words are processed by our short-term memory where we can only retain about seven bits of information (plus or minus 2)... Images, on the other hand, go directly into long-term memory where they are indelibly etched.”

As stated by some scholars and researchers, developing multiple intelligences in general and visual intelligence in particular is important which is given slight attention in Iraqi instructional contexts both by teachers and learners. There is not enough time allocated to develop these skills and abilities. The instructional programs in Iraqi universities, especially the programs that are based on illustrated activities, have not played a major role in providing educational experiences that fit the needs of the learners and are in line with the needs of the current era. By reviewing the previous studies, the researcher has found that there is a weakness in developing visual intelligence skills. This may be due to the university environment's lack of interactive enrichment activities or illustrated activities, which means that there is a deficiency in developing the visual skills. Since the surrounding environment today is highly visible, containing a set of images, drawings, videos, websites, and graphic organizers, the meaning of education has changed, as it is no longer dependent only on words and texts, but it also relies heavily on using images, shapes, maps, puzzles, videos, and sounds. Therefore, the current study turned to develop the visual intelligence skills, which depend on shapes, graphics, symbols and pictures in the educational situation (Hassan & Nuhair, 2018, 264), (Rahim, 2019, 411), and (Mantoob, 2020, 108-109).

Visual intelligence is one of the effective approaches of teaching and learning, which depends on imagination, visualization and the formation of

mental perceptions through a set of visual forms such as: pictures, drawings, picture puzzles, and pictorial analogies. This was confirmed by the study of Mokli (2013) which found that the lack of diversity of teaching strategies leads to a low level of visual perception among learners, as well as the study of Al-Nafisi (2012), the results of which found the effectiveness of the electronic story based on animated images (two and three dimensions) on developing visual intelligence for the primary school students.

Babu & Ganesan (2018) explain that visual intelligence skills refer to “a group of cognitive aptitudes that is crucial in solving problems that involve manipulating visual-spatial information because it is the mental process used to perceive, store, recall, create, edit and communicate spatial images.” (p. 2).

The visual intelligence skills are a major key of learning and motivating learners to think differently to see the world with different details and destinations. The development of these skills also contributes to the development of the rest of the mental abilities and various other types of intelligence. The educator, in turn, can create the appropriate climate through the learner’s interaction with the activities provided to him at the university that are consistent with the philosophy of the authorized curriculum, and this is consistent with what was mentioned by the study Yang et al. (2021), which found that providing educational institutions with the means and equipment and involving instructors in their implementation had a role in developing students’ visual skills, and the study of Babu & Ganesan (2019) which found that the experience of instructors, their educational qualification and the training provided to them had a great role in planning the activities provided to learners to develop their visual intelligence skills such as spatial visualization, visual perception, and mental rotation.

Swartz (2017) states that developing the visual intelligence skills can help the learners work on their memory, thinking and cognitive abilities. Visualizing the object in our minds or decipher moves in a game or battle are skills we can all implement in the teaching and learning world. She identifies some ways the learner can develop and train his/her visual intelligence skills as follows:

- **Use gestures:** Gestures affect learners' cognitive processes. Gestures help activate, maintain, and manipulate visual, spatial, and motoric information for speaking and thinking. Using gestures will help the learner better retain information especially if that information is regarding maps or models that need to be rotated.
- **Explore visual-spatial puzzles:** Visual-spatial puzzle, such as jigsaw puzzles, is the ability to determine the positions of objects, shapes, and their spatial relations to one another. These skills are critical for direction sense and motor planning. Levine et al. (2012) emphasize that “the jigsaw puzzle has been recommended by many sources to help increase learner’s visual-spatial intelligence. It is probably because a study finds that the learners who already play puzzles perform better in a mental visual transformation task than those who do not. It also finds that the more frequently the learners play, the better they perform” (p. 530).
- **Play video games such as Tetris:** According to researchers at the University of Rochester, video games train the brain to process visual information. Experimental studies such as Boot et al.(2008), Hughes (2017) and Quiroga & Colom (2020) suggest that playing video games might help people become more skilful in at least one visual-spatial task.

As a result, learners' visual memory is better than their verbal memory, and their performance is greater when they get information via the senses of sight. Because sight is one of the senses that has the greatest impact on a learner's cognitive, behavioral, and emotional development, the instructor can utilize pictures, drawings, and visual stimuli to assist his/her students learn scientific content and improve their visual intelligence skills.

2.4.7 Instructor’s Role in Developing Visual Intelligence

As one of its most crucial aspects and backbones, the teacher is the nerve and heart of the educational process. S/he must be responsible for developing and improving education through the availability of all educational capabilities such as buildings, educational means and modern curricula. Accordingly, the educational goals will not be achieved without a competent teacher who is eligible of using these capabilities. In the current digital world, the role of the teacher is no longer limited to just transmitting information only, but his/her main task is represented of the ability to plan

and implement by tracking teaching skills appropriate to the variances between students.

Gangwer (2009, 5-6) reports that the role of teacher in developing the visual intelligence is to:

- Encourage students to encode or make more effective still images through an understanding of passive, neutral, and active imagery.
- Avoid passive learning experiences by bridging "seeing" and "doing" through the use of appropriate projects, activities, and technologies.
- Create lesson plans and activities that reflect the methods of visual learning, acknowledging that when we create and utilize images we will most likely be working in one (or more) of the following modes: investigate, chronicle, express, communicate, inspire, and envision.
- Create assignments and activities that allow students to develop and apply their visual information handling skills by using the abilities:
 - to organize images for effective display;
 - to establish visual criteria and arrange images in a visual database;
 - to substitute images for words and establish a visual language;
 - to combine images with text to share ideas more effectively,
 - to integrate images with live presentations to communicate more powerfully, and
 - to alter, manipulate, or transform existing images to envision something new.

Instructors can make connections with visual learners by providing constructive feedback that affirms how they are performing well. By providing students with choices or some flexibility, students have a more personalized learning experience. In summary, instructors need the expertise to develop a class structure that stimulates visual social interaction and affirms academic standards while fostering independent learning skills (Gray and DiLoreto, 2016, 3).

Berg (2016) argues that “As teachers, we will know we have reached our goal of teaching students to think visually when they are able to diagram ideas for themselves and use those strategies independently. Then we will know we have given them a skill for life” (p.3). Martin et al. state that a facilitator guides the learning process by providing opportunities for the learners to build knowledge and skills. As a facilitator, the instructor is also constantly monitoring the visual activities to be readily available to provide support to the students when needed. Facilitation strategies are the various visual strategies used by the instructor when implementing the course with the students. The role of the instructor in developing visual intelligence skills is to facilitate the learning process by making use of illustrated (visual) reading, create the appropriate atmosphere for the educational process by using visual aids in his/her ESL classroom, lead the group, coordinate efforts, encourage students by practice visual learner-friendly activities such as (solve puzzles and Pictionary/Picture Guessing), raise the cognitive spirit of students; and guide students by organizing their visual information into outlines and mind maps (Martin et al., 2018, 52).

In addition, instructors cannot monitor the process within low level technologies. To that end, the instructors need to follow the learning processes, support learners and provide appropriate feedback. The setting also should allow a certain amount of interaction for carrying out team project work (Çakiroğlu & Erdemir, 2019, 548). In this sense, in ART settings, instructors’ roles become more important to develop visual intelligence skills and interactions for meaningful learning. In ART learning instructors’ roles can generally discuss in three aspects: pedagogical, social, and technical . Pedagogically, instructors deliver the content, provide feedback, and evaluate students’ learning. Socially, instructors provide interpersonal communication, and appropriate classroom climate with keeping the visual communication flowing. Using the programs and applications that support ART learning (QR Code Reader and EyeJack Creator) for facilitating the process is also considered in the roles of instructors. Therefore, instructors must include in their lessons visual literacy opportunities for students to express ideas and think in multimodal ways. They should teach students how to analyse, interpret, compose, create images and use visual communications. Additionally, in the current study, there are three presences that enrich the instructor's role in developing the visual intelligence skills: social, cognitive and teaching. The instructor can

design and organize the ART learning experience to construct the learning community (cognitive presence), encourage the visual communication among students or between the instructor and the students (social presence). Also, the instructor can implement various visual strategies and activities in the context of the subject matter to expertise through the variety visual forms of instruction (teaching presence).

To help students use their visual intelligence skills in mastering reading comprehension course, the educators can use some ways for doing more activities in classroom to develop and utilize these skills of their students:

- Allow time after teaching a concept for students to close their eyes and visualize what they have just read or learned, i.e., provide time to students to close their eyes and visualize (e.g. picture in your mind's eye how the main character the writer talking about in this story might respond to his car breaking down) (Gul et al., 2020, 259).
- Show videos to accompany material being learned (ibid, 260).
- Let students draw pictures of the material they are learning (e.g. drawing images of their vocabulary words, and using pictures to illustrate a project etc.). The instructor can ask the learners to illustrate their ideas as a picture and use visual thinking maps (Allen & Rickert, 2010, 19) and (Petersen, 2012, 80).
- Use computer software or apps that are highly visual and interactive to teach the material (e.g. let students illustrate their ideas with paint software program). In today's classrooms, the instructors have the benefit of modern technology to capture students' attention and increase their participation. Document cameras, tablets, Chrome books, and other constantly emerging and evolving multimedia tools, online programs and software, and apps are highly motivating and engaging greatly enhancing the instructor's ability to reach and teach all learners (Rief, 2016, 178).
- Allow students to demonstrate their understanding of a concept by building a model of it (e.g. a diorama to illustrate a story they have read, to show an historical event, etc.).
- Schedule brief "visual thinking" breaks for students which might involve solving visual-spatial puzzles, playing visual-spatial games (e.g.

Pictionary), or doing imagination exercises (like imagining what their ideal study hall would look like). According to Gardner, individuals with high Visual/Spatial intelligence depend on visual thinking and are very imaginative. Students gifted with this kind of intelligence also tend to learn most readily from visual presentations such as movies, pictures, videos, and demonstrations using models and props. They are good at reading diagrams and maps and enjoy solving mazes and jigsaw puzzles. By strengthening these activities, the learners will be able to foster more creativity in their learning (Young-Dorn, 2014, 81).

- Incorporate real-life visual cues into teacher's lessons: Real life situations are perfect visual aids for visual ESL learners. Basic components of instruction included being concrete, brief, specific, and clear when presenting material (e.g., using visual cues, imitation, role play, repetition, and teaching in real-life settings) to match cognitive learning styles and to increase generalization of learning (Gabriels & Hill, 2010, 68).
- Use of interactive smartboards. This board combines the best multimedia touch technology with the usual functions of traditional educational screens. The teacher can display and view a video or search online directly to explain the content and then share it with the students on their devices. In addition, smartboards increase interactions between the students, the teacher and lesson content. Thus, smartboards promote collaboration and interaction in the classroom and increase students' learning. They are powerful visual tools that also allow the integration of media content into the class and support collaborative learning. When used innovatively, smartboards creates a wide range of learning opportunities (Alshahrani & Ally, 2016, 200).
- Encourage making charts, diagrams, graphs, tables and mind maps in their notes as study aids: There are visual aids the instructor can bring to his teaching to help his learners easily remember and recall information, plus it helps them to organise ideas and put them to their thoughts. Graphic organizers offer one way to integrate visual skills into our teaching. Among the many graphic organizers are mind maps, tables, graphs, pie charts, double bubble maps, and Venn diagrams. For example, students can be asked to generate a Venn diagram comparing and contrasting cars and airplanes. Students need to put on their thinking caps to transfer ideas and information from word form, such as a

paragraph, to a graphic organizer, such as a mind map. Fortunately, software has made graphic organizers easier to create and share (Jacobs et al., 2016, 58).

- Add slideshows and videos: the instructor can probably use podcasts for other learning styles, but visual learners need some type of visual input to go together with the audio input. As such, slideshows and videos perfectly fit teaching visual learners. The most common visual aids used when making presentations are computer slideshows, flip charts and hand-outs. Computer slideshows are visual design tools that are both popular and efficient (Jennings, 2021, 90).

To put the whole matter in a nutshell, ART learning environment widens opportunities for learners to learn and acquire visual knowledge independently, enrich real-life learning experiences, and build such a productive ART visual learning environment where spontaneous facilitation among learners might emerge for their autonomous learning. These learning situations are closely interwoven with the teacher's role as a skillful manipulator to ask a question, give commands, and other cues to elicit students' responses to create a responsive classroom. Furthermore, numerous studies have shown the strengths of ART use in the classroom. One of the most significant strengths is that ART changes the role of the teacher from the giver of knowledge into a facilitator (who helps the students explore and learn) manager (who support learning) and guider (to guide the learners to identify the best strategies, help them learn and understand, and allow them to self-regulate) . This strongly complements the constructivist learning theory because the students feel empowered and engaged because they have control over the learning process.

2.4.8 Learner's Role in Developing Visual Intelligence

Visual learning helps students to develop visual intelligence skills, which is a learning style whereby the learner comes better to understand and retain information better by associating ideas, words and concepts with images. Visual information is presented through various interactive visual tools, such as information and communication technologies (e.g., web services), and 2- and 3-D visual environments (Raiyn, 2016, 115).

What students do to assimilate and understand information has made teachers focus and care about the role that the student plays in the successful educational process, and the role played by the student is no less important than of the teacher. One of the categories of learners in the educational process is the visual learner, who depends in his learning process on visual memory.

Visual learners should be able to demonstrate the ability to analyse and interpret or create and compose visual images and messages. In addition, they should be able to identify, understand, and critically analyse visual representations and materials in a larger context. This encompasses aesthetic, cultural, economic, ethical, historical, legal, philosophical, psychological, social, and technological contexts.(Metros, 2008, 105).

Students' visual engagement in the teaching and learning processes is essential as it is a way of stimulating active participation by doing collaborative group work and discussion, sharing comments, and sharing their ideas in a meaningful way. As stated by Farizka et al., visual learners' engagement has been the focus of research in recent years. It was derived from the basic assumption that visual learners' engagement in the teaching and learning processes is very important because it is a main focus in stimulating students to become active learners and more engaged in their process of learning. Engagement is essential to convince students that they already required for their cognitive development as well as their ability to create their knowledge in the meaningful visual activities such as participating collaborative group work, doing some visual discussions, giving comments or suggestions based on their visual knowledge, and sharing ideas both in groups and whole class. In other words, meaningful visual activities will make students develop engagement through their participation in the activities (Farizka et al., 2020, 204).

Visual intelligence learning attracts almost the entire concentration of the individual since it makes learning process more interesting and gives the learner a new experience and finally results in an effective communication of the language. Additionally, activating the student's role in the development of visual intelligence skills implies making the student the center of attention in the kindergarten, school, or university classroom, so that s/he is a participant and self-reliant in getting visual information rather than just a listener. Apart from indoctrination, s/he is given the opportunity

to participate in numerous visual activities aimed at grasping the content of the instructional material. Those students should be able to (Philominraj et al., 2017, 55):

- Ask questions to check their visual comprehension.
- Contribute to the lesson by giving notes that add new visual information, ideas and opinions to the lesson.
- Practice the acquired visual skills under the supervision of the teacher and then independently.
- Accept the opinions of others and interacts with them.
- Classify, distinguish, and reveal the relative importance of things.

In short, the learners need visual-spatial skills to be able to think abstractly and understand how details fit together to create the big picture.

2.4.9 ART and Visual Intelligence

Education today does not focus on the learner's recall and renewal of facts, but rather on the accessibility of these facts and ease of access to the required materials. Today's learners rely largely on visual learning. The educational research supports the claim that the use of visuals in teaching leads to a greater degree of learning as learners appear to focus better and for more sustained periods of time. According to Ainsworth and Loizou (2003) “visuals help to capture and maintain one’s attention” (p. 675). Learners will retain more information with the help of appropriate visual content in their learning materials (Bitter and Legacy, 2008, 23). Moreover, Smaldino et al. emphasize that many students today are visual learners who have grown up in a world of technology, so without visuals learners may not learn (Smaldino et al., 2008, 259).

The most important thought processes come directly from our perception of the world, where sight is the first sensory system that provides the basis for our cognitive processes and forms them, and therefore the spatial visual imagination is a primary source of thinking. Studies have proven that the human brain can absorb and register more than 36,000 images per minute and that more than 80% of the information received by the brain comes through sight (eyes). From the constructing of this information and its integration with the visual processes through the sense of sight, it was found that each person has a different way of obtaining visual knowledge than the other (Jensen, 2004) and (Hyerle, 2008, 153).

Learning with pictures, videos, shapes and drawings is one of the most important visual intelligence teaching methods, as the mind responds faster to pictures. In kaya's study (2012), it was proved that teachers who use visual pictures that belong to texts in textbooks, their students have the ability to predict the topic of the lesson through studying pictures and content prediction before reading the text, i.e., visual learners tend to think in pictures. So while reading they usually create a mental picture of what is described in the text. That is why it is very important for a visual learner to have the educational material presented using maps, diagrams, charts, pictures, etc.

Visual information is mapped better in students' minds. Learners understand information better in the classroom when they see it. Information related to visual intelligence lesson can present in different formats, such as images, videos, flowcharts, graphs, diagrams, simulations, cartoons, colouring books, posters, presentations, movies, flash cards and games. Teacher can use the above mentioned formats to display large amounts of information in ways that are easy to understand and help reveal relationships and patterns. (Raiyn, 2016, 115).

Besides that, in her 2020 book *“Teaching Yourself To Teach: A Comprehensive guide to the fundamental and Practical Information You Need to Succeed as a Teacher Today”*, Watts explains that visual learners are the ones who respond well to the use of visual aids like images, diagrams, colors, pictures, and film clips. They are very good at interpreting or describing information presented visually like in the cases of graphs, charts, and maps. If the instructors have visual learners in class, they will notice that they learn through observation. When the instructors are explaining something and they use visual intelligence aids, these learners would be focused on them intently. Using a lot of visual aids while teaching is the best way to engage the visual learners. Since they are very good at visualizing information, they typically have a great sense of direction too. Most visual learners are also fond of technological programs and applications.

Coupled with visual learning in general and visual intelligence in particular, Fabregat (2012) – cited by Cabero1 & Barroso (2016, 47) – emphasizes that ART scenarios contribute to make it easier for students to contextualize visual information, and simultaneously to enrich it with additional information in a variety of formats and symbolic systems, thus

permitting to individualize training and to adapt it to the different types of intelligences and visual preferences existing amongst students.

Mekni & Lemieux assert that ART is a useful visualization technique to overlay computer graphics on the real world. ART can combine visualization method to apply to many applications, i.e. ART consists in overlaying computer-generated images with a learner's view of the real world. These virtual objects can be 2D or 3D images, sound, videos, and animations. ART learning can also help students to develop visual intelligence skills, which is a learning style whereby the learner comes better to understand and retain information better by associating words, ideas, events, topics and concepts with images, video, music, 3D images etc. Visual information of ART learning is presented through 3D visual environments and various interactive visual tools, such as ARCore, echo3D, Unity, Vuforia, Wikitude, Spark AR Studio, Kudan, EyeJack Creator, and ARToolKit (Mekni & Lemieux, 2014, 208). In the same manner, Chin et al. show that ART also enables the visualization of unseen concepts or events by superimposing virtual objects or information on physical objects or environments. These augmented real objects create new visualizations that have the potential to enhance the understanding of abstract and invisible concepts or phenomena (Chin et al., 2019, 928).

In short, the use of AR-based instructional visual digital environments, supports the development of visual intelligence skills includes visual reading and visual discrimination, and these involve other kind of visual processes, such as visual prediction, visual information analysing, visual information interpreting, and meaning inferring.

2.4.10 Reading Comprehension Course in College of Basic Education

The Reading Study Group (RAND) explains that “Comprehension means the process of simultaneously extracting and constructing meaning through interaction and involvement with written language. Reading Comprehension (RC) involves four components: the reader, the text, the activity, and the situational context . The first three essential components - the reader, the text, and the task - occur within the fourth component of reading comprehension - the situational context” (p.11).

Mohseni & Ahmadi discuss that (RC) is a mental process aimed at obtaining and acquiring meaning . It is a complex process of a number of sub-processes that the reader performs to elicit meaning. The reader

interprets the reading material based on his knowledge background and previous experiences. Comprehension is a process of interaction between the reader and writer, and it is a complex process that depends more on mental perception than on sensory perception. RC needs an interaction between the reader's mind and the writer's text. Therefore, it requires focus, attention, analysis, conclusion, criticism and judgment (Mohseni & Ahmadi, 2017, 16).

The focus of the reading process that the Iraqi educational system attempts to provide to the learner is RC. In order to rise the level of awareness and perception, the learner is considered a reader who possesses the actual functional reading skills that enable him/her to understand the readable text, within the advanced levels, which lead him/her to have a degree of awareness, a more accurate understanding of the readable text, and the ability to understand and analyze the writer's goal; to issue objective judgments on what s/he reads in light of his/her high reading comprehension.

Santhosh & Meenakshi state that the pedagogical approach towards RC learning is of fundamental importance. Innovations are employed to attain the desired objectives. Teaching RC is a challenging task, and the imperfections (defects) in the process can be ironed out by means of adopting appropriate methodologies. Therefore, reading without understanding has little value; comprehension has to be the goal. Some learners start their learning without the necessary literacy skills to access the curriculum electively. These learners are more likely to become disengaged with education. Teaching RC through technology and android applications stimulates in learners a great interest and makes them enhance their language learning skills in an attractive and enjoyable manner (Santhosh & Meenakshi, 2015, 92).

Moreover, Muliawati states there are many factors that influence reading comprehension teaching. Some of them can be related to the instructors and others to the students themselves. Inappropriate choosing of reading texts and boring teaching methods are factors associated with teachers. Factors are related to the students themselves, called internal factors, can greatly affect their language skills performance. These internal factors can be categorized as language attitude, motivation, learners' preferences and intelligence, which lead each student to achieve different outcomes in reading comprehension achievement (Muliawati, 2017, 95) .

The Iraqi Ministry of Higher Education and Scientific Research has been developing the public education system according to a future vision, with the aim of bringing up a student who achieves his highest potential and has an integrated personality, through a high-quality educational system, to keep pace with the scientific and technological progress witnessed by developed countries. The vision was translated through the establishment of scientific conferences, seminars and training workshops, whose objectives were to improve curricula, teaching methods and evaluation processes, which would have a positive impact on students' learning. In order to achieve the recommendations and suggestions that were put forward in these conferences and scientific workshops, some developmental transformations resulted in the curricula of Colleges of Basic Education in general, including the curricula of English language departments, which was represented by the reading comprehension course for the first, second and third stages. Among these developmental transformations were: transformations related to the roles of the teacher and the roles of the learner, the instructional content and its link to technological reality, teaching strategies and methods, and evaluation methods.

The current Reading Comprehension Course (RCC) is divided into three units, the first two of which are preceded by searching tests. Detailed instructions to the student, together with worked examples, precede each unit. In this study, the researcher has chosen seven topics (passages) from the first unit, which is prescribed for second stage students, to be taught and learned in the second semester. The selected content of RCC in Alexander's textbook entitled "*Developing Skills: An integrated Course for Intermediate Students*" for the second stage students, consists of seven topics : "A Noble Gangster, Sixpence Worth of Trouble, Mary had a Little Lamb, The Greatest Bridge in the World, Electric Currents in Modern Art, A Very Dear Cat, and Pioneer Pilots". Therefore, the researcher of the study will work hard to link this scientific content with the instructional program based on ART, and measure the effect of this technology on students' achievement and developing visual intelligence skills in reading comprehension course. The passages of reading comprehension course are multi-purpose texts. Each passage can be used to train the student in the following: comprehension, oral practice, reading aloud, composition, extended oral exercises, dictation, and précis.

Alexander (1972) posits basic aims of this course which can be summarized as follow: “to continue the student’s training in the four skills: understanding, speaking, reading, and writing, to provide the student with a scientific content which enables him to use the language, and to provide the teacher with material which enables him to conduct each lesson with a minimum of preparation.” (p. viii).

Since the emergence of COVID-19 in Iraq, learning and teaching processes have to be carried out at home to prevent increasing transmission. Learning through the use of technology is an alternative during the COVID-19 period. In addition to facilitating learning and applying technology in learning, using ART to access topics can be a good solution because it can be accessed anytime and anywhere, considering that after the emergence of the COVID-19 pandemic. To prevent transmission of COVID-19, the Iraqi government recommends to do activities at home. Based on this, the students are required to be able to keep learning carried out at home according to government instructions. The teacher is challenged to determine the right strategy so that even though studying at home students can learn optimally. In everyday life, the progress of teaching and technology, especially ART, is very influential in the preparation and implementation of learning strategies. This is following Blended Learning method to provide insight into the successful integration of technology or multimedia in the classroom i.e., some of lectures were electronic (on the Google Classroom Platforms) and others were in classroom.

2.5 Review of Related Studies

The previous studies are an important axis in the methodology of scientific research and a main pillar that helps the researcher in defining his research problem and setting the most appropriate hypotheses, as well as placing his research in its historical framework. Through the research conducted by the researcher in Iraqi university libraries, educational magazines, periodicals, and the internet, the researcher did not find studies, to his knowledge, that dealt with the linking between the variables of this study, and on the other hand, studies close to this study were obtained. The current study aimed to identify (the effectiveness of an instructional program based on augmented reality technology on developing visual intelligence skills and academic achievement among students of the College of Basic Education). The researcher reviewed the studies that directly included the

research variables, including the studies that dealt with augmented reality technology (ART) and the studies that dealt with visual intelligence (VI). Although the current study aimed to know the effectiveness of the independent variable and its impact (ART) on the dependent variables, which are academic achievement and the development of visual intelligence skills, the researcher did not find a study that combined these variables, but rather he found studies that included part of these variables in other disciplines and fields, so the researcher decided to take these studies that are closest to the variables of the current study. These studies include two sections as follows:

First: Studies dealing with Augmented Reality Technology (ART).

Second: Studies dealing with Visual Intelligence (VI).

2.5.1 Studies dealing with Augmented Reality Technology (ART) in education

- **Radu (2012)**

The aim of this study was to investigate the positive and negative effects of ART on students' learning, and identify the underlying causes for these effects. The researcher' vision is that educational initiatives will exploit these factors, in order to realize the full potential of ART to enrich the learner's life. A descriptive-analytical study was used (searched online databases for conference and journal articles discussing comparisons of ART and non-ART applications). The sample of the study were (32) publications that have previously compared learning effects of ART vs. non-ART applications. The tool of the study was building a model of the factors that may maximize the employing of ART in learning. The results of the study showed that by reviewing of (32) comparative ART publications, the researcher has identified some positive and negative effects of ART on learning process, as well as some potential factors underlying these effects. Therefore, the researcher in the present study benefited from this paper in reviewing the role of ART positive and negative effects in education as a theoretical basis and a practical guidance during implementing the suggested instructional program based on ART.

- **Silva et al. (2013)**

This paper aims at exploring the role of ARBlocks tool in developing first graders' reading and writing skills. The sample was two classes with (40) first grade students in Brazil. Each class has (20) students, and their

ages range from 4 to 8 years old. Mixed methods were followed in the research design that are associated with two quantitative and one qualitative metrics to evaluate the tool. The first quantitative metric is a test. This test aimed at verifying the content retention i.e., to verify student's abilities to recall the content studied with the tool. The teacher's own formative evaluation was used as a second metric he regularly applies with the students. As a qualitative evaluation, a semi-structured interview was conducted to know the positive and negative aspects regarding the tool and its use. The results showed that the tool helped increase students' educational performance and enhance their reading and writing skills. Moreover, teachers' enthusiasm was extremely high due to its use.

- **Chen (2013)**

In this study, the researcher prepared a study to reveal the impact of learning with peers in an educational environment based on ART, in the field of protein structure learning (chemistry). The study sample consisted of (96) students from the University of Washington who were divided into three groups: the first group, individual learning using ART. The second group, learning with peers (cooperating pairs) using ART. The third group, individual learning without using ART. Descriptive statistics were utilized for each variable. The tools of the study were: personal background questionnaire, Chemistry self-efficacy scale, general chemistry knowledge test, and Purdue Visualization of Rotations Test (Bodner and Guay, 1997). The results showed that the group of students who learned alone using ART achieved better performance than the other two groups, which confirmed the effectiveness of ART in learning and understanding the scientific material. The researcher justified the lack of superiority of the group learning with peers using ART that learning with peers is more complex due to the possibility of many situations occurring among students that may hinder or affect the progress of the learning process, in addition to the students' need for more time than the two groups whose learners were learning individually. The researcher benefited from this study in constructing the research tools and selecting the experimental design.

- **Pérez-López, and Contero (2013)**

This paper examined a study to analyze the use of (AR) to present multimedia content to support the teaching and learning process in science subject (the digestive and circulatory systems) at the elementary school level, and its impact on knowledge retention. A quasi-experimental design of

nonequivalent control groups was selected. The participants of this study were (39) fourth grade students participated as a unique group on the study (two different classes) in Spain . Among (39) participants, 20 were boys and 19 were girls. They played the roles of an experimental group and a control group, depending on the lesson, at the same time. The tools of the study were a pilot study to find out the suitability of the AR application as a teaching and learning tool and learning achievements were evaluated using standard procedures (a written exam). Three traditional evaluations were proposed for each lesson: the first, as soon as the lessons were taught; the second, two weeks after first evaluation, without previous notice; and the third, four weeks after the first evaluation, also without previous notice. The results of a comparative study showed a significant increase in knowledge retention on students who are used the ART multimedia contents as opposed to ones following the traditional classes. The results also showed some practical implications to help teachers design or adapt materials creating with AR to better cater for the students' needs and, as a whole, improve learning and teaching process. The researcher in the present study benefited from this study in using an evaluation system as a tool to determine the domains of visual intelligence test and achievement test for Iraqi students.

- **Küçük et al. (2014)**

This study aimed at examining whether cognitive load and attitudes of students differ according to the achievement levels of students or not by using ART environment among Turkish EFL learners in learning English. The subjects of the study were (122) fifth-grade secondary students (66 males and 56 females) who were from 5 different secondary schools in Erzurum, Turkey. Comparative and correlative methods were used, which are non-experimental. The objective of comparative causal research was used to set the causal relationship between dependent and independent variables. The correlational research was used to determine the relationships between cognitive load, attitude, and achievement in English learning with ART applications. The researcher utilized three instruments namely, ART applications attitude scale, cognitive load scale and achievement test. The attitude scale of ART applications is consisted of (15) items with 5 point Likert scale (1: Strongly disagree, 2: Disagree, 3: Indecisive, 4: Agree, 5: Strongly Agree). Van Merrienber's Cognitive Load Scale (1993) with a rating scale from 1 to 9, was used to quantify the effort amount exerted by learners. The achievement test consisting of (7) multiple-choice questions

and (13) questions to fill in the blanks to determine students' learning levels. Each question is valued 5 points and the maximum score of the test is 100. The findings revealed that there was a positive relationship between cognitive load, attitude, and achievement in English learning with ART applications. It was also found that the participants were satisfied with learning English using ART applications, that their anxiety level is low and they decide to use these applications in future lessons. Furthermore, it has been determined that participants have low levels of cognitive load during the learning process in an ART environment. Another important finding is that learning English using such applications affects student's achievement in a positive way. The researcher of the present study benefited from this study in designing and creating an effective and efficiency AR learning environment to meet learners' needs, provide a high level of achievement for students, and improve their visual intelligence.

- **Al-Husseini (2014)**

This study aimed to identify the effect of using ART on the achievement of computer course at the cognitive levels (remembering - understanding - analysis) among female students of the third grade of secondary school in KSA, and the attitude towards it. The quasi-experimental approach was used in the research. The study sample consisted of (55) female learners who were divided into an experimental group that was taught using ART and a control group that was taught using the conventional method. The measurement tools were an achievement test and a scale of attitude. The study concluded that there were statistically significant differences between the mean of the pre and post tests of the experimental group learners in the attitude scale towards technology, and the experimental group achieved a higher average than the control group in the post achievement at the level of (remembering - understanding - analysis). The researcher of the present study made use of the idea of using some of ART activities to meet learners' needs to improve students' achievement and visual intelligence skills.

- **Solak and Cakır (2015)**

The aim of this study was to determine the motivational level of the language class participants towards course materials designed according to ART and to determine the correlation between academic achievement and motivational level. The sample of the study was (130) undergraduate students in Turkey. Descriptive research model was used in this study.

Turkish version of Material Motivational Survey was used to determine the undergraduate students' motivational level about the materials which were designed with ART to teach English words at the elementary level. The results of this study suggested that ART materials had positive impact on increasing undergraduate students' motivation towards vocabulary learning in language classroom. This study also signified that a positive significant correlation was found between academic achievement and the motivation in the use of ART in language classroom.

- **Chen et al. (2017)**

The study attempted to examine an Augmented Reality Technology-based Blended Learning (ARTBL) approach to evaluate the learning usability of participants. The participants were (25) Taiwanese elementary students who taught science subject with ARTBL. The tool of the study was: a questionnaire of learning usability presented to the sample to understand their feeling about the ARTBL learning. The questionnaire was composed of ten items with three aspects/constructs (usefulness, learnability and satisfaction) that used a 5-point Likert scale. The results confirmed that the students had a positive attitude toward the (ARTBL) approach. ARTBL approach proposed in this paper demonstrated that ART can provide a helpful tool in the blended learning environment.

The researcher of the present study benefited from this paper in that he used the blended learning as an effective strategy to implement the suggested instructional program based on ART.

- **Tobar-Muñoz et al. (2017)**

The study aimed to investigate the effect of Augmented Reality Game-Based Learning (ARGBL) to promote reading comprehension among school students and compared it to traditional approaches. The participants were 51 third through sixth graders from a south western Colombian school. Among the participants, 16 (31.4%) were from the third grade, 9 (17.6%) from the fourth, 15 (29.4%) from the fifth, and 11 (21.6%) were from sixth grade. To make a comparative study, the experiment consisted of an experimental group and a control group. Participants were randomly paired. The pairs were then randomly assigned to either the experimental group (i.e., those who would play the game) or to the control group (i.e., those who would only read the book). The measurement tool was reading comprehension performance questionnaire. The questionnaire had eight questions divided into two sections. The first section (S1) has four questions asking about

situations that the game deals with. The other section (S2) has four different questions asking about situations the game does not deal with, but that are still related to the reading. Results showed increased motivation in learning and better abilities in problem solving, exploration, and socialization.

- **Al-Omarji (2017)**

The study aimed to explore the effectiveness of using ART in teaching history. The unit (global events affecting the world) was selected from the textbook for the first secondary grade in KSA and taught to the study sample consisting of (72) learners who were divided into an experimental group that taught using ART and a control group that taught in the traditional way. The measurement tools were used, including the achievement test and the learning motivation scale. This study had several results, the most important of which are: the superiority of the experimental group learners in the post application of the achievement test over the control group learners, and the superiority of the experimental group learners in the post application of the learning motivation scale over the control group learners. The study also found that ART has a significant impact on developing motivation to learn among the experimental group learners, and a significant impact as well on developing the achievement of the experimental group learners. The researcher benefited from this study by choosing the experimental design that suits his research.

- **Turan et al. (2018)**

The study examined the impact of mobile ART on achievement, levels of cognitive load, and the perspectives of (95) first-year undergraduate students (40 in the experimental group and 55 in the control group) enrolled in a physical geography course in the social sciences in Turkey. A sequential explanatory design and a mixed method type of research, was used. The tools of the study were a cognitive load scale, an achievement test, a semi-structured interview form, and an opinion survey to find out students' perspectives about ART. The achievement test was contained 30 multiple-choice items (30-item achievement test was applied to the control and experiment groups as a pretest and posttest; i.e. before and after the study). Van Merrienber's Cognitive Load Scale (1993) with a rating scale from 1 to 9, was used and adapted to Turkish. An interview form was created by researchers to evaluate lessons conducted using ART. Ten student volunteers were interviewed for 15 minutes and their responses were audio-recorded with the permission of the participants.

The findings of the study revealed that ART increases experimental group students' achievement and reduces their cognitive load levels. The participants' opinions about ART were found to be significant and positive. The researcher took advantage of this study to create an opinion poll to know the students' views about using the proposed ART-based instructional program to develop their visual intelligence skills and achievement after finishing the experiment.

- **Abdul Razzaq et al. (2019)**

The study aimed to design an electronic learning environment integrated with ART to develop visual attention for learnable mentally disabled students. The participants were (18) mentally disabled students from the School of Intellectual Education in Senbellawein, Egypt. The sample members were randomly divided into two experimental groups, where each experimental group included (9) members, where the first experimental group was taught using the blended learning environment, and the second experimental group was taught using ART. The quasi-experimental design was used for the research. Due to the nature of the research, the design known as the (one-dimensional design) with two experimental groups was followed, with pre and post measurement. The tools of the study were an achievement test and a scale for measuring the duration of visual attention concentration. The results showed that the effectiveness of a blended learning environment based on ART on improving the level of cognitive achievement of learnable mentally disabled students. The results also indicated that a blended learning environment based on ART was effective in developing the visual attention of the learnable mentally disabled students. So, the researcher of the present study benefited a lot from this study in designing and preparing the initial form for the stages of building the instructional program based on ART.

- **Pozharina (2019)**

This study aimed to determine the impact of Mobile Augmented Reality (MAR) enhanced materials on students' motivation, attitude level and reflections in EFL academic writing classes. 70 A1 level English Preparatory School students of Istanbul Aydın University participated in this study. The participants of the study were divided into control and experimental groups. The experimental group benefited from MAR enriched materials during academic writing classes, whereas the control group used

traditional writing materials. The tools of study were Academic Writing Motivation Questionnaire (Payne, 2012), Instructional Materials Motivation Survey by Keller, (2010) and semi-structured interview questions which were adopted from Küçük (2015). The results of the study indicate that MAR enhanced EFL writing course materials increase students' intrinsic motivation, level of appreciation of the activities, and eagerness to engage in writing activities. Secondly, MAR integrated materials increase students' extrinsic motivation, affect their viewpoints regarding the importance of writing, contribute to students' personal recognition. Thirdly, these materials are positively correlated with learners' motivational attitudes as they have a positive impact on their attention, confidence and satisfaction level. Finally, students indicated that MAR integrated materials are more appealing, captivating, satisfying, enjoyable, and engaging compared to traditional writing class materials.

2.5.1.1 Commentary on Studies Dealing with ART

By presenting the previous studies for the first axis related to ART, the researcher can give some of the indicators which he has benefited from in his current research, as follows:

1. **The aims:** After reviewing the previous studies that the researcher had access to, which dealt with ART, where the aims of the studies were divided into several axes, some of which focused on knowing the impact of ART on developing academic achievement and the levels of cognitive load as in the studies of (Chen, 2013; AL-Husseini, 2014; Küçük et al., 2014; AL-Omarji, 2017; and Turan et al., 2018). While the studies of (Silva et al., 2013; Tobar-Muñoz et al., 2017; and Pozharina, 2019) aimed to develop writing and reading skills (literacy skills). The study of Abdul Razzaq (2019) aimed to develop visual attention. The study aim of Pérez-López and Contero (2013) was to increase the knowledge retention. The study of Solak and Cakir (2015) aimed to increase students' motivation toward learning the scientific material. As for study of Chen et al. (2017), it aimed to enhance learning science and develop the attitude toward ART. The study of Radu (2012) also aimed to discover the negative and positive effects of ART on students' learning. While the current study aims to know the effectiveness of a proposed instructional program on developing visual intelligence skills and academic achievement in the subject of reading comprehension.
2. **The method used:** Many studies such as Pérez-López and Contero (2013), AL-Husseini (2014), AL-Omarji (2017), Tobar-Muñoz et al. (2017), Abdul

Razzaq (2019), and Pozharina (2019) adopted the quasi-experimental method. The studies of Chen (2013), Solak and Cakir (2015), and Radu (2012) adopted the descriptive-analytical method. The studies of Silva et al. (2013) and Turan et al. (2018) adopted the mixed method. The study of Chen et al. (2017) adopted a pilot experiment method, and the study of Küçük et al. (2014) adopted the comparative and correlative method. With regard to the current study, the method used is mixed (descriptive and experimental).

3. **Samples:** The number of samples in previous studies varied according to the variance of the studied phenomena. The Radu's study (2012) consisted of (32) comparative ART publications. Pérez-López, and Contero study (2013) consisted of (39) fourth grade students in Spain. Silva et al. study (2013) was consisted of (40) first elementary grade students in Brazil. Chen study (2013) consisted of (96) university students in USA. Küçük et al. study (2014) consisted of (122) fifth-grade secondary students in Turkey. The sample of Husseini study (2014) was (55) female learners of the third grade of secondary school in KSA. The largest sample was in study of Solak and Cakir (2015), which reached (130) undergraduate students in Turkey. 25 elementary students were the participants in the study of Chen et al. (2017) in Taiwan. 72 first secondary grade students were the participants in the study of AL-Omarji (2017) in KSA. The study of Tobar-Muñoz et al., (2017) was consisted of (51) third through sixth graders from a south-western Colombian school. The study sample of Turan et al. (2018) was (95) first-year undergraduate students in Turkey. The study of Pozharina (2019) was consisted of 70 A1 level English Preparatory School students of Istanbul Aydın University. Moreover, the study sample of Abdul Razzaq (2019) was the smallest sample which reached (18) mentally disabled students in Egypt. It is clear from the above and through the researcher's review of the studies that dealt with ART that were applied to different age groups with different samples, which ranged between (18-130) students divided into two groups, a control and an experimental one. While the current researcher's sample consisted of (91) male and female students divided into two groups, a control and an experimental.
4. **Tools:** The previous studies varied in the research tools, so some of studies used the achievement tests, semi-structured interview, cognitive load scale, and learning motivation scale. Furthermore, some of these studies used standard written exams, attitude scales, pilot studies, an opinion survey,

visual attention scale, personal background questionnaire, reading comprehension questionnaire and self-efficacy scale. In the current study, the achievement test and the visual intelligence skills test are used as research tools.

5. **The statistical means** used in the previous studies were (Pearson's correlation coefficient, t-test, and chi-square). In the current research, (Pearson's correlation coefficient, t-test, chi-square, Eta square η^2 , Difficulty Coefficient, Discriminative Coefficient, and Cohen's classification of effect size) are used as statistical means.
6. **The results of the studies** that dealt with the use of ART have unanimously agreed on the effectiveness of this technology in developing the different abilities and skills of students, and the results of the current research will be presented in the fourth chapter.

The researcher benefited from previous studies in knowing the size of the samples used in the application of ART, as well as the duration of application. The researcher also reviewed the statistical tools and means used, and he reviewed the findings of previous studies through the results of these studies for the purpose of knowing whether the results of the current research agree or differ with the results of these studies. Moreover, he made use of these studies in how to teach according to augmented reality technology with specific and sequential steps (See Table 2).

2.5.2 Studies dealing with Visual Intelligence (VI):

- **Nadrljanski et al. (2009)**

The aim of this study was to investigate the possibility of developing visual spatial intelligence in students' visual culture learning at Faculty of Philosophy in Sombor and the Faculty of Maritime Studies in Split. A descriptive-analytical research was used. The sample of the study were (250) students Serbian from the Faculty of Maritime Studies in Split and the Faculty of Philosophy in Sombor were tested. The participants were divided into five groups. The tool of the study was visual intelligence test that consists of 16 problems. The result showed that visual intelligence is still not recognized as an important issue that needs to be researched in college study programs, and it indicated that developing visual intelligence is necessary, because it is very important for future college graduates. The researcher in the present study benefited from this paper in designing the research methodology and its procedures.

- **Abu AL-Naga (2013):**

The study aimed to reveal the effectiveness of using divergent thinking strategies in developing visual intelligence and achievement in engineering subject. The researcher used the descriptive approach in preparing the theoretical framework, and the quasi-experimental approach, using two control and experimental groups. The pre and post application of the study tools, which consisted of the visual intelligence test in engineering, and the achievement test in engineering were used. The sample consisted of (110) students from the first year of preparatory school in government schools in Damietta Governorate, Egypt. Accordingly, the results of the study showed the following: (There are statistically significant differences at the level of significance ($\alpha \leq 0.05$) between the mean scores of the control and experimental group in the achievement test in engineering subject in favor of the experimental group. There were also statistically significant differences at the significance level ($\alpha \leq 0.05$) between the mean scores of the control and experimental groups in the visual intelligence test in engineering subject in favor of the experimental group, and there was a correlation between the achievement test and the visual intelligence test in engineering subject. The researcher of the present study benefited a lot from this study in building research tools and selecting experimental design).

- **Mabrouk (2015):**

The study aimed to reveal the effectiveness of the systemic approach on developing the level of cognitive achievement, visual intelligence, and the remaining of the learning impact. The study sample was limited to (63) female students in the first year of preparatory school from Al-Murshidi Omar Preparatory School in Tanta Governorate, Egypt. The quasi-experimental method was used. The study tools were built, which consisted of an achievement test and a visual intelligence scale. The results of the study showed that there was a statistically significant difference at the level ($\alpha \geq 0.05$) in the post-achievement test in favor of the experimental group. Moreover, there were no statistically significant differences between the mean scores of the experimental group in the two post and delayed applications of the cognitive achievement test, and there was a statistically significant difference at the level ($\alpha \geq 0.05$) between the mean scores of the experimental group and the control group in the delayed application in favor of the experimental group for the cognitive achievement test. This confirms the effectiveness of using the systemic approach on remaining of the

learning impact, as well as there was a statistically significant difference at the level ($\alpha \geq 0.05$) between the mean scores of the control and experimental group in the post visual intelligence scale in favor of the experimental group. The researcher of the present study benefited from this study in choosing the appropriate statistical methods for analysing the research data.

- **Yenilmez & Kakmaci (2015)**

This research aims at examining the relationship between the success of spatial visualization and the visual/spatial intelligence abilities of sixth graders. The research sample consisted of 1011 sixth grade students randomly selected from primary schools in Eskisehir, Turkey. In this correlational study, data were collected by using the tests of visual/spatial intelligence and spatial ability. Data were analyzed by descriptive statistics techniques, ANOVA and t-test. In addition, correlation analysis was used to search for correlations between the success of spatial visualization and the visual/spatial intelligence abilities of sixth graders. The results of the study showed that there were significant differences between the success of students' spatial visualization with regard to students' gender, their achievement in mathematics, interest in geometry, and levels of visual/spatial intelligence. In addition, there was a positive (significant) but low correlation between the success of spatial visualization and the visual/spatial intelligence abilities of sixth graders. The researcher benefited from the theoretical aspect of this study, as the way was paved for him in putting well-defined theoretical perceptions of the variables of his research.

- **Al-Saffar (2016)**

This study aims to measure the effectiveness of the visual intelligence strategy on the students' achievement of the Department of Art Education in perspective subject. To achieve that, the researcher used the experimental method with a single group, and applied his study to a sample of students from the Department of Art Education, numbering (109) male and female students, divided into 6 sections. One random sample consisting of (10) male and female students who are taught the "perspective", was selected according to the strategy of visual intelligence. The researcher applied a test of the multiple choice type to show the results of the research, which concluded that there were statistically significant differences at the level of ($\alpha \geq 0.05$) in favor of the post achievement test, so it became clear that the students of the experimental group who are taught the "perspective" according to the strategy of visual intelligence showed superiority in the

results of the posttest compared to the results of the pretest. The researcher benefited from this study in determining the areas of the visual intelligence test and the number of its items.

- **Šafranj and Zivlak (2018)**

This study examined the impact of visual spatial intelligence instructional activities on students' achievement in English for Specific Purposes (ESP). The sample of the study was (58) students of graphic engineering and design department at the Faculty of Technical Sciences, University of Novi Sad. The research sample was divided into two groups. The first group consisted of 30 students and the second group consisted of (28) students. The first group was taught by visual intelligence instructional activities based on creating charts, visual presentation, mind-mapping, imagination and visualization tasks. The second group was taught according to traditional linguistic strategies: storytelling, brainstorming, journal writing and publishing. The instruments of the study included a pre-diagnostic test and a post-language achievement test and both consisted of a written and oral part. The written part included testing grammatical accuracy, vocabulary items, reading comprehension, and translation from English into Serbian. The oral part included reading a text from their English language course book, and conversation. The results showed better achievements at the end of the semester for the group that was exposed to appropriate visual intelligence activities for learners with strong visual spatial intelligence. The researcher of the present study made use of this paper in using some of teaching activities and instructional strategies in the current suggested program.

- **Rahim (2019)**

The study aimed to know the effectiveness of the educational program prepared by the researcher according to knowledge maps on developing the visual spatial intelligence of the fifth literary grade students in natural geography subject. The participants were (64) fifth literary grade students. The researcher randomly selected (32) students from Qutaiba Preparatory School to represent the experimental group and (32) students from Al-Warithain Preparatory School to represent the control group, Baghdad, Iraq. To achieve the goal of the study, the researcher adopted a quasi-experimental design with two groups, the experimental group and the control group, with the post-test. The researcher prepared a test of visual spatial

intelligence consisting of (53) items of the type of multiple-choice and applied it on the two groups at the end of the experiment. The results showed the superiority of the experimental group students who were taught by the instructional program prepared by the researcher over the control group students who were taught by the traditional method. The researcher of the present study made use of this study in using teaching activities and strategies in the current suggested program.

2.5.3 The Benefit of Previous Studies Related to Visual Intelligence

As for the aspects of benefiting from the previous studies, they were as follows:

- Preparing and designing teaching plans.
- Determining and building the assessment tool used in the current study, which is the achievement test and the visual intelligence test.
- Taking advantage of statistical means to process the data that will be obtained.
- Benefiting from the results of previous studies and making a comparison and balancing with the results that the current study will reach.
- Benefiting from the method of presenting and interpreting the results, as well as benefiting from the suggestions and recommendations in previous studies to conduct the current study.
- Guiding the researcher to the sources for his research.

2.5.4 The Benefit of Previous Studies Related to ART

- Benefiting from the methodological procedures formulated by previous studies, especially the experimental research method.
- Finding a number of valuable sources and references related to the research variables.
- Some of these studies have benefited the researcher in the steps of building the visual intelligence skills test prepared by the researcher in his research.
- Some studies have benefited the researcher in identifying the steps of building an educational program based on ART to develop visual intelligence skills and academic achievement in reading comprehension for second stage students.
- The researcher's reviewing of previous studies benefited him in crystallizing the problem of his study and highlighting the importance of

the study and its handling of an important variable, which is the development of visual intelligence skills, as well as highlighting the importance of ART in developing these skills.

- Some previous studies informed the researcher in identifying the studies that were conducted in his field of research and provided him with ideas and explanations that helped him in determining the dimensions of his research problem, setting goals, choosing a sample, following the appropriate procedures to achieve them, and choosing the appropriate statistical methods, which helped in achieving the requirements of the current study.
- The researcher benefited from the results, recommendations and conclusions of previous studies in emphasizing the importance of ART strategies in developing visual intelligence skills and academic achievement for second stage students.

Contemplating on the previously displayed studies, it can be concluded that:

- ART achieves tangible results in collaborative and experiential learning processes, and one of the methods that augmented reality provides in education is situational learning.
- AR applications transfer the learner to the world of educational information; to test its causes by himself in a realistic, stimulating and interesting experience, instead of dealing with this information in a fixed text template.
- ART plays an important role in helping teachers explain information more efficiently. With ART, the teaching process has become easier, as teachers can view each part of the lesson and learners can preview it.
- It is no secret to everyone that motivation plays an important role in the learning process, and this is what ART achieves; because it combines fun and knowledge at the same time, and this would motivate learners to discover more in the educational content.
- Complex topics are no longer a challenge with rich ART; the teacher can now take students outside the physical boundaries to explore geographical sites, or anatomy for example, and in the classroom he can teach them the natural disasters while they are safe from their dangers.
- ART bridges the gap between theoretical and applied education, and focuses on the way in which the real and virtual world can be integrated together to achieve the various e-learning goals and requirements, and

even its environments as well. All that the teacher and student need is a mobile phone and a book that supports ART. As soon as the phone's camera is directed towards the book, the images emit and come alive, so the students/teachers can view the images in front of them in their three dimensions, they can check and watch them in detail, and they can also watch the videos and media built into the book.

2.5.5 General Commentary

After the researcher reviewed the studies that dealt with the topic of ART and the studies that dealt with visual intelligence, he did not find a study that dealt with the relationship between these variables; therefore, he presented some studies that investigated these variables and their relationship to other variables. The previous studies were classified according to the chronology of each study.

It is clear that ART has the ability to display objects that are difficult to imagine and turn them into 3D models, and provide various virtual examples to support textbook materials, which in turn makes the educational content more understandable and easier to remember. ART helps add more interaction to the explanations during the lesson, captures students' attention, and keeps them engaged throughout the lesson. It is worth noting that the use of ART is not limited to a specific age group or educational level, but can be used at all levels of education; from pre-school education to university education.

Table (2): Review of Previous Studies Related to ART

Author(s) (year)	Topic	Method	Sample	Result(s)
Radu (2012)	compared learning effects of ART vs. non-ART applications	descriptive-analytical method.	(32) ART publications	The results showed that by reviewing of (32) comparative ART publications, the researcher has identified some positive and negative effects of ART on learning process, as well as some potential factors underlying these effects.

Pérez-López, and Contero (2013)	Science	quasi-experimental method	(39) fourth grade students, Spain.	The results showed a significant increase in knowledge retention on students who are used the ART multimedia contents as opposed to ones following the traditional classes.
Silva et al. (2013)	Reading and writing skills.	Mixed methods	(40) first elementary grade students, Brazil.	The results showed that ART helped increase students' educational performance and enhance their reading and writing skills. Moreover, teachers' enthusiasm was extremely high due to its use.
Chen (2013)	Chemistry	Descriptive-analytical method.	(96) university students, USA.	The results showed that the group of students who learned alone (individually) using ART achieved better performance than the other two groups, which confirms the effectiveness of ART in learning and understanding the scientific material.

Küçük et al. (2014)	English	Comparative and correlative methods.	(122) fifth- grade secondary students, Turkey.	The findings revealed that there was a positive relationship between cognitive load, attitude, and achievement in English learning with ART applications. It was also found that the participants were satisfied with learning English using ART applications, that their anxiety level is low and they decide to use these applications in future lessons. Furthermore, it has been determined that participants have low levels of cognitive load during the learning process in an ART environment. Another important finding is that learning English using such applications affects student's achievement in a positive way.

Al-Husseini (2014)	Computer course.	quasi-experimental approach.	(55) female learners of the third grade of secondary school, KSA.	The study concluded that there are statistically significant differences between the mean of the pre and post-tests of the experimental group learners in the attitude scale towards technology, and the experimental group achieved a higher average than the control group in the post achievement at the level of (remembering - understanding - analysis).
Solak and Cakır (2015)	English.	Descriptive method.	(130) undergraduate students, Turkey.	The results of this study suggested that ART materials had positive impact on increasing undergraduate students' motivation towards vocabulary learning in EFL classroom.
Chen et al. (2017)	Science.	Pilot experiment method.	25 elementary students, Taiwan.	The results confirmed that the students have a positive attitude toward the (ARTBL) approach. So, ARTBL approach proposed in this paper demonstrated that ART can provide a helpful tool in the blended learning environment.

Tobar-Muñoz et al. (2017)	Reading	quasi-experimental method.	51 third through sixth graders from a southwestern Colombian school.	Results showed increased motivation in learning and better abilities in problem solving, exploration, and socialization.
Al-Omarji (2017)	History	quasi-experimental method.	72 first secondary grade, KSA.	The results of the study indicated that the superiority of the experimental group learners in the post application of the achievement test over the control group learners, and the superiority of the experimental group learners in the post application of the learning motivation scale over the control group learners. The study also found that ART has a significant impact on developing motivation to learn among the experimental group learners, and a significant impact as well on developing the achievement of the experimental group learners
Turan et al. (2018)	Physical geography	mixed method type of research.	(95) first-year undergraduate students, Turkey.	The findings of the study revealed that ART increases experimental group students' achievement and reduces their cognitive load levels.

				The participants' opinions about ART were also found to be significant and positive.
Abdul Razzaq (2019)		quasi-experimental method.	(18) mentally disabled students, Egypt.	The results showed that the effectiveness of a blended learning environment based on ART on improving the level of cognitive achievement of learnable mentally disabled students. The results also indicated that a blended learning environment based on ART was effective in developing the visual attention of the learnable mentally disabled students.
Pozharina (2019)	Writing	mixed methods research design.	70 A1 level English Preparatory School students of Istanbul Aydın University.	Results showed that academic writing lessons were much more captivating, tasks with AR were appealing, satisfying, enjoyable and attention gathering, in addition the students reported a positive learning attitude towards EFL writing.

Table (3): Review of Previous Studies Related to Visual Intelligence

Author(s) (year)	Topic	Method	Sample	Result(s)
Nadrljanski et al. (2009)	visual culture learning.	experimental- analytical research.	(250) students from the Faculty of Maritime Studies in Split and the Faculty of Philosophy in Sombor, Serbia.	• The result showed that visual intelligence is still not recognized as an important issue that needs to be researched in college study programs. • It indicated that developing visual intelligence is necessary, because it is very important for future college graduates.
Abu AL Naga (2013)	Engineering	quasi- experimental approach.	(110) students from the first year of preparatory school, Egypt.	• There are statistically significant differences between the mean scores of the control and experimental group in the achievement test in favor of the experimental group. • There were also statistically significant differences between the mean scores of the control and experimental groups in the visual intelligence test in favor of the experimental group. • There was a correlation between the achievement test and the visual intelligence test in engineering subject.
Mabrouk (2015)		quasi- experimental method.	(63) female students in the first year of preparatory	• The results of the study showed that there was a statistically significant difference in the post-

			school, Egypt.	achievement test in favor of the experimental group. • There were no statistically significant differences between the mean scores of the experimental group in the two post and delayed applications of the cognitive achievement test. • There was a statistically significant difference between the mean scores of the experimental group and the control group in the delayed application in favor of the experimental group for the cognitive achievement test.
Yenilmez & Kakmaci (2015)	Geometry	Correlational analysis method.	(1011) sixth grade students from primary schools, Turkey.	• The results of the study showed that there were significant differences between the success of students' spatial visualization with regard to students' gender, their achievement in mathematics, interest in geometry, and levels of visual/spatial intelligence. • In addition, there was a positive (significant) but low correlation between the success of spatial visualization and the visual/spatial intelligence abilities of sixth graders.
Al-Saffar (2016)	Art education (perspective	the experimental	(109) university	• The results concluded that there were

	subject).	method.	students, Iraq.	statistically significant differences at the level of ($\alpha \geq 0.05$) in favor of the post achievement test, so it became clear that the students of the experimental group who are taught the “perspective” according to the strategy of visual intelligence showed superiority in the results of the post-test compared to the results of the pre-test.
Safranji and Zivlak (2018)	English	quasi-experimental method.	(58) students of graphic engineering and design department at the Faculty of Technical Sciences.	The results showed better achievements (in the improvement in learning English) for the group that was exposed to appropriate visual intelligence activities for learners with strong visual spatial intelligence.
Rahim (2019)	Natural geography.	quasi-experimental method.	(64) fifth literary grade students from two preparatory schools.	The results showed the superiority of the experimental group students who were taught by the instructional program prepared by the researcher, in developing the visual spatial intelligence, over the control group students who were taught by the traditional method.

CHAPTER THREE

METHODS AND PROCEDURES

3.1 An Introductory Note

This chapter describes the procedures followed in the research in terms of determining the nature research, its objective, the approach followed, the tools of collecting data, calculating its scientific coefficients, applying the exploratory study, and determining the appropriate statistical method to obtain the appropriate answers to solve the problem.

3.2 Procedures for Determining the Research Problem

In a trail to ensure the existence of the research problem which the researcher felt and assumed i.e. weakness of the second stage students' academic achievement and visual intelligence skills, the researcher did the following:

First: Reviewing the results of previous studies, including a study of (Mantoob, 2020) and (Juda, 2020) whose results emphasize the need to pay attention to searching for new ways to develop visual intelligence skills and raise the level of students' achievement in various subjects.

Second: Scientific conferences: The researcher reviewed a set of conferences recommendations related to the necessity to raise the level of achievement and the required skills that Basic Education College students can acquire. Among these conferences is the last one entitled: "The First virtual International Scientific Conference of the College of Basic Education - University of Babylon" 2020. One of the most important general recommendations of this conference was adopting teaching methods and strategies based on modern technological innovations in developing academic achievement in different scientific subjects.

Third: For further investigation of this problem, a pilot study was conducted by the researcher. This pilot study included the following:

- a. Administering an achievement test and visual intelligence test to 80 second stage university students in Department of English, College of Basic Education, university of Babylon. The researcher found there was

weakness in the ability of students to think, analyze and conclude the visual forms and the items of the test.

- b. Interviews with some of EFL instructors by making a questionnaire to ask them some questions about students' visual intelligence skills and their academic achievement. Most of their answers indicated that the students are weak in visual intelligence skills and academic achievement. This may be due to the following reasons:
- Most of the instructors neglect the teaching with visualization strategies and do not encourage their students to use them to explain visual-spatial relations. Visual strategies and activities are a powerful communicating and teaching tools. Students often learn better when visualization is used by instructors than when speech is used alone.
 - Academic curricula are still far from keeping pace with developments and updates in technology, as well as the curricula do not respond to the applied needs of learners (Al-Mashhadani, 2018, 1).
 - The conditions and situations of confusion and chaos that our country, as a whole, is experiencing, whose negative effects are reflected in all aspects of life. It goes without saying that Iraq has been a war zone area for decades; this surely affects all aspects of life negatively, including education. The global organizations and associations have started supporting the Ministry of Higher Education and scientific Research and the Ministry of Education with programs and have made agreements on different levels in an attempt to fill the gap that war with its terrible consequences caused to learners, teaching staff, and the educational institutions as well (Doghonadze et al., 2020, 12-13).

3.3 The Research Design:

The nature of the presented problem determines the the method used in the study to reach the appropriate solution. Accordingly, the researcher followed two methods in his study (descriptive and experimental) due to their suitability to the nature of the problem to be addressed and the simplicity to achieve the research objectives.

3.3.1 Descriptive Design:

The researcher has used the descriptive approach in building the proposed instructional program based on ART, because the descriptive approach is one of the scientific research methods that are widely used in the fields of educational, social and behavioral sciences.

The researcher presents the justifications, procedures and stages that he followed in building of the proposed instructional program (See Appendix 2, p. 227), to achieve the aim of the current study, which is the effectiveness of a proposed instructional program based on augmented reality technology on second university stage students' academic achievement and developing the visual intelligence skills.

3.3.2 Experimental Design:

It is the study procedures and methodology to reach the goal and verify its hypotheses, represented in the choosing of the experimental design, the determination of the research population and its sample, and the equivalence of the two research groups, in addition to the preparation of the study tool and the statistical methods used in its procedures and data analysis.

The experimental design of the researcher is like the architectural engineering drawing, as it guarantees him the choice of the right structure and the appropriate strategy that controls his research and leads him to reliable results in answering the questions posed by the research problem and its hypotheses. The design suggests the observations the researcher can make and the method he can follow. It also suggests the appropriate statistical tools and how to analyse the material collected and the possible results that can be drawn from the analysis.

In this study, the experimental design was chosen for the two groups (experimental and control) with achievement test and visual intelligence test, as shown in the following table (4):

Table (4): The Experimental Design Used in the Study

Group	Equivalence	Independent Variable	Dependent Variable	Final Post Test
Experimental	Age	Instructional Program Based on ART	Achievement	Achievement Post-Test
	Intelligence Test (IQ)			
Control	Visual Intelligence Pre-test	Classical/traditional Instruction	Visual Intelligence	Visual Intelligence Post-Test
	Achievement Pre-Test			

3.4. Population and Sample of the Study:

a- The Population of Study: The population of study means the elements related to the problem of the study that the researcher seeks to generalize about the results of the study. One of the requirements of this study is to determine the whole population, as the study population included all the Colleges of Basic Education among the various Iraqi universities. Thus, the population of study is determined by the second stage students at the Departments of English language, Colleges of Basic Education for the academic year (2020/2021).

b- Sample of the Study: The researcher's selection of the sample is considered one of the important steps of the research, and the researcher determines the community according to the topic, phenomenon or problem. Taherdoost defines a sample, as the name implies, is a smaller representative of a large whole. He adds that the sample size is a significant feature of any empirical study in which the goal is to make inferences about a population from a sample. In order to generalize from a random sample and avoid

sampling errors or biases, a random sample needs to be of an adequate size (Taherdoost, 2017, 237) .

Choosing the sample of the study is considered one of the most important factors that affect the experimental research, as the sample selection procedures are based on the goals to be achieved in the study and the exact description of the original population .

The sample of study is represented by the basic sample: the researcher has chosen the second stage students in the Department of English, College of Basic Education / University of Babylon, to implement the experiment according to the letter of approval (permission) of the College Deanship to facilitate the task of applying the experiment (Appendix 1, p.226). Two sections were randomly selected, one of which represents the Experimental Group (EG) (46) male and female students and the other represents the Control Group (CG) (45). Table (5) shows the distribution of the sample of study.

The table (5) :The Sample of Study.

Section	Group	Number
A	Experimental	46
B	Control	45
TOTAL		91

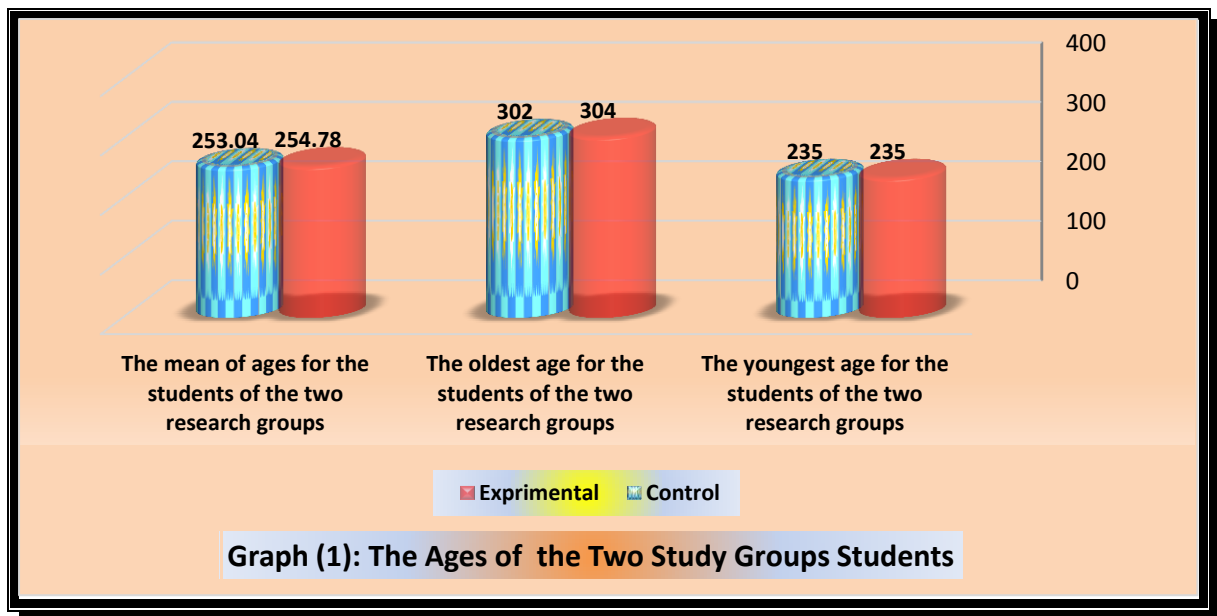
3.5 Equivalence of the two research groups: The researcher chose the two groups at random and decided to make sure that they were statistically equal through the following variables:

3.5.1 Participants' Age:

To ensure that the students of the two research groups are equivalent in this variable, the researcher used the t-test for two independent samples. After analyzing the results, the researcher concluded that the average age of the experimental group was (254.78) and the mean of the control group was (253.04), and this indicates that the difference is not statistically significant at the level (0.05) at the degree of freedom (89). As the calculated t-value (0.49) was smaller than the tabulated t-value of (1.98), which indicates that the two research groups are equivalent in age (See Appendix 3, p.316), and Table (6) illustrates this:

Table (6) : The Equivalence of the Two Groups Scores in Age

Group	No	Mean	Standard Deviation	t- Test Value		Degree of Freedom	Level of significance at (0.05)
				Calculated	Tabulated		
EG	46	254.78	17.70	0.49	1.98	89	Not statistically significant
CG	45	253.04	15.82				



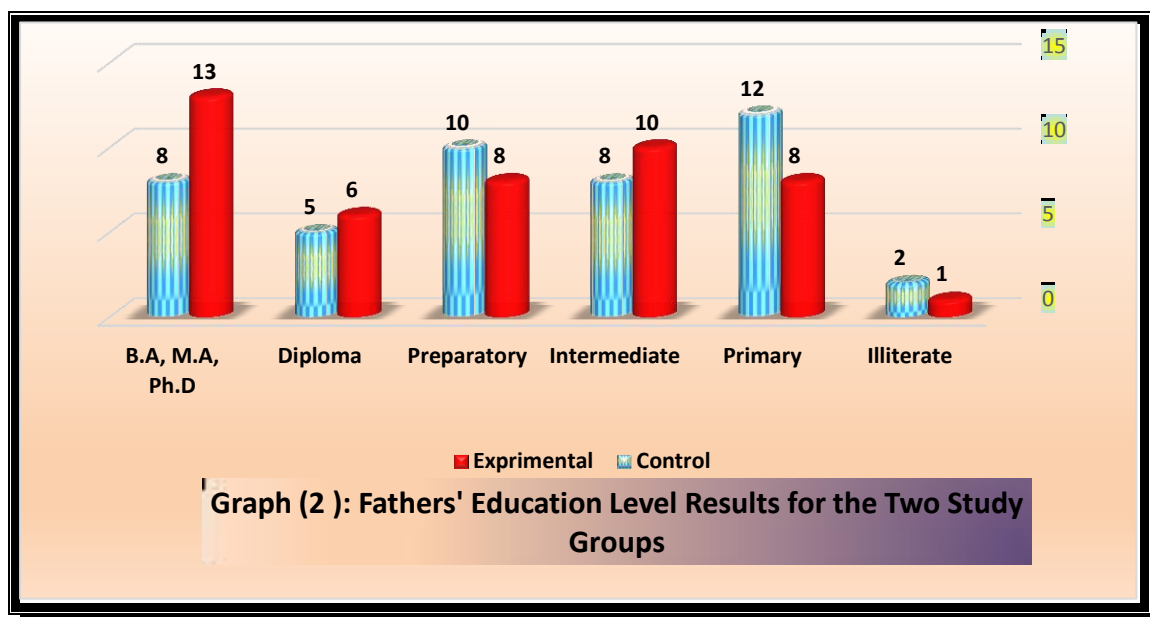
3.5.2 Parental Academic Education

- **Fathers' Education Level:** The researcher conducted a statistical equivalence in fathers' academic level of education for the two research groups to find out if there is a significant difference between (EG) and (CG) in fathers' academic level of education. After collecting the data of fathers' education level from the students and analyzing it, the researcher used the Chi-square formula, and the findings show that the calculated Chi-square value was (2.80) which is less than tabulated Chi-square value (9.48) at (4) degree of freedom. This means there is no significant difference between the (EG) and (CG) at (0.05) level of significance. It is

also indicated that the two groups are statistically equivalent in this variable. Table (7) and Graph (2) show this.

Table (7): The Frequencies of Fathers' Education Level for the Two Study Groups, the Degree of Freedom, the Calculated and Tabulated Chi-square Values, and the Level of Significance*

Group	Fathers' Education Level							DF	Chi-value		Level of significance at (0.05)
	NO	Illiterate	Primary	Intermediate	Preparatory	Diploma	B.A, M.A,Ph.D		Calculated	Tabulated	
EG	46	1	8	10	8	6	13	4	2.80	9.48	Not statistically significant
CG	45	2	12	8	10	5	8				



* (Illiterate) and (Primary) have been merged because the number of frequencies is less than (5).

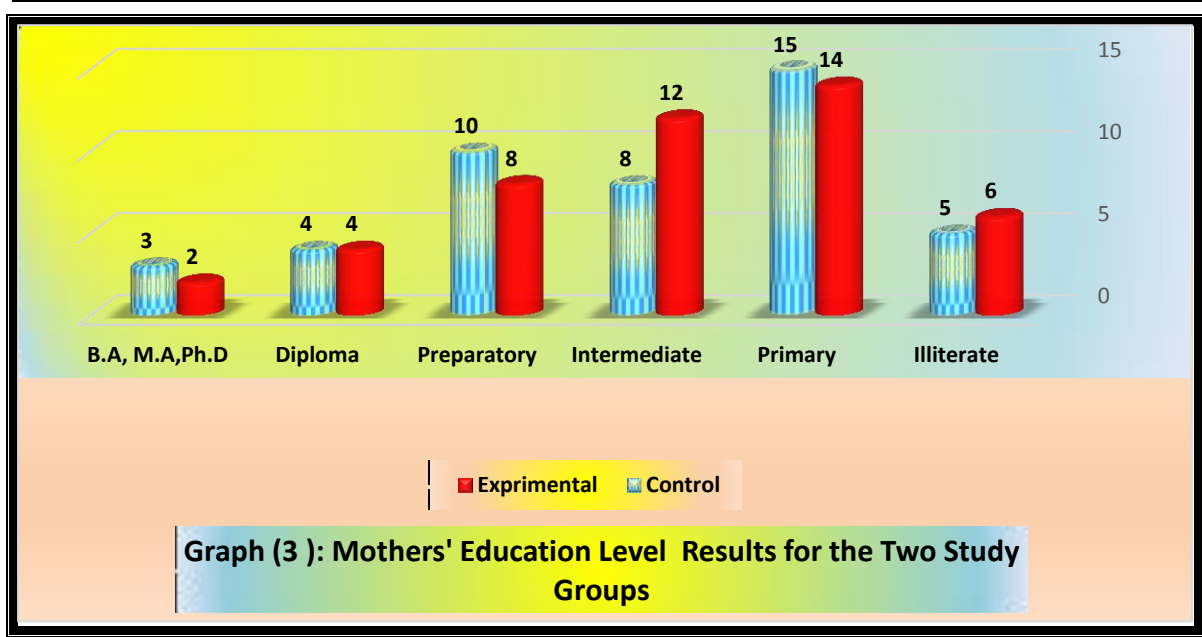
- Mothers' Education Level:

For mothers' education level, the researcher has done the same procedure in gathering data for mothers' education level. A statistical equivalence was conducted in mothers' academic level of education for two research groups to find out if there is a significant difference between (EG)

and (CG) in mothers' academic level of education. After collecting the data of mothers' education level from the students and analyzing it, the researcher used the Chi-square formula, and the findings showed that the calculated Chi-square value (1.21) was smaller than the tabulated Chi-square (9.48) at (4) degree of freedom. This means there is no significant difference between the (EG) and (CG) at (0.05) level of significance. It also indicates that the two groups are statistically equivalent in this variable. Table (8) and Graph (3) show this.

Table (8): The Frequencies of Mothers' Education Level for the two Study Groups, the Degree of Freedom, the Calculated and Tabulated Chi-square Values, and the Level of Significance*

Group	Mothers' Education Level							DF	Chi-value		Level of significance at (0.05)
	NO	Illiterate	Primary	Intermediate	Preparatory	Diploma	B.A, M.A, Ph.D	4	Calculated	Tabulated	Not statistically significant
EG	46	6	14	12	8	4	2		1.21	9.48	
CG	45	5	15	8	10	4	3				

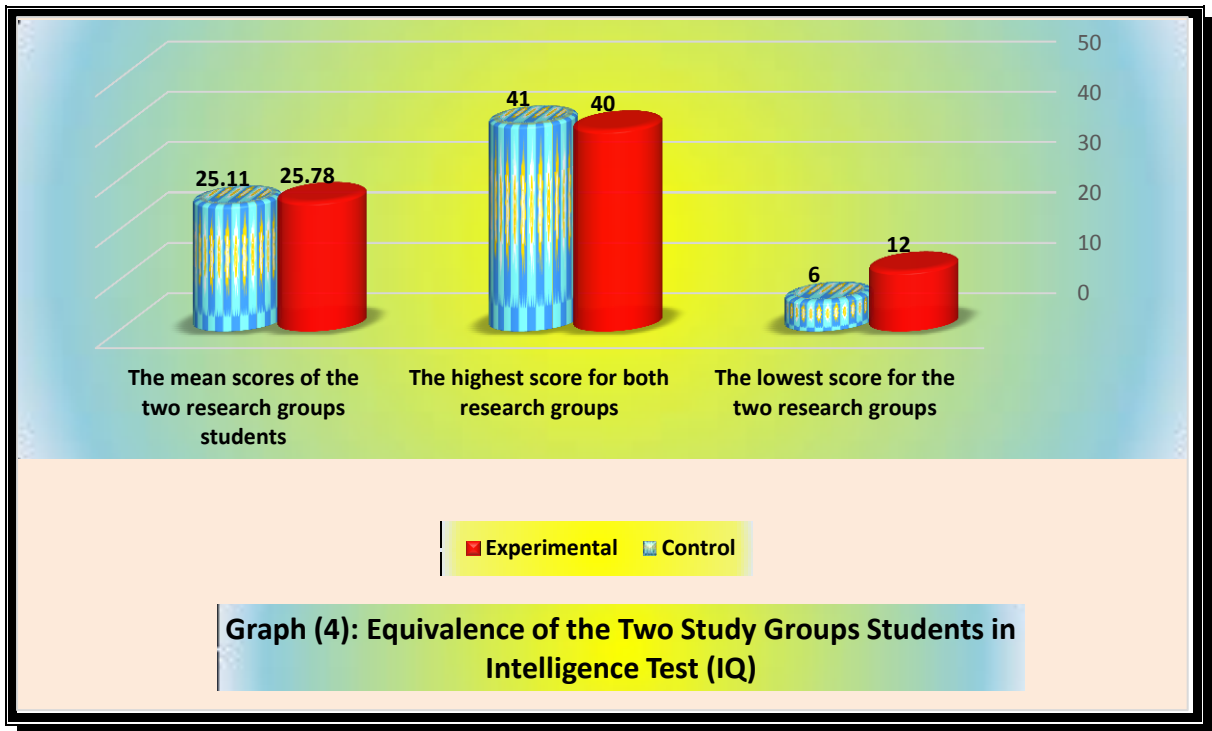


* (Illiterate) and (Primary) have been merged because the number of frequencies is less than (5).

3.5.3 Intelligence Test (IQ): Intelligence tests reveal the general mental level of the individual of his/her performance of certain mental tasks. For the purpose of achieving equivalence between the students of the two research groups in the variable of intelligence and after reviewing the literature and previous studies, Philip Carter IQ test (2005) for university students was applied. The test consists of (50) items of multiple-choice forms. Each item has 4-5 alternatives, one of which is correct. Some items are of the complement question type. The test contains instructions for answering and a separate answer sheet (see Appendix 4, p.318). It was carried out on Sunday, 2/ 5 / 2021. t-test formula of two unequal independent samples was used by the researcher for both groups (EG) and (CG) to find out if there was a significant difference between (EG) and (CG) in the variable of intelligence. After calculating the mean and the standard deviation of the students of the two research groups, it was found that the mean scores of the experimental group students were (25.78) with a standard deviation (7.45), while the mean scores of the control group was (25.11) and with a standard deviation of (8.81). The calculated t-value is (0.39), which is smaller than the tabulated t-value (1.98) at (89) degree of freedom and at a significance level of (0.05). This indicates that there is no statistically significant difference between the students of the two groups (See Appendix 5, p.333), and accordingly, the two groups are equivalent in the intelligence test before conducting the experiment as shown in Table (9) and Graph (4).

Table (9): Equivalence of the Two Study Groups Students in Intelligence Test

Group	No	Mean	Standard Deviation	t- Test Value		Degree of Freedom	Level of significance at (0.05)
				Calculated	Tabulated		
EG	46	25.78	7.45	0.39	1.98	89	Not statistically significant
CG	45	25.11	8.81				

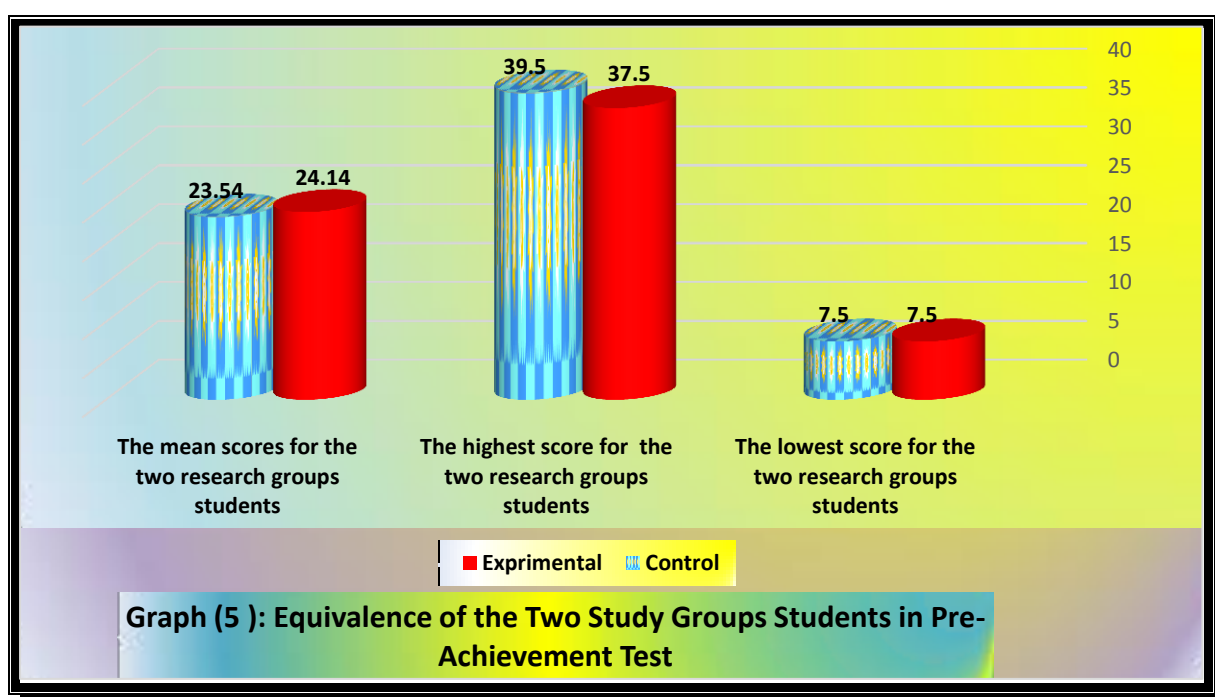


3.5.4 Academic achievement pre-test of reading comprehension:

The researcher used the academic achievement pre-test for the purpose of equivalence between the experimental and control groups. He prepared a pre-achievement test consisting of (5) questions which are distributed as follows: (2) multiple-choice questions, (2) open-ended questions and (1) an essay question. The test was applied to the students of the two research groups on Monday 3 / 5 / 2021. After correcting the answers and using the t-test for two independent samples to find out the significance of the statistical differences, the mean scores and standard deviation were calculated, as the mean scores of the experimental group was (24.41) and with a standard deviation (7.63), while the mean scores of the control group was (23.78) and with a standard deviation (8.15). It was found that the difference is not statistically significant at the level of significance (0.05), as the calculated t-value amounted to (0.38), which is smaller than the tabulated t-value (1.98) at degree of freedom (89). This indicates that the experimental and control groups are statistically equivalent in the achievement test (See Appendix 6, p.335). Table (10) and Graph (5) illustrate this:

Table (10) : T-test Results of the Achievement Pre-test in Reading Comprehension

Group	No	Mean	Standard Deviation	t- Test Value		Degree of Freedom	Level of significance at (0.05)
				Calculated	Tabulated		
EG	46	24.41	7.63	0.38	1.98	89	Not statistically significant
CG	45	23.78	8.15				



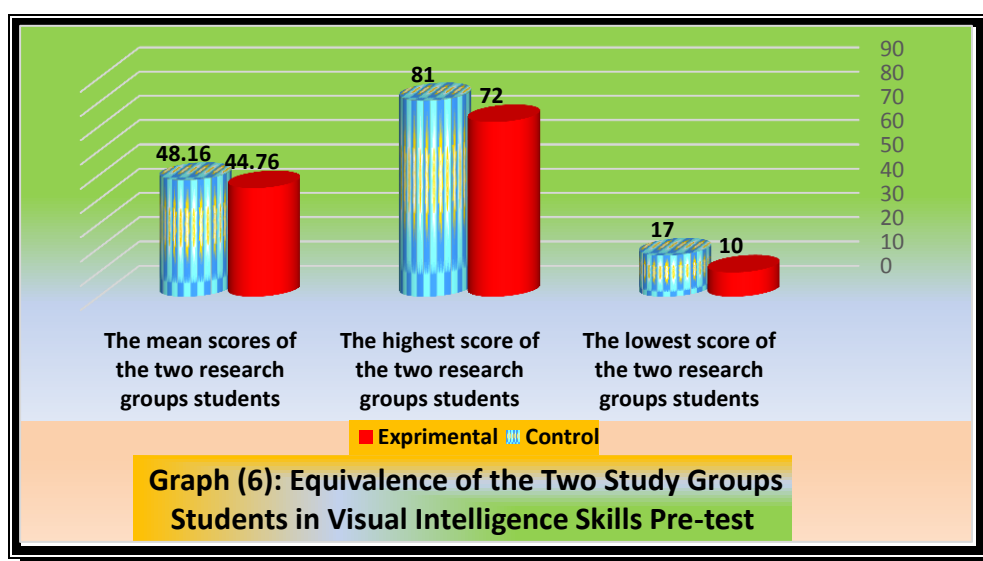
3.5.5 Visual Intelligence Skills Pre-Test:

The researcher equalized the students of the two research groups (experimental and control) in visual intelligence. He prepared a pre-visual intelligence skills test consisting of (8) visual questions, pictorial story

questions and open-ended questions (see Appendix 13a, p.364). The test was applied to the students of the two research groups on Tuesday 4 / 5 / 2021. After correcting the answers and using t-test for two independent samples to find out the significance of the statistical differences, the mean scores and standard deviation were calculated, as the mean scores of the experimental group was (44.76) and with a standard deviation (15.48), while the mean scores of the control group was (48.16) and with a standard deviation (13.20). It was found that the difference was not statistically significant at the level of significance (0.05), as the calculated t-value amounted to (1.06), which is smaller than the tabulated t-value (1.98) at degree of freedom (89). This indicates that the experimental and control groups are statistically equivalent in visual intelligence skills test (See Appendix 7, p.337) . Table (11) and Graph (6) illustrate this:

Table (11) : T-Test Results of the Visual Intelligence Pre-test

Group	No	Mean	Standard Deviation	t- Test Value		Degree of Freedom	Level of significance at (0.05)
				Calculated	Tabulated		
EG	46	44.76	15.48	1.06	1.98	89	Not significant
CG	45	48.16	13.20				



In the above, the control procedures and the internal safety of the two study groups were carried out, as the internal safety of the experimental design is one of the most important factors, so it must be taken into account by adopting equivalence between the experimental and control groups in the variables that may affect the dependent variable. Street emphasizes that the research is characterized by internal safety when the differences between the experimental and control groups are attributed to the effects of independent variables and not to extraneous factors (Street, 1995,178) .

3.6 Controlling Extraneous Variables (External Safety of Experimental Design):

The extraneous variables are those factors that affect the dependent variable, because not controlling the influencing variables may cause differences that have statistical significance(Tavakoli, 2012, 217). The following are the procedures for controlling these variables:

3.6.1 Experimental conditions and accompanying accidents (history):

Brossart et al. (2002, 101) mentioned that “History Threat” is the possibility that the observed effects (dependent variables) are caused by extraneous or historical events rather than by the experimental treatment. Moreover, it refers to unexpected events (not part of the treatment) that affect the dependent variable (the longer the trial, the greater the effect of this threat). Accompanying accidents mean the natural accidents that can occur during the experiment (disasters, floods, wars and other accidents, including disturbances, which impede the path of the experiment) .

The experiment of the current research was exposed to an emergency circumstance that passed over the country and the whole world, with the spread of the Corona pandemic (Covid-19), and there was a need to increase a number of lectures required by the research.

3.6.2 Maturation-related processes: Maturation means the biological, mental, psychological or social changes that occur to the members of the research sample during the period of application of the experiment, and it has an impact on the dependent variable in addition to the independent variable i.e. maturation threats refer to alternative explanations associated with natural development and growth over time (Cor, 2016, 394). In order to reduce the impact of this factor, the equivalence of chronological age was conducted, and the study tools were applied under the same conditions and time period.

3.6.3 Instrumentation: The term instrumentation encompasses a class of extraneous variables larger than the word implies. It includes not only physical instrumentation (electrical, mechanical, and the like) but also human observers, raters, or scorers. In much research, repeated observations are necessary. Any changes in performance between the first and all following observations may be due to changes in measuring instrument—physical or human. Raters or observers may become more skillful in identifying certain behaviors, but they may also become fatigued or bored. As Best and Kahn (1995, 398) argue, this threat to internal validity refers to unreliability, or lack of consistency, in measuring instruments which may result in invalid assessment of performance.

To measure the achievement and visual intelligence skills of the students of the two research groups, the researcher designed tests for the purposes of his research to be applied to the students of the two research groups (experimental and control) in each of the topics selected of reading comprehension. The effect of such variable is managed by the use of the exact number of questions for both groups (EG) and (CG) and the use of equivalency in pre and post-tests.

3.6.4 Selection of sample members (selection bias): In a typical experiment, groups are selected to receive different levels of the independent variable. To conclude that this manipulation caused differences in the dependent variable, the researcher must be confident that the groups were not selected in a way that created differences in the dependent variable before the independent variable was even introduced. Moreover, Street (1995) states that “selection bias frequently occurs when intact classes are employed as experimental groups (i.e. one class may be brighter, more receptive, or older). The treatment effects may be due to differences in the groups, not because the treatment is superior to other methods” (p.177). That is, the researcher must be confident that the groups were equivalent to begin with. The researcher tried to avoid this variable in the research results by random selection of the sample and conducting statistical equivalence processes between the members of the two research groups in four variables to increase the sensitivity of the experiment.

3.6.5 Experimental extinction (Mortality): It means the effect resulting by leaving or interrupting a number of students included in the experiment, which affects the results i.e., it means the loss of students under experiment

for any cause including a move to another section, sickness or dropping out of lectures. Students should not be excluded randomly because this may influence the formation of groups for the purpose of the experiment (Tavakoli, 2012, 370). In the experiment, only some cases of single absence occurred, but they occurred in few percentages and in an almost equal manner.

3.6.6 Statistical regression: According to Flannelly et al., the statistical regression refers to the tendency of very high or very low scores to return to the mean when the test is repeated (Flannelly et al., 2018, 113). The idea of statistical regression comes from the fact that some members of the research groups get extreme high or low scores in the pre-test, which leads to the tendency of these performances towards the mean, and this affects the internal safety of the study (i.e. in experiments involving both a pre-test and post-test, subjects tend to exhibit regression toward the mean; subjects who score highest on the pretest are likely to score relatively lower on the post-test, and those who score lowest on the pre-test are likely to score relatively higher on the post-test). This factor was controlled by random selection of the research sample students as well as the researcher could control this factor by (avoid the selection of extreme scorers to the exclusion of average scorers).

3.6.7 The Effect of the Experimental Procedures:

One of the characteristics of the real experiment is the control, and we mean by that fixing a number of characteristics related to the research situation, which may appear during the study of the relationship between the experimental variable and the dependent variable (Melhem, 2006, 422). Controlling the impact of these procedures is of great importance in experimental research, and lack of interest about them may affect the results of the experiment (Abdul Hafeedh and Mustafa, 2000, 110), so the researcher was keen to control a number of variables to ensure the conduct of the experiment, its safety, and the accuracy of its results, as follows:

- **Secrecy of the research:** The researcher was keen on keeping the research confidential in agreement with the chairman of Department of English Language not to inform or tell the students of the nature and purpose of the research, so that their activity or behaviour would not change, which might affect the safety of the experiment and its results.

- **Teaching:** The researcher taught the students of the two groups (experimental and control) for the duration of the experiment by himself in order to ensure the safety of the experiment from being affected by the difference in teaching experience and individual differences between teachers, to ensure that the students of the two groups received the same treatment, and because the researcher is the best person who can apply his teaching plans in a uniform and systematic manner. This could give the results of the experiment more accuracy and objectivity. Thus, it was possible to control the effect of this factor.
- **Teaching aids:** The ways of teaching were not the same for the students of the experimental and control groups. For the experimental, the instructional program was presented using smartphones, tablets, data show, interactive whiteboard, pictures, GIF images, PNG images, and using the two applications EyeJack Creator and QR Code Scanner. Moreover, the digital content was presented on Google Sites.
- **Distribution of lectures (lessons):** This variable was controlled through the equaled distribution of lessons between the two groups, as the researcher has taught two lessons per week (one lesson for each group) (See Appendix 8, p.339). The researcher has followed the weekly schedule of the Department of English at a rate of two hours per week for each of the two research groups, Table (12) illustrates this:

Note: The researcher needed additional lectures to teach the two research groups because there was not enough time for students to attend the university due to the spread of COVID-19. The researcher compensated for this period of time with additional lectures.

Table (12): Distribution of Lectures (Lessons)

Group	Day	Lecture		Hours
		From	To	
EG	Wednesday	8:30	10:30	2 hrs.
CG	Tuesday	8:30	10:30	3 hrs.

3.7 Instructional material:

The material of the two groups was the topics of the Reading Comprehension subject for stories (14,15,16,17,18,19, and 20) in the second semester of the academic year (2020 – 2021) (see Appendix 9, p.341). The material was taught with blended teaching, so online classes of some topics at department of English Language, have taken place on Google Classroom Platform. It was presented to the experimental group

with an instructional program based on ART using EyeJack Creator and QR Scanner applications, as well as the digital content of the scientific material was presented electronically on the Google Sites using Google Classroom platform, while the control group was given the scientific material without those applications and Google Sites (i.e. they were taught with classic/traditional instruction method). Thus, the researcher was able to control this factor.

3.8 Determining of the behavioural objectives:

The formulation and preparation of behavioral objectives for any important planned work, whether is a curriculum or a program, is the first step in building it, because it helps the planner or designer who is working to identify the important elements in building that curriculum, work on organizing it, and clarify what the student should do when he finishes of performing the educational task, which represents the most important criterion in evaluating the educational process. The researcher prepared (72) behavioral objectives (See Appendix 10, p.348) in light of the general objectives and content of reading comprehension topics, distributed on the levels of the cognitive domain in Bloom's Taxonomy (remember, understand, apply, analyze, evaluate, and create) as shown in Table (13). To verify its validity and fulfillment of the topics content, the researcher presented it to a group of experts and specialists in curricula, teaching methods, linguistics and psychology (See Appendix 11, p.353).

Table (13): Behavioral Objectives According to Bloom's Taxonomy

Topics	Behavioral Objectives	Remember	Understand	Apply	Analyze	Evaluate	Create
1	9	1	2	2	2	1	1
2	11	2	3	2	2	1	1
3	9	1	5	0	1	0	2
4	10	2	2	0	4	1	1
5	12	2	5	1	3	0	1
6	11	2	4	0	2	0	3
7	10	0	1	2	3	2	2
Total	72	10	22	7	17	5	11

3.9 Duration of the experiment:

The duration of the experiment was unified for the two research groups, which started on Sunday (18/4/2021) and ended on Tuesday (21/7/2021).

3.10 Introductory session:

The researcher has conducted an introductory session on Wednesday (5/5/2021) for the students of the experimental group before starting to teach reading comprehension, by doing the following steps:

1. Welcoming the participants of the experimental group and showing them a spirit of friendliness and acceptance, and a desire to help them.
2. Giving an idea to the sample members about the proposed program, and introducing them to the procedures followed in the sessions and the tasks required from them.
3. Asking the students of the experimental group to be cooperated to achieve the desired goals of the program, to be aware of the importance of regularity in sessions and willingness to participate, and setting dates for the upcoming sessions.

By the end of this session, EG students should be aware of:

- Objectives of the proposed framework of the suggested instructional program based on ART;
- Steps of the application of the framework of the suggested instructional program based on ART;
- The time of the application of the framework of the suggested instructional program based on ART;
- Content of the framework of the suggested instructional program based on ART;
- Procedures of the sessions of the suggested instructional program based on ART.

3.11 The Experiment

As the researcher mentioned, the experimental group was taught by using ART, while the control group was taught using the conventional method. A lesson plan of the present research was prepared and exposed to a jury members of TEFL experts (Appendix 11, p.353).

3.11.1 A model lesson plan of experimental group using QR Code Reader Application

Throughout the instructional program, students were asked to practice visual intelligence activities. They practiced visual intelligence skills based

on ART. Students were also asked to read, think, respond, and listen while reading the stories. Thus, teaching using the suggested instructional program based on ART went through the following procedures:

1. Preparation: In this stage, the researcher did the following:

- ✓ The researcher makes sure that all his students downloaded the QR Code Reader app and Eye Jack Creator app on their smartphones or tablets.
- ✓ The researcher makes sure that his students are connected to internet network.

2. Presentation(Pre-reading stage): In this stage, the researcher did the following:

- ✓ asks the students to open their textbook on the story “A Noble Gangster” page (38).
- ✓ asks them to look at the QR code in the top right of the page.
- ✓ asks them to open their smartphones cameras and scan the QR Code to open and display the augmented reality link related to the story.

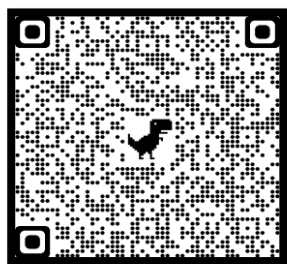


Figure (17): QR Related to the Story

- ✓ After opening the link, a new interactive Google site page, which contains the digital content of the story, will display on the screens of students' smartphones and tablets (See Appendix 12, p.355).
- ✓ The researcher makes sure that the students scanned the required QR Code and the new interactive Google site page is opened.
- ✓ After opening the site, the content of the story will display on their smartphones, then the researcher introduces the students to the topic of the story.
- ✓ The researcher brainstorms the lecture by asking the students: Can you tell me what this picture is about?



Figure (18): A Picture Related to the Presented Story

- ✓ After answering the above question (which is an example of instruction), the researcher asks another question: Based on the title of the story above, what is the hardest part for this character of being in gang? The students work in groups to answer the questions, grasp meaning and analyse it using life experience knowledge.

3. Practice (while-reading stage): In this stage, the researcher did the following:

- ✓ The researcher tells his students to look at vocabulary bank chart provided to help them know the difficult and new words in the story.
- ✓ The researcher, for example, asks his students to look at the following two pictures. He tells the students that these two pictures will give them hints about the information of the story. Moreover, it will make them ready to use their prior knowledge to talk about what is going to happen in the story.



Figure (19): Two Pictures Related to the Events of the Story

- ✓ The researcher tells the students to play a video to watch the whole story of “A NOBLE GANGSTER”.
- ✓ The researcher adds for more understanding, Please press on the link of following audio recording to listen to the whole story of "A Noble Gangster":

<http://www.listeningexpress.com/ncea/book3/14-A-Noble-Gangster.html>

4. Production (post- reading stage): In this stage, the researcher went through the following procedures:

- ✓ After watching the video, the researcher encourages student to participate: while some students willingly speak up, others have difficulty sharing their ideas, so it is important to try to keep students' voices balanced. Asking open-ended questions, MCQ questions, and true/false questions, are a good way to get the class talking.
 - ✓ The students work in groups of 3 or 4 to answer the post-reading questions, and to elicit information from their classmates about the given story, classify them in a chart, create a story map, make connections graphic organizer to better understand the story, produce a short note or a report about what they found and be ready to present it to the whole class.
5. **Homework:** The researcher tells his students to solve the exercises in page 39 in the student's textbook.
6. **Wrap-up:** In this stage, the researcher does the following:
- ✓ Have the students evaluate the lesson. " Did you enjoy the activities."
 - ✓ The researcher asks the students " What are your feelings about today's lesson"?
 - ✓ Elicit the answers.
 - ✓ Say goodbye.

3.11.2 Model lesson plan of control Group:

Teaching the control group of the current research went through using the so-called three P's methodology which consists of three stages: presentation, practice and production:

1. **The presentation stage:** It can be achieved by engaging the class in discussions and activities relevant to the story topic before actually reading it. These will be motivators for generating interest in the story understanding and the practice stage: discuss the title, the main idea, the author, and any other topics that may also be used as an introduction to the second stage. (30 minutes).
2. **In the practice stage,** the students engage in exercises and activities based on the reading comprehension material taught in the first stage. At this stage, the students will be guided by the researcher, and this part of lesson should be concerned with checking the students' general understanding. This can be done by engaging the whole class in a question and answer activity based on the story topic. (50 minutes).

3. In the production stage, the students will be required to answer the story open-ended questions and multiple choice questions with the guidance of the researcher. This stage should also allow time for correction, explanation and analysis of the students' responses to those questions. (40 minutes).

3.12 Instruments of the study

Among the requirements of the current research is the preparation of the achievement test and the visual intelligence skills test, and the preparation was done as follows:

3.12.1 Achievement test: It requires preparing an academic achievement test to measure the cognitive aspect according to the levels of Bloom Taxonomy of behavioural objectives, the performance aspect (skills) and the emotional aspect (inclinations and interests). Tests are the tool that is used to measure knowledge, understanding and skill of a subject or group of subjects. Achievement tests play a central role in evaluating students' learning. They give us appropriate measures of learning outcomes. The validity of the information provided by these tests depends on the degree of care during preparation or correction. Achievement tests are extensively used to achieve the purpose of evaluating several aspects of teaching and learning. These tests are used to assess a person's ability, knowledge, interest, aptitude and attitude. Therefore, achievement test is a sample of questions or educational tasks formulated in a manner with which it is possible to measure the extent to which the predetermined objectives of a particular educational subject or skill have been achieved (Nugba & Quansah, 2021, 43).

Construction of achievement test: What is meant by achievement test is a series of organized procedures that determine students' information in a specific subject that has been previously studied. To prepare the achievement test, the researcher designed the following steps, as shown in Figure (16).

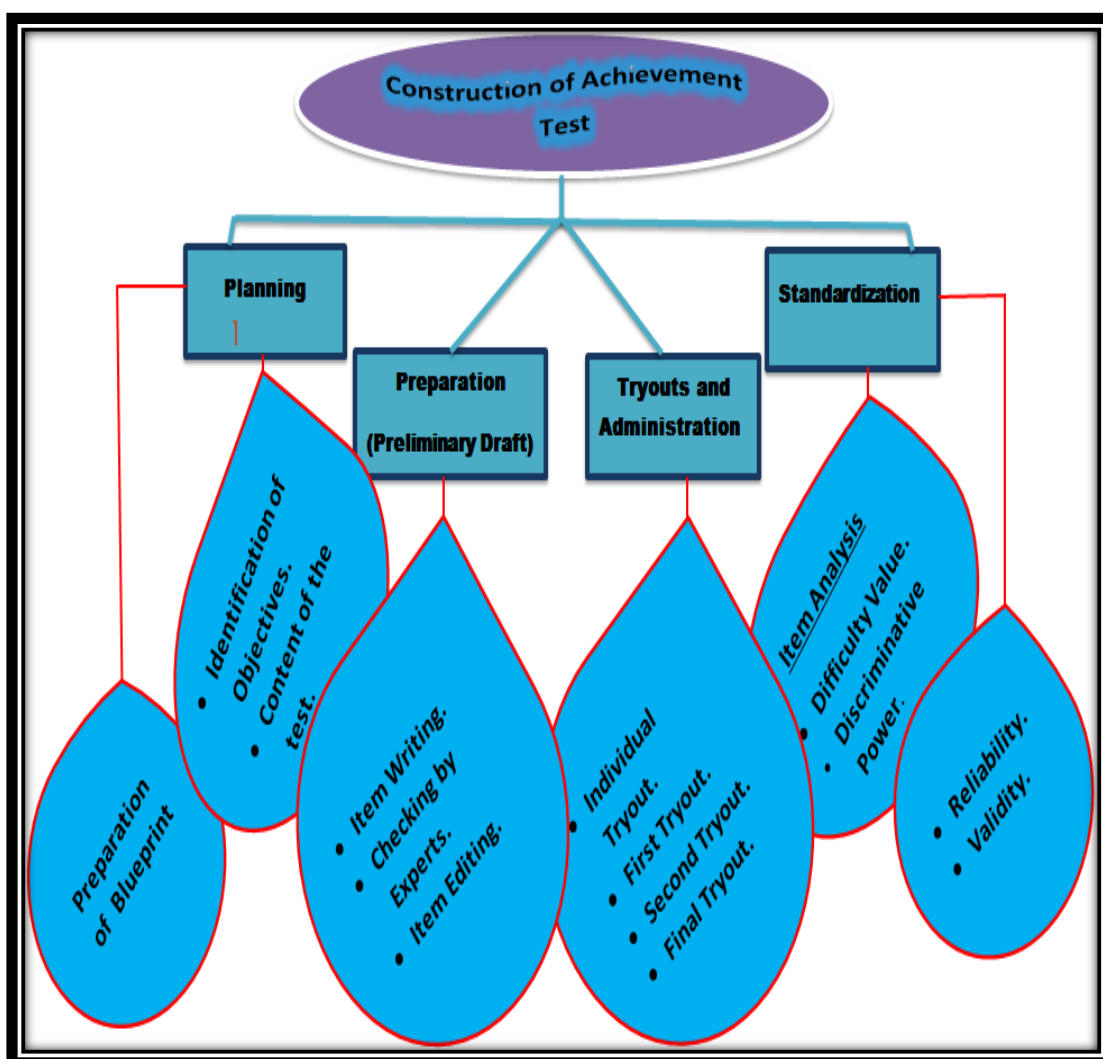


Figure (20): Construction of achievement test (designed by the researcher)

The following steps were taken by the researcher during construction and standardization of the achievement test in reading comprehension:

- 1- Planning of the test:** For proper planning of the tes, the researcher kept following aspects in mind such as: in which subject, level, to whom, what, when and how to measure. In this context, following decisions were taken by the researcher such as: objectives, content, scoring process, number and type of items, length of test, weightage to the objectives, and content, allotment of time and marking process of the achievement test.
- 2- The aim of the test:** It is to know what information the students obtained in reading comprehension for the two groups after completing the experiment, and to know the difference between the two groups, the

experimental that was taught according to the instructional program, and the control group that was taught by conventional method.

- 3- **Identification of test items :** The researcher determined the number of test items with (25) test items, based on the opinions of a number of experts after reviewing the behavioral objectives and content of the seven selected topics of EFL reading comprehension syllabus recommended for the second stage students.
- 4- **Building the specification table:** The specification table is defined as a two-dimensional table consisting of the horizontal dimension of the levels of behavioral objective and the vertical dimension of the content. It also includes the relative weights of each of the objectives and content, and it is used to determine the number of questions that must measure each level of objectives in each content in order for the test to be real. The aim of preparing the specification table is to distribute the achievement test items on the parts of the material and on the behavioral objectives in a manner consistent with the percentage of content and specific objectives.

Therefore, the researcher determined the specification table to test the students' reading comprehension performance for students of the second stage - College of Basic Education - University of Babylon, based on the behavioral objectives prepared in advance at the six levels in the cognitive domain of revised Bloom's taxonomy (2001) (remember, understand, apply, analyze, evaluate, and create) (Irvine, 2017, 13-14), as the test items covered the content that was taught according to the relativity importance for each level, as shown in table (14). A specification table has been prepared by the following steps:

- **Identification of the objectives:** Objectives of achievement test were defined in behavioural terms focusing on remember, understand, apply, analyze, create, and evaluate, of all the topics of reading comprehension of second stage prescribed by Ministry of Higher Education and Scientific Research. Objectives defined by Bloom's Taxonomy and important action verbs are adopted by the researcher which are shown in the following table:

Table (14): Distribution of Weightage to Objectives & Action Words of Bloom's Taxonomy

Objectives	No	Weightage	Action words
Remember	10	14%	recognize, say, state, write, examine, describe, tell.
Understand	22	31%	identify, interpret, explain, indicate, demonstrate, summarize, scan, scan, express.
Apply	7	9%	choose, link, order, change, find, modify, relate.
Analyze	17	24%	analyze, predict, compare, determine, elicit, infer, distinguish.
Evaluate	5	7%	Make, judge, criticize, evaluate.
Create	11	15%	write, create, picture, translate, generate.
Total	72	100%	

The following equation was used to calculate and find weightage of objectives:

Weightage of objectives

$$= \frac{\text{Number of behavioural objectives for each domain}}{\text{Total of behavioural objectives}}$$

- **Content of the test:** Content analysis is another important Procedure in construction of an achievement test. It covered most important seven

topics of EFL reading comprehension syllabus prescribed by Ministry of Higher Education and Scientific Research for the second semester which are shown in the following table:

Table (15): Distribution of Weightage to Content (Topics)

Topics	Content	No. of Pages.	Weightage
1	Passage 14 "A Noble Gangster".	2	14.2857143
2	Passage 15 "Sixpence Worth of Trouble".	2	14.2857143
3	Passage 16 "Mary had a Little Lamb".	2	14.2857143
4	Passage 17 "The Greatest Bridge in the World".	2	14.2857143
5	Passage 18 "Electric Currents in Modern Art".	2	14.2857143
6	Passage 19 "A Very Dear Cat".	2	14.2857143
7	Passage 20 " Pioneer Pilots".	2	14.2857143
Total		14	100%

The following equation was used to calculate and find weightage of topics:

$$\text{Weightage of topics} = \frac{\text{Number of lessons for each topic}}{\text{Total of lessons}}$$

Table (16): A Specification Table (Test Map) of the Achievement Test

Topics	Educational Objectives						Weightage (the importance of the topics)	Number of questions
	Remember	Understand	Apply	Analyze	Create	evaluate		
	10	22	7	17	11	5		
1	0.499	1.106	0.321	0.856	0.535	0.249	14.28	3.566
Marks	0.999	2.21	0.64	1.71	1.07	0.49		7.119
2	0.499	1.106	0.321	0.856	0.535	0.249	14.28	3.566
Marks	0.999	2.21	0.64	1.71	1.07	0.49		7.119
3	0.499	1.106	0.321	0.856	0.535	0.249	14.28	3.566
Marks	0.999	2.21	0.64	1.71	1.07	0.49		7.119
4	0.499	1.106	0.321	0.856	0.535	0.249	14.28	3.566
Marks	0.999	2.21	0.64	1.71	1.07	0.49		7.119
5	0.499	1.106	0.321	0.856	0.535	0.249	14.28	3.566
Marks	0.999	2.21	0.64	1.71	1.07	0.49		7.119
6	0.499	1.106	0.321	0.856	0.535	0.249	14.28	3.566
Marks	0.999	2.21	0.64	1.71	1.07	0.49		7.119
7	0.499	1.106	0.321	0.856	0.535	0.249	14.28	3.566
Marks	0.999	2.21	0.64	1.71	1.07	0.49		
Weightage to objectives	0.14	0.31	0.09	0.24	0.15	0.07	100	
Number of questions	3.493	7.742	2.247	5.992	3.745	1.743		24.962
Revised questions	3	8	2	6	4	2		25
Marks	6.99	15.47	4.48	11.97	7.49	3.43		49.83
Revised marks	6	16	4	12	8	4		50

5- Preparation (preliminary draft):

The task of preparation of an achievement test in reading comprehension includes three steps: item-writing, checking by expert, and item-editing. At the initial stage preliminary draft was prepared corresponding to seven topics of reading comprehension of second stage. This draft consists of 30 items covering the major objectives of teaching; remembering, understanding, application, analysis, creativity, and evaluation. Items having similar units were grouped at one place. Some items were multiple types i.e. every item is fed with four options in which only one option was the appropriate answer. Here the students are expected to answer the questions by selected the right option from among the four

listed responses. So, the researcher while writing the items in preliminary draft, considers the following aspects as priority points:

- ✓ Questions must be simple, clear and easy to understand.
- ✓ Each item in draft should be corresponding to the framed objective.
- ✓ Avoidance of Ambiguous statements.
- ✓ Items should be sequenced from simple to complex.

All the items were evaluated by the experts in order to remove ambiguous terms and language difficulty in the format of test items. Then the items of the test were edited and reviewed according to the suggestions given by experts. The suggestions are incorporated and defects are removed. Some items were deleted and few items were modified as per suggestions received from the experts. In this way preliminary draft with 25 items was made.

The researcher followed the formulation of the objective test items of the type short answer questions (open-ended) ,multiple choice (one correct answer pattern among 4) and one an essay question . The test consists of 25 items, 10 multiple-choice items, as two marks are allocated for each correct answer and zero for each incorrect or left answer. 14 short answer items were also presented to students, as two marks are allotted for completely correct answer, one mark for the incomplete answer and zero for each incorrect or left answer. The researcher also formulated one essay item and assigned two marks for the completely correct answer, one mark for the incomplete answer, and zero for the incorrect or left answer. Thus, the highest score of the test is (50) and the lowest score is zero, as shown in (Appendix 13b, p. 363).

6- Tryouts and administration (piloting the test):

The main operation of achievement test is measured when it is implemented on the students. Poor planning of the administrative process can lead to fake result. That is why after preparing a preliminary draft, it is subjected to tryouts. The exploratory sample consists of three groups:

The first pilot sample: After finalizing, the test items were administered on few students (approximately 5) for individual try-out. The researcher made sure about the practicability of the test. The draft was modified on the basis of feedback given or problems faced by students. It can be identified as difficulty in identifying or understanding of any particular word/words,

incorrect numbering, misleading statements, grammatical errors etc. Total time taken by students to complete the test is also noted.

The second pilot sample: To ensure the valid usability of test items and to get rid of shortcomings, it is essential to have second try out of items on at least sample of 30 to 50 students. Following aspects are considered while testing in sample: proper sitting arrangements, total time required for test completion, and proper motivation of students. The researcher randomly selected a sample to represent the exploratory sample which consists of 50 male and female students from Department of English Language - College of Basic Education - University of Diyala. The application was on Sunday (18/4/2021). Piloting the test aimed at knowing the clarity of the test instructions and estimating the suitable time for the test. After applying the test, it became clear that the test time was determined, so the average time taken by the exploratory sample members was (90) minutes (See Appendix 14, p.376). By applying the following equation, the test time was calculated as follows:

$$\text{Test Time} = \frac{\text{Summation of time taken by all students}}{\text{Number of students}}$$

Final tryout: After the researcher made sure of the clarity of the test and its instructions, he administered the test again to a sample of (75) male and female students from Department of English - College of Basic Education - University of Misan within allotted time. The application was on Wednesday (21/4/2021). This tryout is administered to find out the level of difficulty and ease of test items, the power of discrimination, and the effectiveness of the wrong (incorrect) alternatives (See Appendix 15 a, b, c, d, and e, pp. 377-380). Separate answer sheets are provided to all students and the required instructions about the test are given. The students are supposed to mark the right answer on the sheets. The test sheets along with answer sheets are collected and answer sheets were used for scoring with the help of scoring key.

7- Standardization of the test:

a. Difficulty level of the items: The purpose of calculating the difficulty coefficient of the items is to decide the students' ability to choose the items of appropriate difficulty and delete the very easy and difficult items because both types do not help us know the differences between the students. The difficulty of the item is the level of complexity that the student faces in the

correct answer to the test item, and whether that level is high or medium. The difficulty of the item (Item Difficulty) can be expressed by the ratio of the number of students who answered the item correctly. The amount of this percentage is called the Difficulty Index, the higher this amount indicates the ease of the item, and the less the item is considered difficult (Brown, 2010, 70- 71).

Since the number of students of statistical analysis is 75, the researcher arranged their scores in descending order, and 27% of them represent the upper group, and their number is 20, and another 27%, whose number is 20, to represent the lower group. After calculating the difficulty coefficient for each of the test items, the researcher found that its value ranges between (0.28 - 0.63) with an average of (0.48) (See Appendix 15a, p. 377), and therefore all items are acceptable if the degree of difficulty ranges between (0.15 - 0.85) (Saleem & Abu Al-Rub ,2020, 3338). By applying the formula, the difficulty coefficient was calculated for the achievement test items.

The formula of calculating difficulty value is:

$$Dv = \frac{RU + RL}{NU + NL}$$

Where,

Dv = Difficulty value.

RU = the number of students in the upper group who responded correctly.

RL = the number of students in the lower group who responded correctly.

NU = the number of students in the upper group.

NL = the Number of students in the lower group.

- b. Discriminative power:** The discrimination coefficient is one of the test parameters. It is called the ability of the test items to distinguish between students (with high level) and students (with low level). After calculating the discriminatory power for each of the test items, the researcher found that the value of discrimination ranges between (0.42 - 0.75) with an average of (0.56) for the items of the test (See Appendix 15b, p. 378). By applying the item discrimination power formula, the discrimination coefficient was calculated.

It is clear that the discrimination coefficients ranged between (0.42 - 0.75), and therefore all items are acceptable, as Saleem & Abu Al-Rub (2020, 3338) indicate that the item acceptable if the degree of discrimination exceeds (0.30).

The internal consistency discrimination index of each item was found by applying the following formula:

$$Dp = \frac{NU - NL}{N/2}$$

Where,

Dp = Discrimination power.

NU = Number of students of higher group answering the item correctly.

NL = Number of students of lower group answering the item correctly.

N = Total number of students.

c. Effectiveness of Wrong (incorrect) Alternatives (Distractor Efficiency):

A wrong alternative is effective when the largest number of students of the lower group errs as the correct alternative and at the same time errs a few students of the upper group. When there is an alternative that has not attracted any of the lower and higher groups, it must be replaced from the item. Mahjabeen et al. (2017) indicated that Distractor Efficiency (DE) is “the ability of incorrect answers to distract the students” (p.312).

By applying the formula of the effectiveness of alternatives to the answers of the students of the upper and lower groups, the effectiveness of each incorrect alternative and for each test item was calculated (See Appendix 15c, p.379). When calculating the effectiveness of the correct alternatives for the items of the objective test, the researcher found that it is limited to (0.11- 0.22), and this means that the incorrect alternatives have attracted more students of the lower group than the students of the upper group. Therefore, the test designer seeks negative values for the wrong alternatives in order for the test items to be good.

After conducting statistical operations to find out the effectiveness of the wrong alternatives, the researcher found that these alternatives have attracted more students of the lower group than the students of higher group, so the researcher did not make any modification or deletion on these items (i.e., it was decided to keep the incorrect alternatives as they are without any change).

d. Validity of the test: Validity refers to the attainment of purpose for which the test is prepared .There are different methods of estimating validity such as (face validity, content validity, and construct validity). The validity of the

test is one of the statistical procedures that the designer/teacher/researcher must verify when s/he wants to build his/her test because the validity of the test is a prerequisite for considering the test as a valid tool for measurement (Sharma and Poonam, 2017, 235) and (Mohajan, 2017, 72). The researcher verified the validity of the test as follows:

- **Face Validity:** It refers to the transparency or relevance of a test as it appears to test participants. A test can be said to have face validity if it "looks like" it is going to measure what it is supposed to measure. A test appears valid, if its title indicates the behavior to be measured. For example, if a test is constructed to measure whether students can perform minus process, and the persons to whom it is shown all agree that it looks like a good test of minus ability, this depicts face validity of the test. In other words, face validity refers to researchers' subjective assessments of the presentation and relevance of the measuring instrument as to whether the items in the instrument appear to be relevant, reasonable, unambiguous and clear (Oluwatayo, 2012, 392).

The face validity was reached through the experts' judgment on the degree of test measurement of the measured trait, and since it is subject to the subjectivity of experts, so the test was given to more than one expert. The degree of face validity of the test can be evaluated through the agreement of experts' estimates. Thus, the test was presented to a number of experts and specialists in curricula, teaching methods, measurement and evaluation, linguistics, and educational psychology ([Appendix 11, p. 353](#)) to know their views on the validity of the items. The percentage was calculated with the agreement of the experts on the items, it was amounted to (88%). In the light of their suggestions, the modification was made and the test was ready to be applied on the sample of the research.

Table (17): The Percentage and Chi-square Value of the Face Validity for the Achievement Test Items

No	Items	No of items	No. of experts			Df	Percentage	Chi-square value		Statistical significance at (0.05) level
			Total	Agree	Disagree			Calculated	Tabulated	
1	MCQ	Q1/ 1,3, and 5.	21	19	2	1	90%	13.76	3.84	Sig.
		Q2/ 1,2 and 5								
		Q1/ 2 and4	21	18	3	1	86%	10.71	3.84	Sig.
		Q2/ 3 and4								
2	Short answers	Q4/ 1 and 4	21	18	3	1	86%	10.71	3.84	Sig.
		Q3 (B) 1 and 2								
		Q5/ 2,3,5 and 6								
		Q4/ 2,3 and 5	21	19	2	1	90%	13.76	3.84	Sig
3	Essay	Q5/ 1,4 and7								
		Q3 (A)	21	19	2	1	90%	13.76	3.84	Sig.

- **Content Validity:** Content validity is defined by Yusoff (2019) as “the degree to which elements of an assessment instrument (all aspects of the measurement process that can affect the data obtained such as questionnaire items, response formats and instructions) are relevant to and representative of the targeted construct (the concept, attribute, domain, or variable that is the target of measurement) for a particular assessment purpose (the expected functions of the measurement tool, for examples, a questionnaire)”.(p. 49). The content validity is concerned with the relevance of the contents of the items, individually and as a whole. In which expert judgment was taken into consideration. To estimate content validity of the achievement test, test was given to experts to compare test items with the content and objectives of content. Moreover, the test is considered valid in terms of content if its items obtain 75% or more of the experts’ estimates (Bloom, 1983, 126). Adopting

the specification table to set a sample of questions that represent the instructional content, and the educational goals that the teacher seeks to achieve, is an endorsement of the content's validity. Therefore, the researcher prepared the achievement test in the light of a specification table (test map) he designed for this purpose. The test was presented to experts, and thus the researcher was able to verify the content validity of the test items.

- **Construct validity:** This type of validity was achieved by finding the coefficient of ease, difficulty and discriminatory power of the items of the achievement test by using the two extreme groups method, as it was found that all the test items are of medium ease and difficulty, and of acceptable discrimination (See Appendix 15, p. 380).

e. Test Reliability: Reliability is one of the important characteristics that must be available in the test or measuring instrument. The fixed instrument is the one that gives the same results if it is repeatedly applied to the same sample and under the same conditions. Reliability is one of the important characteristics of any test and measuring instrument. Chakrabartty (2013) stated that reliability refers "to measure consistency, precision, repeatability, trustworthiness, etc. of a test" (p.1). Thus, Reliability refers to consistency of scores obtained by same individual when re-examined with test on different sets of equivalent items or under other variable examining condition.

There are several methods for calculating the test reliability. The researcher used to calculate the reliability coefficient the re-correction method, which is explained as follows: the researcher randomly chose the answers of ten students in order to ensure the reliability of the test correction. The researcher used the Pearson correlation coefficient as a statistical means to calculate the reliability of the achievement test correction, and he used two types of agreement in the correction:

First: reliability over time (test-retest reliability): Graziano, & Raulin (2006) emphasized that "the reliability coefficient is obtained by repetition of the same measure on a second time, is called the test-retest reliability".(p.107). Two weeks after the first correction, the researcher re-corrected the test without placing a sign or mark indicating the correction (See Appendix 16, p. 381), and the correlation coefficient between the researcher and himself over time reached (0.98) as shown in table (18).

Second: reliability with another rater (Inter-rater reliability): To find the reliability of the test correction with another corrector (rater), the same test sheets were corrected with a corrector who has experience in correcting the test,

and it was agreed with him to hide the score and not to put signs and marks on the answer sheets to reduce the effect of the corrector. The correlation coefficient between the researcher and the other corrector was (0.96) (See Appendix 16, p. 381).

The test reliability coefficient was ranged between (0.88 – 0.96), which indicates that the test reliability coefficient is good, as Mohajan indicates that the reliability coefficient ranging between (0.70 – 0.90) is a good indicator of the test reliability (Mohajan, 2017, 11).

Table (18): Reliability of the Achievement Test

Test	Reliability through time	Reliability with another corrector
Achievement test	0.98	0.96

f. The Final Form of the Achievement Test

The achievement test in the current research consists of 25 test items, which were divided as follows:

- Ten multiple-choice items (four alternatives), as the items were corrected by giving two marks for the correct answer and zero for the wrong or left answer.
- Fourteen short answer items were corrected by giving two marks for the completed answer, one mark for the incomplete answer, and zero for the incorrect or left answer.
- One essay item was corrected by giving two marks for the completed answer, one mark for the incomplete answer, and zero for the incorrect or left answer.

Thus, the total score of the achievement test is 50 marks, and the lowest score is zero (See Appendix 13, p. 370).

3.12.2 Visual Intelligence Skills Test

The visual intelligence skills test represents the second tool for measuring the second dependent variable of this research, and the process of its construction proceeded to reach the final form according to the following:

A. Determining the aim of the test: The test aims to measure the visual intelligence skills of the second stage students - Department of English Language (the research sample).

B. Construction of visual intelligence test: The visual intelligence test consists of 41 test items distributed as follows:

- 22 short answer items represented by questions (3- 5- 6- 7- 10) , 20 of them were corrected by giving two marks for each item when the answer is correct, one mark when the answer is incomplete, and zero when the answer is incorrect or left out. These items were evenly distributed in each of the following questions (3, 5, 6, and 7) .The other two items, in question 10, were corrected by giving 5 marks for each item when the answer is correct, 3 marks when the answer is incomplete, and zero when the answer is incorrect or left out, and thus the total score of 22 short answer items is 50 marks. (See Appendix 17, p. 382).
- 10 matching items represented by question (8), as the items were corrected by giving one mark for each item when the answer is correct and zero when the answer is incorrect or left out. Thus, the total score of 10 matching items is 10 marks.
- 5 completion items represented by question (9), as the items were corrected by giving two marks for each item when the answer is correct and zero when the answer is incorrect or left out. Thus, the total score of 5 completion items is 10 marks.
- 4 essay items represented by the question (1-2-4), as the items were corrected by giving 10 marks for each item when the answer is correct, 5 marks when the answer is incomplete, and zero when it is incorrect or left out. The total score of 3 essay items is 30 marks.

Thus, the total score of the visual intelligence test is 100 marks, and the lowest score is zero.

The steps of construction the visual intelligence test are as follows:

1- Determining of the visual intelligence skills.

The researcher prepared an initial questionnaire consisting of 20 skills to determine the visual intelligence skills that should be included in the test (See Appendix 18a, p. 408). The questionnaire was presented to a number of experts and specialists in curricula, teaching methods, measurement and evaluation , and psychology. In light of the experts' opinions, the researcher identified 20 visual intelligence skills. Experts agreed by 80% that 14 of

these skills should be used in the test paragraphs (see Appendix 18b, p. 411). The Table (19) explains the initial form of the number of visual intelligence skills before deletion and modification.

Table (19): Experts' Opinions Regarding the Checklist of Visual Intelligence Skills in Its Initial Form

Skills	No. of experts			Percent age	Chi-square value		Statistical significance at 0.05 level
	Total	Agree	Disagree		Cal.	Tab.	
1	21	21	0	100%	21	3.84	Significant
2		21	0	100%	21		Significant
3		14	7	67%	2.33		Not Significant
4		21	0	100%	21		Significant
5		18	3	86%	10.71		Significant
6		18	3	86%	10.71		Significant
7		18	3	86%	10.71		Significant
8		18	3	86%	10.71		Significant
9		13	8	62%	1.19		Not Significant
10		21	0	100%	21		Significant
11		20	1	95%	17.19		Significant
12		17	4	81%	8.05		Significant
13		17	4	81%	8.05		Significant
14		21	0	100%	21		Significant
15		12	9	57%	0.43		Not Significant
16		21	0	100%	21		Significant
17		21	0	100%	21		Significant
18		19	2	90%	13.76		Significant
19		21	0	100%	21		Significant
20		21	0	100%	21		Significant

2- Formulating and writing the items of the visual intelligence test.

After reviewing the standards, mental tests, various visual intelligence skills, literature, papers, articles, and previous studies, the researcher prepared test items at the level of the second stage students at the Department of English Language - to measure (14) visual intelligence skills. The researcher formulated a test consisted of 41 visual intelligence items. The items were formulated in the form of short answer items, completion items, matching items, and essay items (Appendix 17, p. 392), then they were presented to specialists in curricula, teaching methods, linguistics, measurement and evaluation, and psychology.

3- Test instructions: It refers to answering and correcting instructions.

Answering instructions: The researcher prepared special instructions for the visual intelligence test, which included how to answer the items, and put a place to answer the test items on the test sheet itself, with clarity and accuracy of the items. The second-stage students were informed by the researcher that the results they obtain will only be utilized for scientific research.

Correction instructions: The researcher prepared key answers for the test items, which he relied on in correcting the items of the visual intelligence test. The researcher also distributed the test marks to the test items, and the total mark of the test in its initial form ranged from (100) marks.

4- Tryouts and administration (piloting the test)

The first tryout of the test: The researcher applied the test to a first exploratory random sample consisting of (50) male and female students from the second stage - Department of English, College of Basic Education - University of Diyala. The application was on Sunday (25/4/2021). The researcher was keen to apply the test for students in appropriate conditions. As a result of the application, it was found that the time taken is 178 minutes (See Appendix 19, p. 414).

The second tryout of the test: This tryout is administered to find out the coefficient of difficulty, the discriminatory power, the validity of the test, and the reliability of the test.

The researcher applied the test to a sample of (75) male and female students from the second stage - Department of English - College of Basic Education - University of Misan. The application was on Wednesday (28/4/2021).

5- Statistical analysis of visual intelligence test items

Students' answers were marked and arranged in descending order from highest to lowest score. The 27% of the highest scores and 27% of the lowest scores were taken. The total number was (75) students. The researcher analyzed the data (correct answers for the upper and lower groups) statistically as follows:

- a. **Difficulty coefficient:** The purpose of calculating the difficulty coefficient of the items is the students' ability to choose the items of appropriate difficulty and delete the very easy and difficult items. It is clear that the coefficients of difficulty ranged between (0.28 - 0.73) with an average of (0.51), therefore, all items are acceptable, as Saleem & Abu Al-Rub (2020, 3338) see that the items are valid and acceptable for application if the difficulty coefficient ranges between (0.15 - 0.85). [Appendix \(20a, p. 415\) explains this.](#)
- b. **Discriminative power:** It is the ability of the test items to distinguish between students (with high level) and students (with low level). After calculating the discriminatory power for each of the test items, the researcher found that the value of discrimination ranges between (0.45-0.80) for the items of the test. By applying the item discrimination power formula, the discrimination coefficient was calculated.
It is clear that the discrimination coefficients ranged between (0.45 - 0.80) with an average of (0.59), and therefore all items are acceptable, as Saleem & Abu Al-Rub (ibid, 3338) indicate that the item is acceptable if the degree of discrimination exceeds (0.30). [Appendix \(20b, p.417\) illustrates this.](#)
- c. **Validity of the test:** The researcher verified the validity of the test using face validity.
- **Face validity:** It is the general appearance of the test in terms of the type of vocabulary, how it is formulated, and the extent of its clarity. It also deals with the test instructions, its accuracy, degree of clarity, objectivity, and the extent to which the test is suitable for the purpose for which it was developed.

In order to verify the face validity, the researcher presented the test to a group of experts and specialists in teaching methods, linguistics, measurement and evaluation ([Appendix 11, p.353](#)); to give their opinions and observations about the general form of the test and the validity of its

items. After the researcher obtained the experts' observations and opinions, some items were modified in terms of formulating and with deleting some items. By adopting an agreement percentage of (92%) of the total number of experts, the percentage and the value of the chi-square for each item were calculated and compared with the tabulated value (3.84) at the level of significance (0.05) with the degree of freedom (1), where the results showed the validity of all items of the test. The percentage was calculated with the agreement of the experts on the items, it was amounted to (92%). In light of their observations and suggestions, the modification was made and the test was ready, and Table (20) illustrates this:

Table (20): The Percentage and Chi-square Value of the Face Validity for the Items of Visual Intelligence Skills Test

Skills	Test items	No of experts			Percent age	Chi-square value		Statistical significance at 0.05 level
		Total	Agree	Disagree		Cal.	Tab.	
1	Q2 a	21	20	1	95%	17.19	3.84	Significant
2	Q9		19	2	90%	13.76		Significant
3	Q3		20	1	95%	17.19		Significant
4	Q6		20	1	95%	17.19		Significant
5	Q5		18	3	86%	10.71		Significant
6	Q4		19	2	90%	13.76		Significant
7	Q2 b		19	2	90%	13.76		Significant
8	Q2 a		18	3	86%	10.71		Significant
9	Q7		19	2	90%	13.76		Significant
10	Q1		20	1	95%	17.19		Significant
11	Q10 a		19	2	90%	13.76		Significant
12	Q10 b		18	3	86%	10.71		Significant
13	Q8		20	1	95%	17.19		Significant
14	Q5		21	0	100%	21		Significant

d. Reliability of the test: There are several methods for calculating the test reliability. The researcher used to calculate the reliability coefficient the re-

correction method, which is explained as follows: the researcher randomly chose the answers of ten students in order to ensure the reliability of the test correction. The researcher used the Pearson correlation coefficient as a statistical means to calculate the reliability of the visual intelligence test correction, and he used two types of agreement in the correction:

First: reliability over time: Two weeks after the first correction, the researcher re-corrected the test without placing a sign or mark indicating the correction (See Appendix 21, p.420), and the correlation coefficient between the first and the second marking over time reached (0.98) as shown in table (21).

Second: reliability with another corrector (rater): To find the reliability of the test correction with another corrector, the same test sheets were corrected with a corrector (rater) who has experience in correcting the test, and it was agreed with him to hide the score and not to put signs and marks on the answer sheets to reduce the effect of the corrector. The correlation coefficient between the researcher and the other corrector was (0.95) (Appendix 21, p. 420).

Table (21): Reliability of Visual Intelligence Test

Test	Reliability through time	Reliability with another corrector
Achievement test	0.98	0.95

3.12.3 Administration of the Two Research Instruments:

After the two tests were ready in their final form, see (Appendix 13, p.370) for the final achievement test and Appendix (17, p. 392) for the visual intelligence test, a week before the end of the experiment, the researcher told the students that they will set for two tests.

The researcher administered the two tools to (91) students of the two groups (experimental and control), at Department of English Language, College of Basic Education, University of Babylon. The achievement test was applied on Wednesday 16/ 7/ 2021, and the visual intelligence test was applied on Wednesday 21/ 7/ 2021.

3.13 Statistical means:

The program (SPSS) version 24 and the program (Excel 2016) were used in the experiment to obtain the results, and the researcher used the following statistical methods:

- a. T-test of two independent samples** to calculate the equivalence between the experimental and control group in the variables (intelligence, achievement test, visual intelligence test, and chronological age.)

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{(n_1 + n_2) - 2} \times \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

Where:

$\bar{x}_1$ = Mean of experimental sample

$\bar{x}_2$ = Mean of control sample

n_1 = Sample size of experimental sample

n_2 = Sample size of control sample

s_1 = Standard deviation of experimental sample

s_2 = Standard deviation of control sample

- b. Chi-square law for expert orientation.**

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

Where:

O = observed frequencies

E = expected frequencies

- c. Eta square η^2 to calculate the size of the effect.**

$$\eta^2 = \frac{t^2}{t^2 + df}$$

Where: η^2 (Eta Square) = the calculated effect size, t = the estimated value and df = the degrees of freedom.

The criteria to which the effect size is judged are:

The value of “ η^2 ” 0.2= small effect size.

The value of “ η^2 ” 0.5= medium effect size.

The value of “ η^2 ” 0.8= large effect size.

- d. Pearson's correlation coefficient** to find out the reliability of the achievement test and visual intelligence test.

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}}$$

Where,

X = the first sets of scores.

Y = the second sets of scores.

N = the number of the sample.

e. Scale of variance and standard deviation.

f. Ease and difficulty coefficient of achievement test and visual intelligence test.

$$Dv = \frac{RU + RL}{NU + NL}$$

Where,

Dv = Difficulty value

RU = the number of students in the upper group who responded correctly

RL = the number of students in the lower group who responded correctly

NU = the number of students in the upper group

NL = the Number of students in the lower group

g. Formula of discrimination coefficient of the items of the achievement test and visual intelligence test.

$$Dp = \frac{NU - NL}{N/2}$$

Where,

Dp = Discrimination power

NU = Number of students of higher group answering the item correctly

NL = Number of students of lower group answering the item correctly

N = Total number of students

h. The effectiveness of the wrong alternatives (Distractor Efficiency).

i. Spearman Brown Corrective formula.

$$rtt = \frac{2rh}{1+rh}$$

where,

r_{tt} = reliability of the entire test

rh = correlation the two halves

j. Haridy's Simple Gain Ratio (H-SGR)

$$H - SGR = (M2 - M1) / T$$

Where,

H - SGR = Haridy's Simple Gain Ratio.

M2= Mean scores for post-test of the experimental group students.

M1= Mean scores for pre-test of the experimental group students.

T= Total score of the test.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 An Introductory Note

This chapter presents the statistical analysis of the collected data and explains the findings after the application of statistical instruments for both groups (experimental and control).

4.2 Presentation of Results

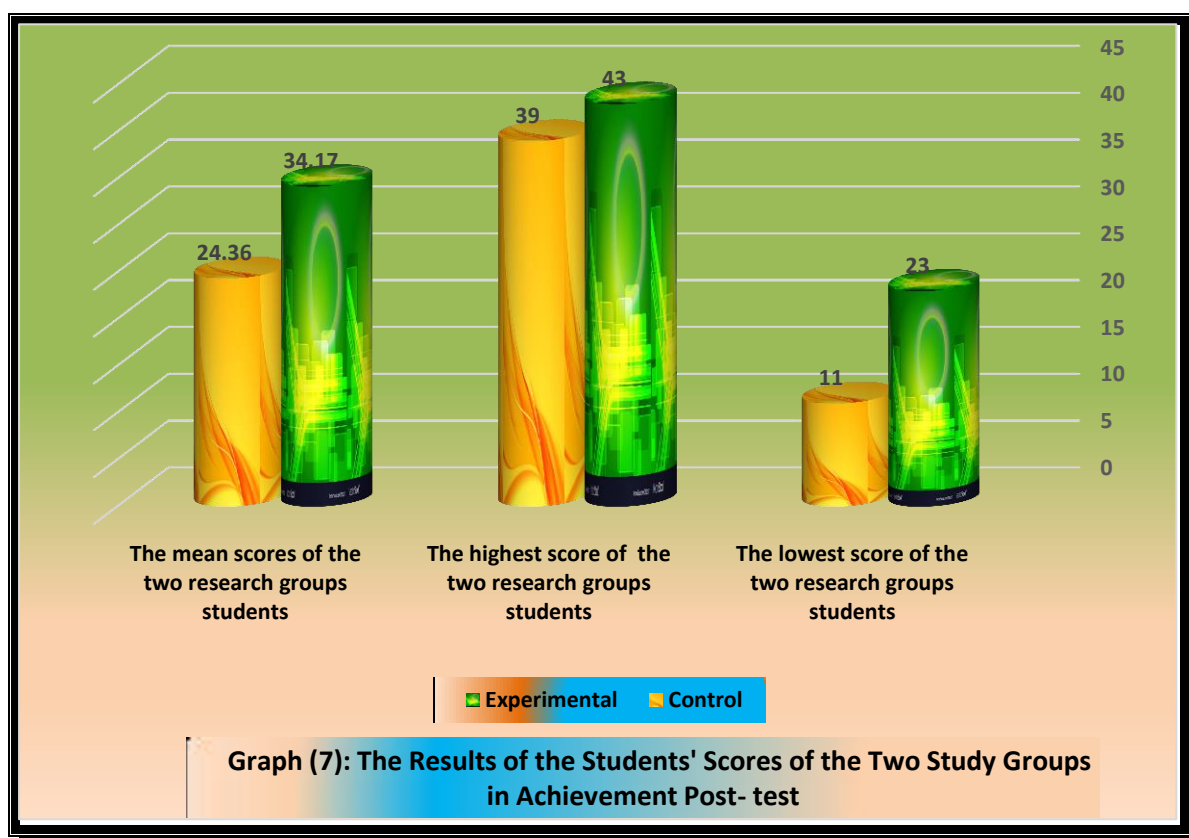
4.2.1 The results of the first null hypothesis:

1- To verify the results of the first null hypothesis which states that (there is no statistically significant difference at the level of significance (0.05) between the mean scores of the experimental group students and the mean scores of the control group students in the post-achievement test). The researcher applied the final achievement test to the students of the experimental and control groups, and after correcting the answers and analyzing them statistically, the mean, variance and standard deviation of the students of the two research groups were calculated ([See Appendix 22, p. 421](#)).

By using the t-test for two independent samples, it was shown that the mean scores of the experimental group students was (34.17) with a standard deviation (5.68), while the mean scores of the control group students was (24.35) with a standard deviation (7.48). The calculated t-value (7.05) was larger than the tabulated t-value (1.98) with a degree of freedom (89). This means that there is a statistically significant difference between the experimental group students and that of the control group students in the post-achievement test, in favor of the experimental group at the level (0.05). Thus, the null hypothesis is rejected and the alternative hypothesis is accepted. Table (22) and Graph (6) illustrate the results:

Table (22): T-test Results of the Two Research Groups in Achievement Post- test.

Group	No	Mean	Standard Deviation	t- Test Value		Degree of Freedom	Level of significance at (0.05)
				Calculated	Tabulated		
EG	46	34.17	5.68	7.05	1.98	89	statistically significant
CG	45	24.35	7.48				



It can be noticed, from table (22) and graph (7), that there is a statistically significant difference between the mean scores of the students of the two research groups in the achievement test in favor of the experimental group. This result indicates the superiority of the students of the

experimental group who were taught using ART over the students of the control group who were taught using the conventional method.

2- Calculating the effect size (the extent of effectiveness) of the independent variable on the variable dependent in academic achievement:

The researcher used the Eta square (η^2) equation to extract the effect size of the independent variable on the dependent variable, and the effect size was (0.36), which is an appropriate value to explain the effect size and by a (large) amount for the teaching variable with augmented reality technology in the achievement test in favor of the experimental group, as shown in Table (23). The researcher used Cohen's (1988) classification to determine the effect size, as shown in Table (24):

Table (23): The Effect Size of the Independent Variable (ART) on the Dependent Variable (Achievement)

Independent Variable	Dependent Variable	Value of effect size η^2	Effect Size
Augmented Reality Technology	Achievement	0.36	Large

Table (24): Effect Size and Its Values According to Cohen's Classification

Values of Effect Size (η^2)	Significance
(0.01) – (0.05)	Small
(0.06) – (0.14)	Medium
(0.14) –	Large

(Almeida et al., 2020: 4)

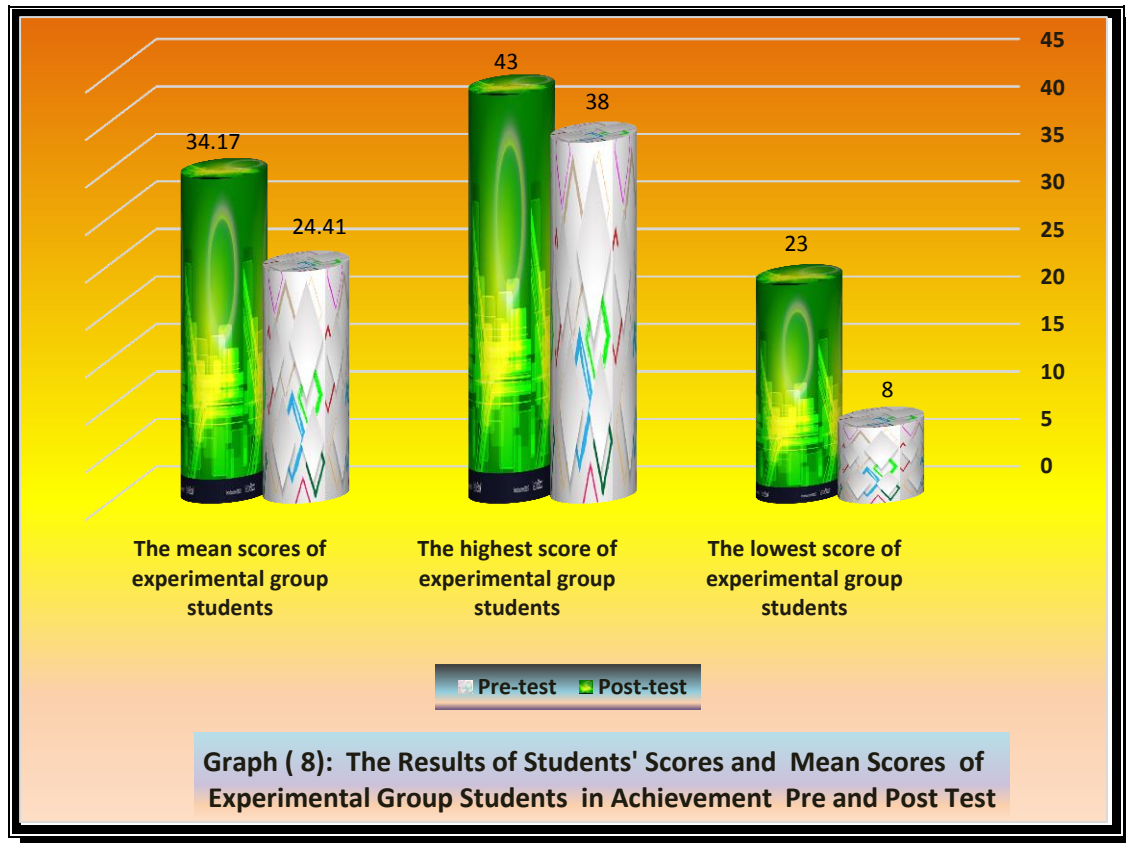
4.2.2 The results of the second null hypothesis:

1- To verify the results of the second null hypothesis, which states that (there is no statistically significant difference at the significance level (0.05) between the mean scores of the experimental group students in pre and post achievement test). The researcher applied the pre and post achievement test

to judge the students of the experimental research group. After correcting the answers and analyzing them statistically, the mean, variance and standard deviation of the students of the research group were extracted (See Appendix 23, p. 423). By using the t-test for two correlated samples, it was found that there is a statistically significant difference in favor of the post-test at the level (0.05). It appeared that the mean scores of the experimental group students in the pre visual intelligence test were (24.41) with a standard deviation (7.63), while the mean scores of the experimental group students in the post visual intelligence test reached (34.17) with a standard deviation (5.68). The calculated t-value (15.65) was larger than the tabulated t-value (2.02) with a degree of freedom (45), and this indicates the superiority of the students of the experimental group after conducting the experiment and introducing the independent variable (the instructional program based on augmented reality technology) on them. Thus, the second null hypothesis is rejected and the alternative hypothesis is accepted. Table (25) and Graph (7) illustrate the results:

Table (25): Mean Scores and T-values (Calculated and Tabulated) of the Experimental Group Students in Achievement Pre and Post Test

Group	No	Test	Mean	Standard Deviation	t- Test Value		Statistical significance	Degree of Freedom	Level of significance at (0.05)
					Calculated	Tabulated			
EG	46	Pre	24.41	7.63	15.65	2.01	0.00	45	statistically significant
		Post	34.17	5.68					



It can be noticed, from table (25) and graph (8), that there is a statistically significant difference between the mean scores of the students of the experimental research group in the pre-post achievement test in favor of the post-achievement test.

3- Calculating the effect size (the extent of effectiveness) of the independent variable on the dependent variable (pre and post achievement) of the experimental group. The researcher used Cohen's equation to extract the effect size (d) for the independent variable on the dependent variable (academic achievement), and the effect size (d) reached (2.31), a value that explains the effect size with a (large) amount of the teaching variable using augmented reality technology in developing the achievement, and Table (26) explains this. The researcher used Cohen's (1988) classification to determine the effect size, and Table (27) explains that:

Table (26): The Effect Size of the Independent Variable (ART) on the Dependent Variable (Pre and Post Achievement Test) of the Experimental Group.

Independent Variable	Dependent Variable	Value of effect size d	Effect Size
Augmented Reality Technology	Achievement	2.31	Large

Table (27): Effect Size and Its Values According to Cohen's Classification

Values of Effect Size (d)	Significance (relative size)
(0.2) – (0.4)	Small
(0.4) – (0.7)	Medium
(0.8) –	Large

(Juandi & Tamur, 2021: 4)

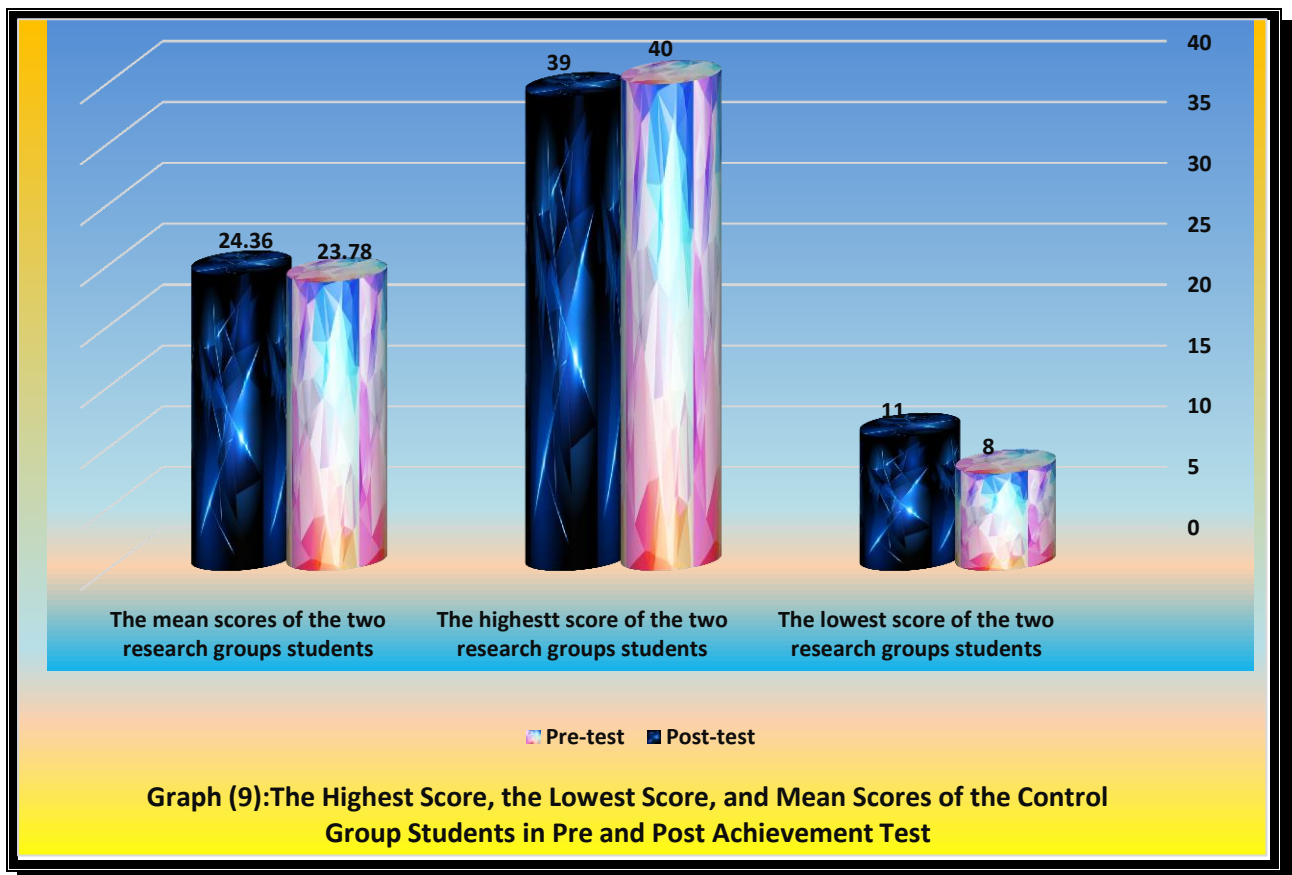
4.2.3 The results for the third null hypothesis:

1- To verify the results of the third null hypothesis, which states that (there is no statistically significant difference at the level of significance (0.05) between the mean scores of the control group students who are taught reading comprehension using the conventional method in the pre-post achievement test). The researcher applied the pre- and post- achievement test to judge the value of development in achievement on the students of the control research group. After correcting the answers and analyzing them statistically, the mean, variance and standard deviation of the students of the research group were extracted (See Appendix 24, p. 425). Using the t-test for two correlated samples, it became clear that there was no statistically significant difference at the level (0.05), as it appeared that the mean scores of the control group students in the pre-achievement test was (23.77) with a standard deviation (8.15), while the mean scores of the control group students in the post-achievement test was (24.35) with a standard deviation (7.48). The calculated t-value (1.33) was smaller than the tabulated t-value (2.01) with a degree of freedom (44). This means that there is no statistically significant difference in favor of the post-test in the control group, and this

indicates that this result does not indicate that there is a development in achievement among the students of the control group who are taught according to the conventional method. Thus, the third null hypothesis is accepted and the alternative hypothesis is rejected . Table (28) and Graph (8) illustrate this.

Table (28): The Mean and T-test value (Calculated and Tabulated) for the Scores of Control Group Students in Achievement Pre and Post test

Group	No	Test	Mean	Standard Deviation	t- Test Value		Statistical significance	Degree of Freedom	Level of significance
					Calculated	Tabulated			
CG	45	Pre	23.78	8.15	1.33	2.01	0.19	44	Not statistically significant
		Post	24.36	7.48					



It can be noted, from table (28) and graph (9), that there is no statistically significant difference between the mean scores of the students of the control group in the pre and post achievement test.

2- Calculating the effect size (the extent of effectiveness) of the independent variable on the dependent variable (for pre and post achievement) of the control group:

The researcher used Cohen's equation to extract the effect size (d) for the independent variable on the achievement dependent variable, and the value of the effect size (d) was (0.29). This value explains that the effect size is (small) for the teaching variable using the traditional method in developing the achievement variable, and Table (29) explains this. The researcher used Cohen's (1988) classification to determine the effect size.

Table (29): The Effect Size of the Independent Variable (ART) on the Dependent Variable (Pre and Post Achievement Test) of the Control Group.

Independent Variable	Dependent Variable	Value of effect size d	Effect Size (Relative size)
Conventional method	Achievement	0.29	Small

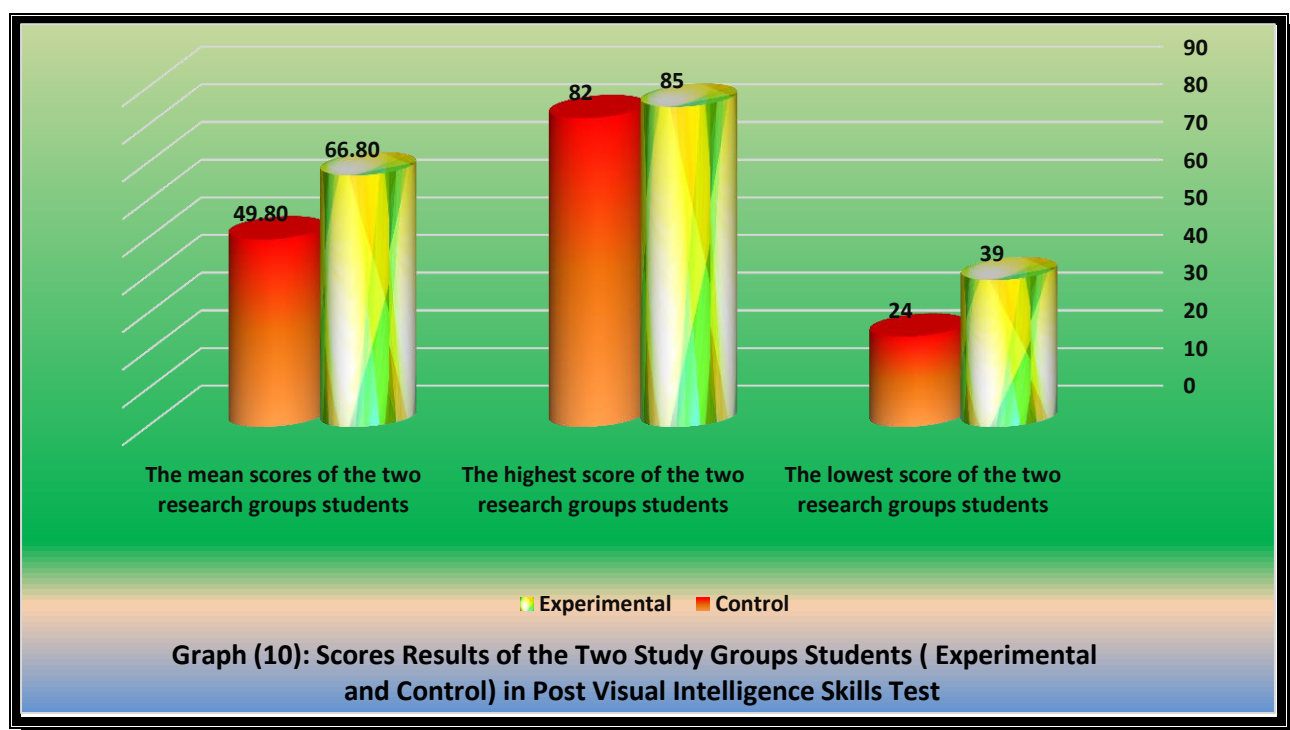
4.2.4 Results related to the fourth null hypothesis:

1- To verify the results of the fourth null hypothesis, which states that (there is no statistically significant difference at the level of significance (0.05) between the mean scores of the experimental group students who are taught reading comprehension using the instructional program based on augmented reality technology and the mean scores of the control group students who are taught the same subject using the conventional method in the post visual intelligence skills test). The researcher applied the post visual intelligence skills test to the two research groups students (experimental and control). After correcting the answers and analyzing them statistically, the mean, variance and standard deviation of the two research groups students were calculated ([Appendix 25, p.427](#)). Using the t-test for two independent samples, it was found that there is a statistically significant difference in favor of the experimental group at the level (0.05). It was appeared that the

mean scores of the experimental group students was (66.80) with a standard deviation (11.85), while the mean scores of the control group students reached (49.80) with a standard deviation (13.26), and the calculated t-value (6.45) was larger than the tabulated t-value (1.98) with a degree of freedom (89). Table (30) and Graph (9) illustrate this:

Table (30): T-test Results of the Two Study Groups in the Post-Visual Intelligence Skills Test.

Group	No	Mean	Standard Deviation	t- Test Value		Degree of Freedom	Significance	Level of significance at (0.05)
				Calculated	Tabulated			
EG	46	66.80	11.85	6.45	1.98	89	0,00	statistically significant
CG	45	49.80	13.26					



It can be noticed, from table (30) and graph (10), that there is a statistically significant difference between the mean scores of the two

research groups students in the post visual intelligence skills test in favor of the experimental group.

This result indicates the superiority of the experimental group students (who are taught according to the educational program based on augmented reality technology) on the control group students (who are taught according to the conventional method) in post visual intelligence skills test.

2- Calculating the effect size (the extent of effectiveness) of the independent variable on the dependent variable (visual intelligence):

The researcher used the Eta square equation to extract the effect size (η^2) for the independent variable on the dependent variable. The effect size (η^2) was (0.32), which is an appropriate value to explain the effect size by a amount of (large) for the teaching variable by the instructional program based on augmented reality technology in development of visual intelligence and in favor of the experimental group, as shown in Table (31). The researcher used Cohen's (1988) classification to determine the effect size.

Table (31): The Effect Size of the Independent Variable (ART) on the Dependent Variable (Visual Intelligence)

Independent Variable	Dependent Variable	Value of effect size (η^2)	Effect Size (Relative size)
Augmented reality technology	Visual intelligence skills	0.32	Large

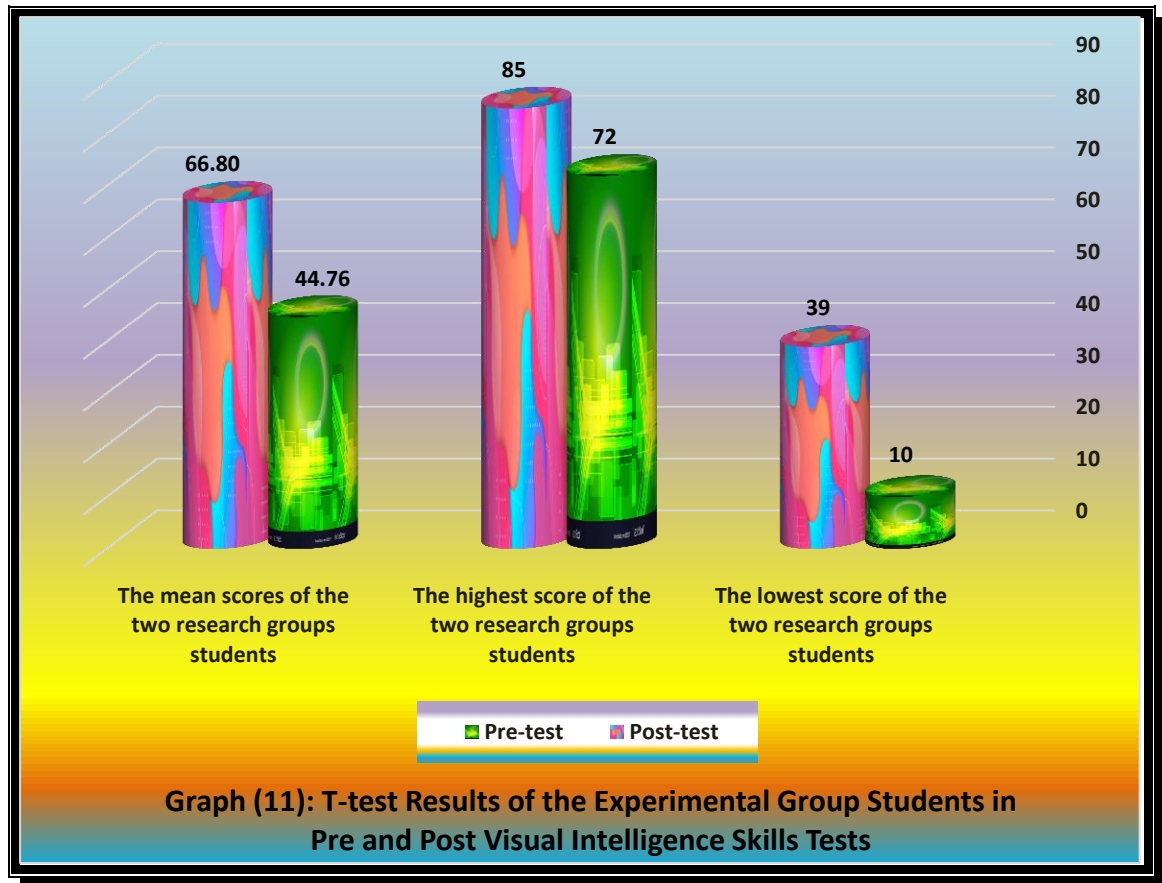
4.2.5 The results of the fifth null hypothesis:

1- To verify the results of the fifth null hypothesis, which states that (there is no statistically significant difference at the level of significance (0.05) between the mean scores of the experimental group students who are taught reading comprehension using the instructional program based on ART in the pre-post visual intelligence skills test). The researcher applied the pre and post visual intelligence skills test to judge the development in visual intelligence skills on the experimental research group students. After

correcting the answers and analyzing them statistically, the mean and standard deviation of the research group students were extracted and calculated (See Appendix 26, p. 429). Using the t-test for two correlated samples, it was found that there is a statistically significant difference in favor of the experimental group for the post-test at the level (0.05). It appeared that the mean scores of the experimental group students in the pre-skills test were (44.76) with a standard deviation (14.37), while the mean scores of the experimental groups students in the post-skills test were (66.80) with a standard deviation (11.85). The calculated t-value (22.39) was larger than the tabulated t-value (2.02) with a degree of freedom (45). This indicates a high level of development of visual intelligence skills among the experimental group students in favor of the post-test, i.e. these skills were developed among experimental group students after conducting the experiment and inserting the independent variable (the instructional program based on augmented reality technology) on them. Thus, the fifth null hypothesis is rejected and the alternative hypothesis is accepted. Table (32) and Graph (10) explain that:

Table (32): The Mean and T- test Value (Calculated and Tabulated) for the Scores of the Experimental Group Students in the Pre and Post Visual Intelligence Skills Tests

Group	No	Test	Mean	Standard Deviation	t- Test Value		Degree of Freedom	Statistical significance	Level of significance
					Calculated	Tabulated			
EG	46	Pre	44.76	14.37	22.39	2.01	45	0.00	statistically significant
		Post	66.80	11.85					



It can be noticed, from table (32) and graph (11), that there is a statistically significant difference between the mean scores of the experimental research group students in the pre-post visual intelligence skills test in favor of the post- skills test.

- 2- Calculating the effect size (the extent of effectiveness) of the independent variable on the dependent variable (pre and post visual intelligence skills test) of the experimental group students. The researcher used Cohen's equation to extract the effect size (d) for the independent variable on the dependent variable (visual intelligence skills), and the effect size (d) was (3.30), which is the value of the interpretation of the effect size with a large amount for the teaching variable using the instructional program based on augmented reality technology in developing visual intelligence skills, as shown in Table (33). The researcher used Cohen's (1988) classification to determine the effect size.

Table (33): The Effect Size of the Independent Variable (ART) on the Dependent Variable (Visual Intelligence Skills Test) of the Experimental Group

Independent Variable	Dependent Variable	Value of effect size (d)	Effect Size
Augmented reality technology	Visual intelligence skills	3.30	Large

4.2.6 The results of the sixth null hypothesis:

1- To verify the results of the sixth null hypothesis, which states that (there is no statistically significant difference at the level of significance (0.05) between the mean scores of control group students who are taught reading comprehension using the conventional method in the pre-post visual intelligence skills test). The researcher applied the pre-post skills test to judge the value of development in the visual intelligence skills on the control research group students. After correcting the answers and analyzing them statistically, the mean, variance and standard deviation of the students of the research group were extracted ([See Appendix 27, p. 431](#)).

Using the t-test for two correlated samples, it became clear that there is no statistically significant difference in favor of the control group at the level (0.05). It was appeared that the mean scores of the control group students in the pre visual intelligence test was (48.15) with a standard deviation (16.11), while the mean scores of the control group students in the post visual intelligence test was (49.80) with a standard deviation (13.26). The calculated t-value (1.45) was smaller than the tabulated t-value (2.01) with a degree of freedom (44), which means that there is no statistically significant difference between the means of the two tests in the control group. This indicates that this result does not indicate that there is a development in the visual intelligence skills of the control group students who are taught according to the conventional method. Thus, the sixth null hypothesis is accepted and the alternative hypothesis is rejected. The table (34) and graph (11) explain this:

Table (34): The Mean Scores and T- test Value (Calculated and Tabulated) for the Scores of the Control Group Students in Pre and Post Visual Intelligence Skills Tests

Group	No	Test	Mean	Standard Deviation	t- Test Value		Degree of Freedom	Statistical significance	Level of significance
					Calculated	Tabulated			
CG	45	Pre	48.16	16.11	1.45	2.01	44	0.16	Not significant
		Post	49.80	13.26					

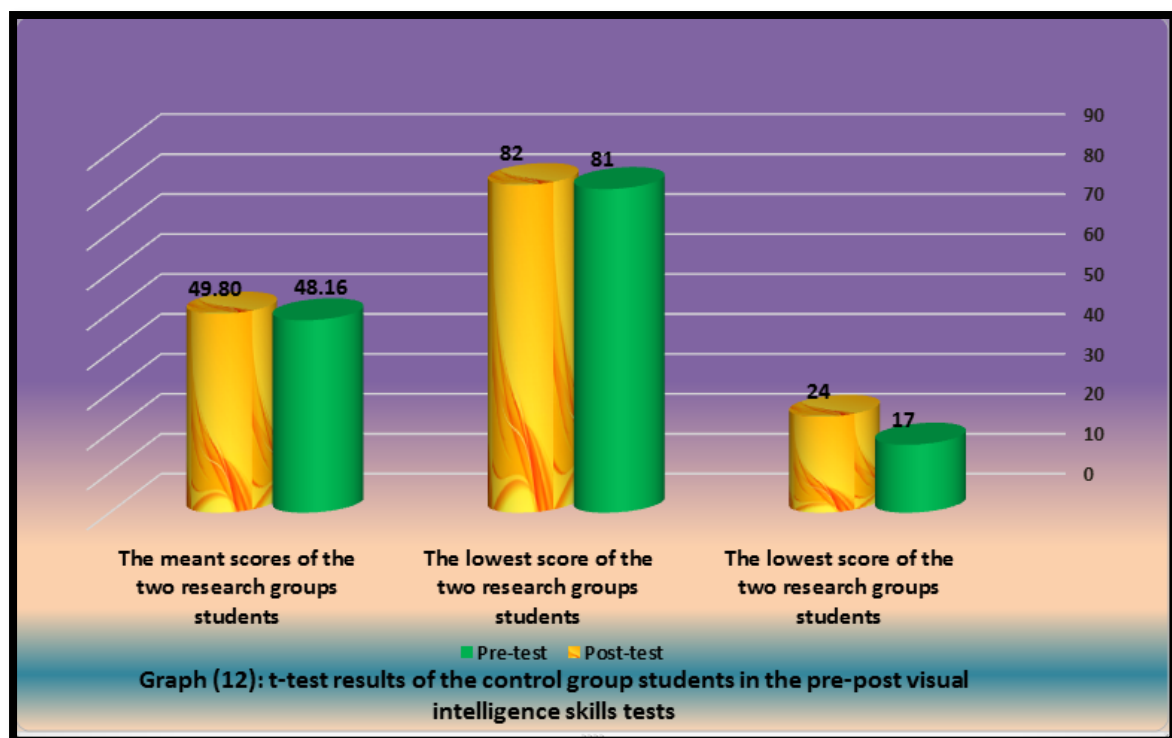


Table (34) and graph (12) show that there is no statistically significant difference between the mean scores of the control group students in the pre-post skills test.

2- Calculating the effect size (effectiveness) for the independent variable on the dependent variable (pre and post skills test) of the control group. The researcher used Cohen's equation to extract the effect size (d) for the

independent variable on the variable dependent in visual intelligence (for correlated groups). The amount of the effect size (d) reached (0.22), which is a value that explains the effect size with small amount of the variable of teaching in the conventional method on the variable of visual intelligence, and Table (35) explains this. The researcher used Cohen's (1988) classification to determine the effect size.

Table (35): The Effect Size of the Independent Variable (ART) on the Dependent Variable (Pre and Post Visual Intelligence Skills Test) of the Control Group

Independent Variable	Dependent Variable	Value of effect size (d)	Effect Size
Conventional way	Visual intelligence skills	0.22	Small

4.3 Calculating the amount of gain (Added Value) between the experimental group and control group

To find out the amount of gain (Added Value) between the experimental group and control group in the pre and post application of the achievement test and the visual intelligence skills test, the researcher uses the model of gain, or the difference between two scores, which depends on subtracting the previous score for each learner on a test of a particular subject that the learner obtained on another test in the same subject to obtain the score of gain. Then, the gain average for the two groups is calculated by adding the gain scores for all learners and dividing them by their number (Wright et. al, 2010, 2). This process was used to identify the effectiveness of using the instructional program based on ART to develop achievement and visual intelligence skills for the second stage, Department of English Language, College of Basic Education, University of Babylon. As a result, Table (36) clarifies the gain ratio (Added Value) of the experimental group using the gain amount model:

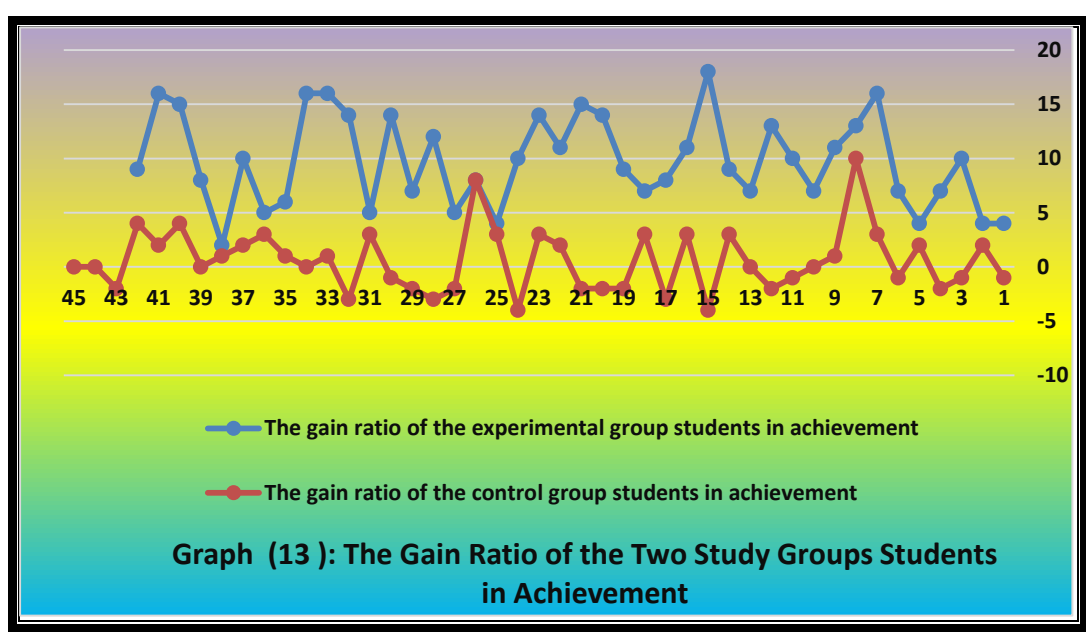
Table (36): The Gain Ratio (Added Value) of the Experimental Group and Control Group in Achievement Test and Visual Intelligence Skills Test

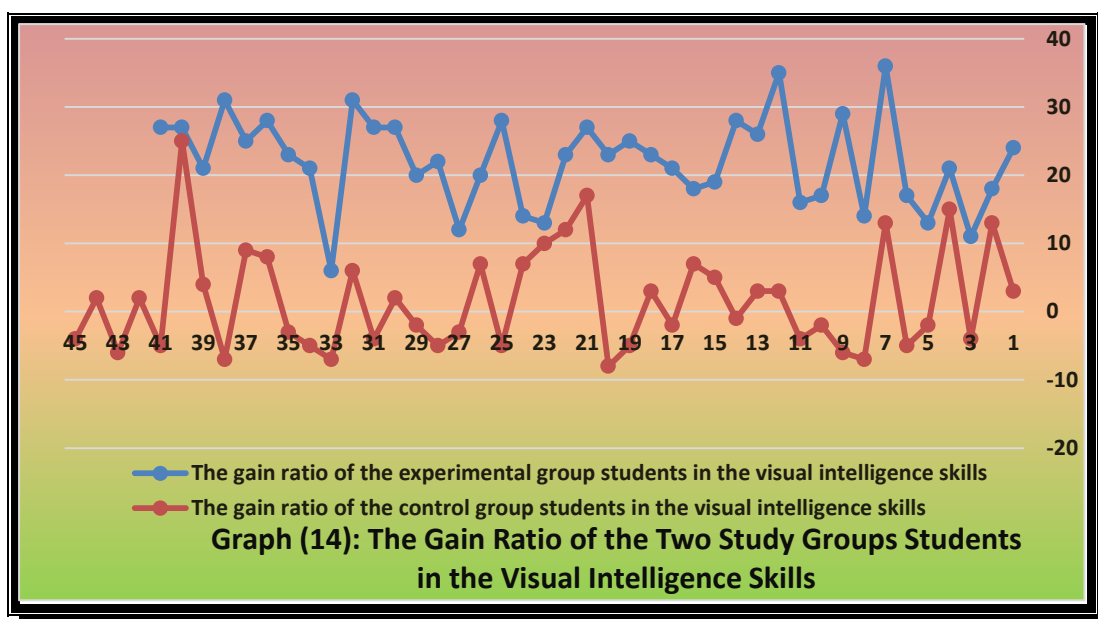
Experimental Group							Control Group					
No	Achievement Test			Visual Intelligence Skills Test			Achievement Test			Visual Intelligence Skills Test		
	Pre	Post	Gain	Pre	Post	Gain	Pre	Post	Gain	Pre	Post	Gain
1	32	36	4	55	79	24	28	27	-1	44	47	3
2	29	33	4	48	66	18	24	26	2	35	48	13
3	17	27	10	41	52	11	32	31	-1	42	38	-4
4	33	40	7	60	81	21	17	15	-2	25	40	15
5	36	40	4	57	70	13	15	17	2	46	44	-2
6	34	41	7	63	80	17	36	35	-1	64	59	-5
7	10	26	16	25	61	36	14	17	3	33	40	7
8	18	31	13	44	58	14	8	18	10	48	41	-7
9	19	30	11	36	65	29	23	24	1	41	35	-6
10	35	42	7	68	85	17	31	31	0	53	51	-2
11	25	35	10	39	55	16	23	22	-1	39	35	-4
12	10	23	13	34	69	35	24	22	-2	65	68	3
13	22	29	7	46	72	26	23	23	0	45	48	3
14	28	37	9	53	81	28	17	20	3	46	45	-1
15	8	26	18	45	64	19	19	15	-4	19	24	5
16	23	34	11	55	73	18	30	33	3	71	78	7
17	23	31	8	48	69	21	29	26	-3	60	58	-2
18	34	41	7	62	85	23	18	21	3	40	43	3
19	24	33	9	45	70	25	33	31	-2	58	53	-5
20	14	28	14	29	52	23	35	33	-2	74	66	-8
21	17	32	15	40	67	27	23	21	-2	27	44	17
22	24	35	11	54	77	23	21	23	2	17	29	12
23	22	36	14	49	62	13	35	38	3	55	65	10
24	28	38	10	44	58	14	17	13	-4	51	58	7
25	26	30	4	50	78	28	17	20	3	50	45	-5
26	20	28	8	36	56	20	10	18	8	40	47	7
27	38	43	5	72	84	12	17	15	-2	53	50	-3
28	30	42	12	58	80	22	35	32	-3	77	72	-5
29	32	39	7	55	75	20	28	26	-2	61	59	-2
30	15	29	14	32	59	27	40	39	-1	80	82	2
31	21	26	5	21	48	27	20	23	3	45	41	-4
32	23	37	14	28	59	31	19	16	-3	27	33	6
33	19	35	16	49	55	6	20	21	1	59	52	-7
34	23	39	16	18	39	21	23	23	0	44	39	-5

35	27	33	6	37	60	23	24	25	1	33	30	-3
36	19	24	5	38	66	28	17	20	3	37	45	8
37	23	33	10	43	68	25	13	15	2	30	39	9
38	26	28	2	10	41	31	33	34	1	67	60	-7
39	35	43	8	57	78	21	28	28	0	46	50	4
40	25	40	15	36	63	27	20	24	4	20	45	25
41	17	33	16	24	51	27	9	11	2	55	50	-5
42	31	40	9	56	74	18	35	39	4	58	60	2
43	22	38	16	39	63	24	20	18	-2	46	40	-6
44	15	27	12	25	59	34	29	29	0	60	62	2
45	37	41	4	65	80	15	38	38	0	81	77	-4
46	34	40	6	70	86	16						

Haridy's Simple Gain Ratio (H-SGR) was used to measure the effectiveness of the proposed instructional program for developing visual intelligence skills and the achievement of experimental group students in reading comprehension subject. This Gain Ratio is suitable for measuring the effectiveness of experimental programs and treatments in experimental educational research that depends on untimed tests to measure knowledge, mental skills, and attitudes(Haridy, 2017, 160) .

Depending on the values listed in Table (36), the researcher noted the superiority of the experimental group students in achievement test and visual intelligence skills test, as shown in Graphs (12) and (13) which represent the aspects of the two tests for the experimental group and the control group.





From the observation of Graphs (12) and (13), the actual development and growth in the performance of the experimental group students can be seen through their answers to the aspects related to the two tests due to the use of the instructional program based on ART in teaching reading comprehension for this group. This is what the added value focuses on directly in the development of student learning outcomes with their knowledge and skills, as many countries in the world have begun to develop the use of assessment methods that reflect the results in the achievement and actual growth of learners and distribute their grades according to the moderation curve. This assessment is considered an academic development for the students, considering its added value as a statistical method for examining the results derived from the tests (Braun, 2005, 25).

According to the above results, the researcher concludes that using the instructional program based on ART in teaching reading comprehension increases the proficiency of the second stage, Department of English, College of Basic Education, University of Babylon, in knowledge, comprehension and application, analysis, evaluation and creativity levels of the achievement test; and develops the visual intelligence skills of those students. These results agreed with the results of the previous studies mentioned in this study such as the study of Chen (2013), Al-Husseini (2014), Al-Omarji (2017) and Abdul Razzaq (2019), and this indicates the effectiveness of using ART in teaching different scientific subjects. Table

(37) explains the development and actual growth of the experimental research group students' visual intelligence skills:

Table (37): T-test of the Experimental Group Pre and Post Administrations Mean Scores on Visual Intelligence Skills Test on Each Category of the Skills.

Skills	Pre mean scores	Std. Deviation	Post mean scores	Std. Deviation	Df	t-test and statistical significance		
						Calculated	Tabulated	Sig.
1	2.63	1.37	3.74	1.08	45	5.489	2.01	Sig
2	3.02	2.20	5.59	1.82		6.451		Sig
3	4.39	2.23	6.28	1.89		5.989		Sig
4	2.09	1.09	3.59	0.80		8.847		Sig
5	4.54	2.01	7.13	1.82		8.217		Sig
6	2.37	1.20	3.89	0.95		8.306		Sig
7	2.13	1.34	3.83	0.90		8.055		Sig
8	2.63	1.37	3.74	1.06		5.624		Sig
9	4.05	1.56	4.72	1.61		2.863		Sig
10	2.35	1.27	3.74	0.98		6.637		Sig
11	2.52	1.31	3.65	0.97		5.062		Sig
12	2.26	1.10	3.76	1.02		7.560		Sig
13	4.61	2.32	6.13	2.33		4.202		Sig
14	5.04	2.19	7.02	1.93		6.654		Sig

The results in Table (37) indicate the following:

1- The results reflecting the first visual intelligence skill used in this study:

The results show that the mean score of the post administration of experimental group students was higher than the pre administration of the first skill on the visual intelligence skills test. The experimental group post administration mean score was (3.74) with standard deviation (1.08) while the pre administration mean score was (2.63) with standard deviation (1.37). Moreover, the t-calculated value of the difference between the mean scores of the experimental group reflecting this skill on the pre and post administrations of the visual intelligence skills test was significant at the level of (0.05) as indicated by its value (5.489) which was higher than the t-tabulated value (2.01) with a degree of freedom (45). This actual growth and

development are attributed to the use of the proposed instructional program based on ART .

2- The results reflecting the second visual intelligence skill used in this study:

The results show that the mean score of the post administration of experimental group students was higher than the pre administration of the second skill on the visual intelligence skills test. The experimental group post administration mean score was (5.59) with standard deviation (1.82) while the pre administration mean score was (3.02) with standard deviation (2.20). Furthermore, the t-calculated value of the difference between the mean scores of the experimental group reflecting this skill on the pre and post administrations of the visual intelligence skills test was significant at the level of (0.05) as indicated by its value (6.451) which was higher than the t-tabulated value (2.01) with a degree of freedom (45). This actual growth and development are attributed to the use of the proposed instructional program based on ART .

3- The results reflecting the third visual intelligence skill used in this study:

The results show that the mean score of the post administration of experimental group students was higher than the pre administration of the third skill on the visual intelligence skills test. The experimental group post administration mean score was (6.28) with standard deviation (1.89) while the pre administration mean score was (4.39) with standard deviation (2.23). Moreover, the t-calculated value of the difference between the mean scores of the experimental group reflecting this skill on the pre and post administrations of the visual intelligence skills test was significant at the level of (0.05) as indicated by its value (5.989) which was higher than the t-tabulated value (2.01) with a degree of freedom (45). This actual growth and development are attributed to the use of the proposed instructional program based on ART .

4- The results reflecting the fourth visual intelligence skill used in this study:

The results show that the mean score of the post administration of experimental group students was higher than the pre administration of the

fourth skill on the visual intelligence skills test. The experimental group post administration mean score was (3.59) with standard deviation (0.80) while the pre administration mean score was (2.09) with standard deviation (1.09). Moreover, the t-calculated value of the difference between the mean scores of the experimental group reflecting this skill on the pre and post administrations of the visual intelligence skills test was significant at the level of (0.05) as indicated by its value (8.847) which was higher than the t-tabulated value (2.01) with a degree of freedom (45). This actual growth and development are attributed to the use of the proposed instructional program based on ART .

5- The results reflecting the fifth visual intelligence skill used in this study:

The results show that the mean score of the post administration of experimental group students was higher than the pre administration of the fifth skill on the visual intelligence skills test. The experimental group post administration mean score was (7.13) with standard deviation (1.82) while the pre administration mean score was (4.54) with standard deviation (2.01). Besides, the t-calculated value of the difference between the mean scores of the experimental group reflecting this skill on the pre and post administrations of the visual intelligence skills test was significant at the level of (0.05) as indicated by its value (8.217) which was higher than the t-tabulated value (2.01) with a degree of freedom (45). This actual growth and development are attributed to the use of the proposed instructional program based on ART .

6- The results reflecting the sixth visual intelligence skill used in this study:

The results show that the mean score of the post administration of experimental group students was higher than the pre administration of the sixth skill on the visual intelligence skills test. The experimental group post administration mean score was (3.89) with standard deviation (0.95) while the pre administration mean score was (2.37) with standard deviation (1.20). In addition, the t-calculated value of the difference between the mean scores of the experimental group reflecting this skill on the pre and post administrations of the visual intelligence skills test was significant at the level of (0.05) as indicated by its value (8.306) which was higher than the t-

tabulated value (**2.01**) with a degree of freedom (45). This actual growth and development are attributed to the use of the proposed instructional program based on ART .

7- The results reflecting the seventh visual intelligence skill used in this study:

The results show that the mean score of the post administration of experimental group students was higher than the pre administration of the seventh skill on the visual intelligence skills test. The experimental group post administration mean score was (**3.83**) with standard deviation (**0.90**) while the pre administration mean score was (**2.13**) with standard deviation (**1.34**). Additionally, the t-calculated value of the difference between the mean scores of the experimental group reflecting this skill on the pre and post administrations of the visual intelligence skills test was significant at the level of (0.05) as indicated by its value (**8.055**) which was higher than the t-tabulated value (**2.01**) with a degree of freedom (45). This actual growth and development are attributed to the use of the proposed instructional program based on ART.

8- The results reflecting the eighth visual intelligence skill used in this study:

The results show that the mean score of the post administration of experimental group students was higher than the pre administration of the eighth skill on the visual intelligence skills test. The experimental group post administration mean score was (**3.74**) with standard deviation (**1.06**) while the pre administration mean score was (**2.63**) with standard deviation (**1.37**). Moreover, the t-calculated value of the difference between the mean scores of the experimental group reflecting this skill on the pre and post administrations of the visual intelligence skills test was significant at the level of (0.05) as indicated by its value (**5.624**) which was higher than the t-tabulated value (**2.01**) with a degree of freedom (45). This actual growth and development are attributed to the use of the proposed instructional program based on ART.

9- The results reflecting the ninth visual intelligence skill used in this study:

The results show that the mean score of the post administration of experimental group students was higher than the pre administration of the ninth skill on the visual intelligence skills test. The experimental group post administration mean score was (4.72) with standard deviation (1.61) while the pre administration mean score was (4.05) with standard deviation (1.56). Along with, the t-calculated value of the difference between the mean scores of the experimental group reflecting this skill on the pre and post administrations of the visual intelligence skills test was significant at the level of (0.05) as indicated by its value (2.863) which was higher than the t-tabulated value (2.01) with a degree of freedom (45). This actual growth and development are attributed to the use of the proposed instructional program based on ART .

10- The results reflecting the tenth visual intelligence skill used in this study:

The results show that the mean score of the post administration of experimental group students was higher than the pre administration of the tenth skill on the visual intelligence skills test. The experimental group post administration mean score was (3.74) with standard deviation (0.98) while the pre administration mean score was (2.35) with standard deviation (1.27). Besides that, the t-calculated value of the difference between the mean scores of the experimental group reflecting this skill on the pre and post administrations of the visual intelligence skills test was significant at the level of (0.05) as indicated by its value (6.637) which was higher than the t-tabulated value (2.01) with a degree of freedom (45). This actual growth and development are attributed to the use of the proposed instructional program based on ART .

11- The results reflecting the eleventh visual intelligence skill used in this study:

The results show that the mean score of the post administration of experimental group students was higher than the pre administration of the eleventh skill on the visual intelligence skills test. The experimental group post administration mean score was (3.65) with standard deviation (0.97) while the pre administration mean score was (2.52) with standard deviation

(1.31). Furthermore, the t-calculated value of the difference between the mean scores of the experimental group reflecting this skill on the pre and post administrations of the visual intelligence skills test was significant at the level of (0.05) as indicated by its value (5.062) which was higher than the t-tabulated value (2.01) with a degree of freedom (45). This actual growth and development are attributed to the use of the proposed instructional program based on ART .

12- The results reflecting the twelfth visual intelligence skill used in this study:

The results show that the mean score of the post administration of experimental group students was higher than the pre administration of the twelfth skill on the visual intelligence skills test. The experimental group post administration mean score was (3.76) with standard deviation (1.02) while the pre administration mean score was (2.26) with standard deviation (1.10). Moreover, the t-calculated value of the difference between the mean scores of the experimental group reflecting this skill on the pre and post administrations of the visual intelligence skills test was significant at the level of (0.05) as indicated by its value (7.560) which was higher than the t-tabulated value (2.01) with a degree of freedom (45). This actual growth and development are attributed to the use of the proposed instructional program based on ART.

13- The results reflecting the thirteenth visual intelligence skill used in this study:

The results show that the mean score of the post administration of experimental group students was higher than the pre administration of the thirteenth skill on the visual intelligence skills test. The experimental group post administration mean score was (6.13) with standard deviation (2.33) while the pre administration mean score was (4.61) with standard deviation (2.32). Additionally, the t-calculated value of the difference between the mean scores of the experimental group reflecting this skill on the pre and post administrations of the visual intelligence skills test was significant at the level of (0.05) as indicated by its value (4.202) which was higher than the t-tabulated value (2.01) with a degree of freedom (45). This actual growth and development are attributed to the use of the proposed instructional program based on ART.

14- The results reflecting the fourteenth visual intelligence skill used in this study:

The results show that the mean score of the post administration of experimental group students was higher than the pre administration of the fourteenth skill on the visual intelligence skills test. The experimental group post administration mean score was (7.02) with standard deviation (1.93) while the pre administration mean score was (5.04) with standard deviation (2.19). Besides that, the t-calculated value of the difference between the mean scores of the experimental group reflecting this skill on the pre and post administrations of the visual intelligence skills test was significant at the level of (0.05) as indicated by its value (6.654) which was higher than the t-tabulated value (2.01) with a degree of freedom (45). This actual growth and development are attributed to the use of the proposed instructional program based on ART.

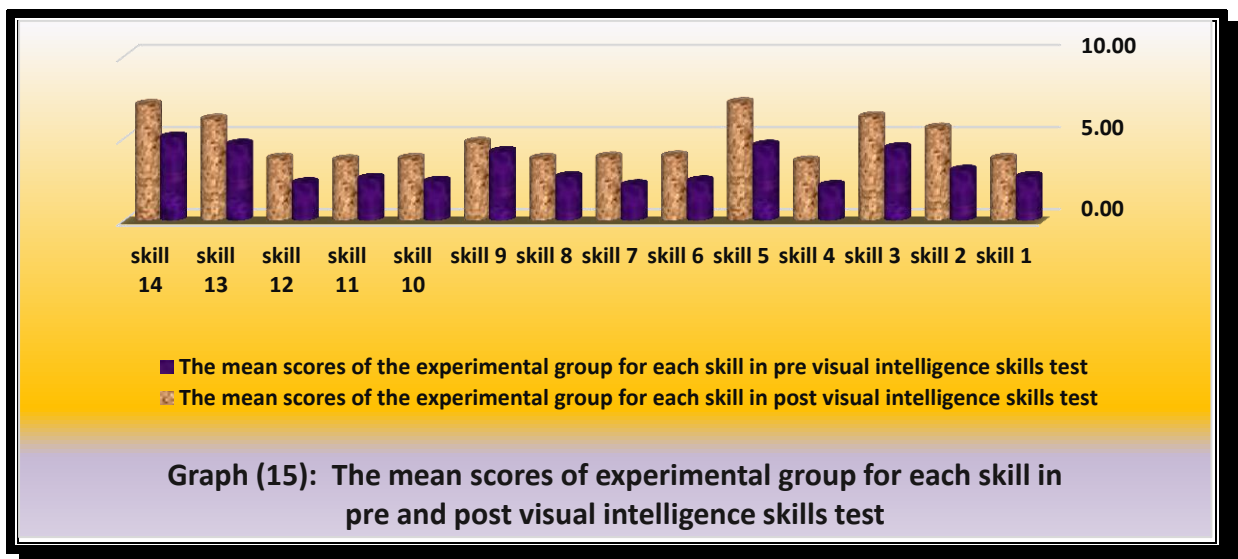


Table (38): The Gain Ratio (Added Value) and the Effect Size of the Experimental Group for Each Skill in Pre and Post Visual Intelligence Skills Tests

Skills	Mean scores of Pre-test	Mean scores of Post-test	Gain ratio	Value of effect size	Relative size
5	4.54	7.13	2.59	1.21	Large
2	3.02	5.59	2.57	0.95	Large
14	5.04	7.02	1.98	0.98	Large
3	4.39	6.28	1.89	0.88	Large
7	2.13	3.83	1.70	1.19	Large

6	2.37	3.89	1.52	1.22	Large
13	4.61	6.13	1.52	0.62	Medium
4	2.09	3.59	1.50	1.30	Large
12	2.26	3.76	1.50	1.11	Large
10	2.35	3.74	1.39	0.98	Large
11	2.52	3.65	1.13	0.75	Medium
1	2.63	3.74	1.11	0.81	Large
8	2.63	3.74	1.11	0.83	Large
9	4.05	4.72	0.67	0.42	Medium

Table (38) shows that the highest gain ratio was for the skill number 5 with a gain value of (2.59) and a large effect size (1.21), and the lowest gain ratio was for skill number 9 with a value of (0.67), and a medium effect size (0.42).

It is clear from the above table that there was a development in the amount of a large effect size of skills (1, 2, 3, 4, 5, 6, 7, 8, 10, 12, and 14), where the values of the effect size ranged between (0.81 – 1.30), and there was also a development in the amount of a medium effect size of skills (9, 11 and 13), where the values of the effect size ranged between (0.42 – 0.75). These results showed the effectiveness of the proposed educational program based on augmented reality technology in developing the visual intelligence skills of the experimental group students.

The results in table (38) indicates the following:

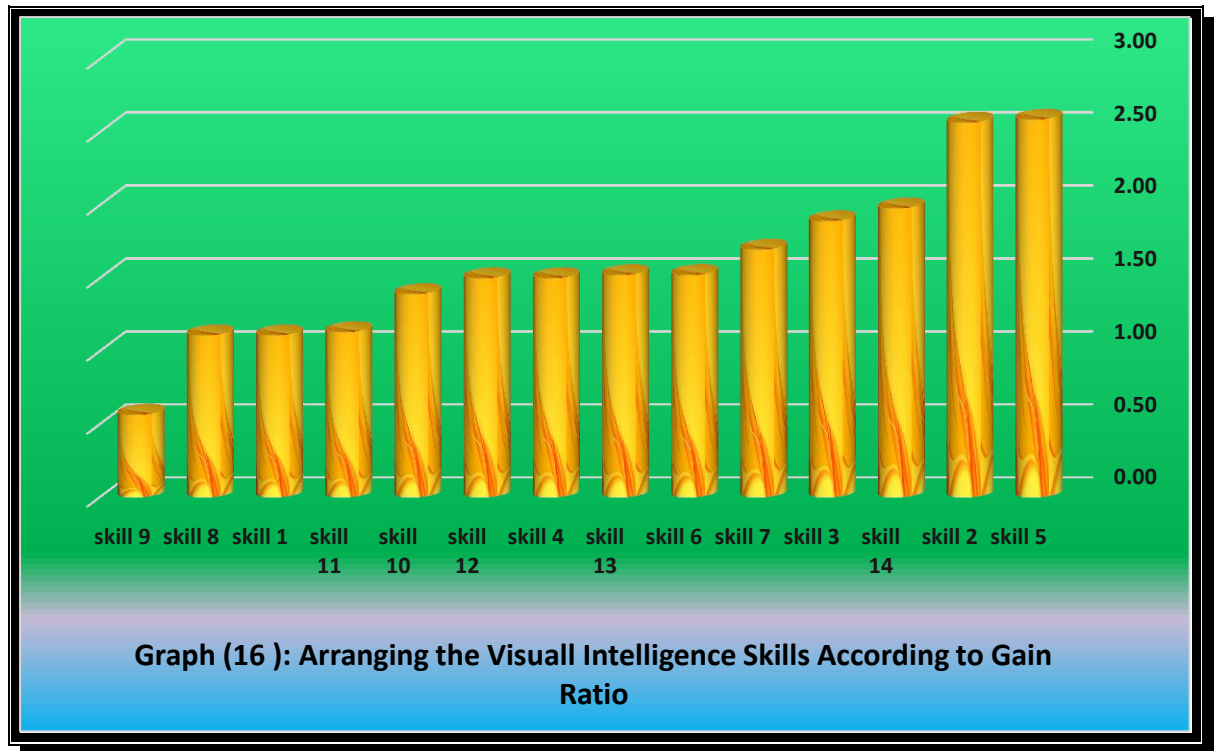
The values of gain of visual intelligence skills were, according to its availability, in the following order:

1. The gain ratio of the fifth skill was **(2.59)** with a large effect size which means that **(1.21)** of the relative extent of change in the level of visual intelligence skills (the dependent variable) is attributed to the use of the proposed instructional program based on ART (the independent variable) and it showed that the effect size of the independent variable was large.
2. The gain ratio of the second skill was **(2.57)** with a large effect size which means that **(0.95)** of the relative extent of change in the level of visual intelligence skills (the dependent variable) is attributed to the use of the proposed instructional program based on ART (the independent variable) and it showed that the effect size of the independent variable was large.

3. The gain ratio of the fourteenth skill was **(1.98)** with a large effect size which means that **(0.98)** of the relative extent of change in the level of visual intelligence skills (the dependent variable) is attributed to the use of the proposed instructional program based on ART (the independent variable) and it showed that the effect size of the independent variable was large.
4. The gain ratio of the third skill was **(1.89)** with a large effect size which means that **(0.88)** of the relative extent of change in the level of visual intelligence skills (the dependent variable) is attributed to the use of the proposed instructional program based on ART (the independent variable) and it showed that the effect size of the independent variable was large.
5. The gain ratio of the seventh skill was **(1.70)** with a large effect size which means that **(1.19)** of the relative extent of change in the level of visual intelligence skills (the dependent variable) is attributed to the use of the proposed instructional program based on ART (the independent variable) and it showed that the effect size of the independent variable was large.
6. The gain ratio of the sixth skill was **(1.52)** with a large effect size which means that **(1.22)** of the relative extent of change in the level of visual intelligence skills (the dependent variable) is attributed to the use of the proposed instructional program based on ART (the independent variable) and it showed that the effect size of the independent variable was large.
7. The gain ratio of the thirteenth skill was **(1.52)** with a medium effect size which means that **(0.62)** of the relative extent of change in the level of visual intelligence skills (the dependent variable) is attributed to the use of the proposed instructional program based on ART (the independent variable) and it showed that the effect size of the independent variable was medium.
8. The gain ratio of the fourth skill was **(1.50)** with a large effect size which means that **(1.30)** of the relative extent of change in the level of visual intelligence skills (the dependent variable) is attributed to the use of the proposed instructional program based on ART (the independent variable) and it showed that the effect size of the independent variable was large.
9. The gain ratio of the twelfth skill was **(1.50)** with a large effect size which means that **(1.11)** of the relative extent of change in the level of visual intelligence skills (the dependent variable) is attributed to the use of the proposed instructional program based on ART (the independent

variable) and it showed that the effect size of the independent variable was large.

10. The gain ratio of the tenth skill was **(1.39)** with a large effect size which means that **(0.98)** of the relative extent of change in the level of visual intelligence skills (the dependent variable) is attributed to the use of the proposed instructional program based on ART (the independent variable) and it showed that the effect size of the independent variable was large.
11. The gain ratio of the eleventh skill was **(1.13)** with a medium effect size which means that **(0.75)** of the relative extent of change in the level of visual intelligence skills (the dependent variable) is attributed to the use of the proposed instructional program based on ART (the independent variable) and it showed that the effect size of the independent variable was medium.
12. The gain ratio of the first skill was **(1.11)** with a large effect size which means that **(0.81)** of the relative extent of change in the level of visual intelligence skills (the dependent variable) is attributed to the use of the proposed instructional program based on ART (the independent variable) and it showed that the effect size of the independent variable was large.
13. The gain ratio of the eighth skill was **(1.11)** with a large effect size which means that **(0.83)** of the relative extent of change in the level of visual intelligence skills (the dependent variable) is attributed to the use of the proposed instructional program based on ART (the independent variable) and it showed that the effect size of the independent variable was large.
14. The gain ratio of the ninth skill was **(0.67)** with a medium effect size which means that **(0.42)** of the relative extent of change in the level of visual intelligence skills (the dependent variable) is attributed to the use of the proposed instructional program based on ART (the independent variable) and it showed that the effect size of the independent variable was medium.



4.4 Discussion of Results

The statistical analysis presented earlier , resulted in verifying all the hypotheses of the study. It also achieved the main aim of this study, which was to develop academic achievement and visual intelligence skills for 2nd stage university students through the implementation of the proposed instructional program based on ART.

The use of ART has helped the students to play a positive role in acquiring knowledge and developing their abilities to understand and analyze information, whether in academic achievement or visual intelligence skills. It also provided the students with the opportunity to understand the topics of reading comprehension in a deeper way, which helped the students to improve their levels of knowledge and develop their visual skills and abilities to employ this information in new educational situations.

The researcher attributes the previous results to the applications of ART used in the present study (QR Codes Reader and EyeJack Creator) which have great capabilities in displaying the content of reading comprehension and clarifying it in the form of a video, an animation, an audio, an image or a text. This increases the students' motivation towards learning and the knowledge retention on students who are taught with ART. The students feel happy and satisfied when using these applications, which they improve their attitudes towards learning with ART, and lead to a greater interaction among

the students with these applications than the textbook, which has an impact on increasing academic achievement. This result is consistent with the results of the following studies: Pérez-López and Contero (2013), Solak and Cakır (2015), and Chen et al. (2017).

During the implementation of the program, it is realized that the students seek to find an alternative learning methods to use them instead of the rigid learning methods which are boring. The researcher also attributes this result to the fact that the students always try to stay away from learning by traditional methods that make his/her to feel bored and reduce his/her learning motivation. Thus, the applications of ART impose strongly in attracting the attention of students through the element of suspense in the process of displaying the educational material, which in turn increases students' motivation to learn, and increases interaction, and this contributes to the development of visual intelligence as shown in the results of visual intelligence test.

The results of this study revealed that using the proposed instructional program based on ART, had a large effect on developing the experimental group students' academic achievement . This result is consistent with the results of the following studies: AL-Husseini, (2014); Küçük et al., 2014; Solak and Cakır (2015), AL-Omarji (2017), and Turan et al. (2018).

The results also showed that using the proposed instructional program based on ART, had large effect on developing the experimental group students' visual intelligence skills. This result is consistent with many previous studies that indicated that ART was effective in developing various students' skills and ability to read, write and engage in their own learning, such as the study of Silva et al. (2013) and the study of Abdul Razzaq (2019).

It was noted from comparing the mean scores of the experimental group and the control group that the progress accomplished by the experimental group in the necessary visual intelligence skills was higher than the control group students on the post administration of the visual intelligence test and the attitude scale. In other words, after the implementation of the proposed instructional program, the experimental group students achieved significant progress and development in their visual intelligence skills. This progress could be attributed to numerous factors among which were the following:

1. The use of technology and applications based on effective activation of classroom and extra-curricular reading comprehension activities, for

example: the use of digital electronic content designed on Google sites, which increases reading comprehension. It includes an organized method of presenting the material and provides the evaluation and reinforcement required to master this scientific material.

2. The use of electronic guided investigation outweighs human investigation in developing visual intelligence, because the ART applications used in this study enrich texts with realism that contain a set of images, videos as well as the visual activities that are based on (story map, graphic organizers, charts and diagrams). Learners self-integrate with these applications and, thus, they can acquire different visual skills (such as visual prediction skill and visual comparison skill) and connect them with their past and current experiences.
3. The researcher's use of diverse and effective teaching strategies and methods, such as reciprocal teaching, blended learning, flipped classroom, and visual strategies in teaching the prescribed reading comprehension subject, increased the efforts and practices in developing visual intelligence skills and academic achievement for second-year students.
4. The researcher's respect of diversity and differences in the students' levels of intelligence and thinking, individual differences, diverse viewpoints, and openness to new ideas, played a vital role in developing students' interest towards learning with ART.
5. Encouraging the experimental group students to freely express their opinions, discuss their views, and encourage them to participate and make decisions.
6. The researcher accepted the students' ideas and he played the role of a leader, guide, friend and mentor. When the instructor accepts the students' ideas, he builds a classroom environment free of threat, and invites students to participate and not hesitate to express their opinions.
7. Giving a positive feedback when the experimental group students practice the learning with ART applications to increase their self-confidence, through positive evaluation and avoidance of negative and offensive comments.
8. The great capabilities provided by ART in learning reading comprehension, encouraged the experimental group students to pay attention to it and try to take advantage of it in making their learning more interactive and realistic, to create an augmented environment that

can be employed in teaching the reading comprehension book, and transformed into a vibrant interactive book by pointing a smartphone camera on it.

9. Using different interaction patterns such as group work and pair work among students. They were permitted to participate in the discussion freely without being shy. This aided greatly in improving their academic achievement and visual intelligence skills.
10. Taking into account the adequate time for the learning process in line with the individual differences of students.
11. Adopting different assessment tools in line with the requirements of learning with augmented reality technology.
12. By integrating ART applications into the real learner's environment, it allowed learners to practice educational and enrichment activities that provide an interesting environment supported by the elements of movement, visual interaction and discussion, which led to the ease of learning the skills provided to them and thus improving their skilled performance.
13. The effective role of integrating ART into the real learner's environment to motivate, entice and increase students' involvement in the learning process, in addition to their passion for using smart devices within the learning environment and linking them to the scientific content of reading comprehension course that is provided to them, had an impact on learning effectively and improving students' visual intelligence skills.

The study results presented in this chapter revealed that developing visual intelligence skills and academic achievement by using the proposed instructional program based on ART had a large effect.

CHAPTER FIVE

CONCLUSIONS, RECOMMENDATIONS AND SUGGESTIONS FOR FURTHER STUDIES

5.1 An Introductory Note

This chapter includes a presentation of the conclusions, recommendations and suggestions for further studies according to the aims and hypotheses of the current study.

5.2 Conclusions

In light of the results reached by the researcher in this study, the following conclusions can be drawn:

1. ART can be employed through an instructional program to develop students' visual intelligence skills and academic achievement. The experimental group showed better performance than the control group in developing visual intelligence skills and academic achievement after being exposed to the instructional program.
2. Visual intelligence skills have advantage in stimulating students' minds, as it keeps them away from negativity and boredom resulting from stereotypical or traditional methods of teaching.
3. The design of the instructional program contributed to give the lesson a good role in reorganizing the content away from randomness and commensurate with the achievement of educational goals.
4. Students' understanding and acceptance of ART helped them comprehended RC topics.
5. Students' commitment to the researcher's instructions of teaching and learning with two ART applications (QR Codes Reader and EyeJack Creator) played a prominent role in the growth of their visual intelligence skills and academic achievement, and this is evidenced by the improvement of the experimental group performance in the post-test.
6. The AR applications used in this study have contained the animated images and live videos, which led to the interaction of the experimental group students and their quest to understand the selected story or text, which contributed to the high level of development of visual intelligence skills and academic achievement.

7. The association of the two ART applications (QR Codes Reader and EyeJack Creator) with searching for information and events of the seven stories in reading comprehension textbook, led the students of the experimental group to use multiple sources of knowledge via the Internet, which contributed to a high level of their information search skills .
8. The traditional method of teaching reading comprehension no longer achieves satisfactory results on the level of achievement of second stage students, if compared to the results of modern technologies in teaching.
9. The two ART applications used in teaching reading comprehension topics are closely related to touch screens and image recognition technologies, and this makes learning contexts appropriate to the needs of the second stage students by displaying clear texts, images, videos, or audio recordings. All of which contributed to increase students' motivation towards the learning process.

Besides that, among the most important benefits of ART in education, the researcher can add some:

- a. ART has the potential to replace paper textbooks, physical models, posters, and printed guides with portable and less expensive learning materials, and as a result, education becomes easier i.e., ART is accessible to everyone and allows the instructors to carry out different types of experiments using easily available as well as user-friendly types of technological equipment such as laptops or mobile devices.
- b. The use of ART has effective improvement of learner's visual skills. ART is a tool that explains material well by visualization and overcoming realistic barriers.
- c. Improve students' enthusiasm, enhance the teaching effect and increase the interest of learning. ART-based learning environments can motivate students to learn more deeply. ART allows students not only to acquire experiences but also to learn –through understanding– how the concepts acquired in the classroom can be applied to solve problems in real world situations. Within such contexts, ART helps students obtain a deeper appreciation of learning by relating the different learning contents to their own experiences.
- d. No special equipments are required: Unlike VR, AR does not require any expensive hardware, and most of learners currently own a smartphone, so ART is immediately available for use by the majority of the target audience. Students can directly and naturally interact with

virtual objects through the manipulation of real objects –and without needing to utilize sophisticated, costly devices.

- e.** In regard to students' participation in the lesson, interactive ART-based learning can have a huge positive effect on students, it keeps them engaged throughout the lesson and makes learning fun and effortless. The ART-based learning environment give learners opportunity to naturally interact with the scientific material. As shown by some research works such as Küçük et al. (2014) and Pozharina (2019), students interact with AR objects during the sessions, they show a high participation level, and also achieve a high degree of satisfaction with regard to the materials used, the chance to receive information in different formats, and the feeling that they have control over the activity.
- f.** Improve collaboration skills: Teaching in this format breaks the deadlock in the classical ways of teaching and promotes interaction, as the students participate in the learning process, which leads to improve teamwork skills.
- g.** Increase the effectiveness of the educational process: ART helps students to achieve better results through visualization and full immersion in scientific content, as it is known that “one picture can be worth a thousand words”, instead of theoretical reading, students can see it with their own eyes as if they are part of reality.
- h.** Increased learning activity: In education, ART apps cover the various lapses in educational technology. The interactive models provide grants students access to learning activities. These models enhance and improve educational and learning interactive activities for students.
- i.** Attractive learning experience: The famous Chinese proverb says: “Tell me and I forget, show me and I remember, discuss (involve) me, I understand (learn).” Therefore, participatory education is one of the most effective ways of learning, as information is transferred from short-term memory to long-term memory. This requires students to rely on the methodology of discussion and participation rather than just listening and receiving.
- j.** ART can allow students more freedom and independence when it comes to explore topics. In a textbook, students read or listen, while in learning with ART, they explore the knowledge on their own.

- k. Moreover, it can be concluded, by using some of the visual intelligence activities and strategies in learning process, that the second stage students' improvement is most noticed in the following areas:
- **Saving Information:** When information is displayed and taught to students visually, they retain it better and are able to recover and access it more readily.
 - **Reading Comprehension:** Using visual activities such as graphic organizers, story maps, and Venn diagrams, can help improve students' reading comprehension.
 - **Student's Achievement:** Visual activities can increase students' enthusiasm to study as well as offer them with a variety of learning sources. The importance of these activities is reinforced by the fact that they offer students with feedback, allowing them to track their progress and seek to improve their achievement.

5.3 Recommendations

In light of the results of the current study and its conclusions, the researcher recommends the following:

1. Adopting the current program based on ART in teaching reading comprehension course at Colleges of Basic Education.
2. Organizing training courses for instructors of reading comprehension and other study courses to train them to prepare instructional programs related to the curriculum and the strategies used in developing visual intelligence skills so that they can develop these skills among their students. Training the instructors to produce and design their lesson plans using this technology in teaching the content, to move from a culture of memorization to a culture of creativity and innovation. This leads us to prepare educational courses and workshops for instructors about teaching with ART, its latest applications and importance in education. Moreover, introducing ART and its remedial methods within the programs of preparing and rehabilitating the educators.
3. Providing the technological infrastructure in the classrooms, which contributes to teach curricula through technology and developing students' skills.

4. Integrating technology in textbooks and curricula in accordance with ART, i.e., introducing ART to school and university courses, and motivating students to use ART in their presentations.
5. Encouraging instructors to use ART in different academic subjects because of its impact on increasing visual intelligence and academic achievement.
6. Enhancing the opportunity for students to deal with modern technologies in education, including ART, and removing the barrier of fear to deal with such technologies.
7. Additionally, the researcher suggests the following recommendations and ways to overcome the challenges and obstacles of ART in education:
 - Educating teachers and students with ART and informing them of its importance in facilitating teaching and learning processes.
 - Converting the textbook from a boring book to another full of vividness that includes videos, audios, interactive texts, animations and three-dimensional images (interactive book).
 - In order to overcome the financial problems, ART can be employed through computers and with free programs that support this technology instead of expensive tablets.
 - Creating and providing digital instructional content for learners of all ages.
 - Educating the learners with modern technologies that support the educational process in order to eradicate technological illiteracy.
8. In the light of all that has been explained above, the researcher can suggest some visual intelligence skills to facilitate learners' understanding of reading comprehension topics, enhance their visual abilities in distinguishing information and ideas represented visually, and encourage them to use their intellectual abilities. The following are some of these skills:
 - ***Mental visualization skill:*** It is the ability to receive images and think about them, as well as the ability to transfer visual and spatial ideas from memory to construct meaning; in other words, students can construct mental images when reading a text by using prior knowledge and background experiences. Students learn how to build mental pictures while reading through guided visualization.

- **Visual description skill:** It is the ability to reformulate the elements and components of a visual form (picture or illustration) from a visual language to an equivalent spoken or written language.
 - **Visual comparison skill:** It is the ability to identify similarities and differences in the events of two stories or texts, expressed in pictures or illustrations, in light of certain criteria such as main idea, conflict, viewpoint, plot, length, theme, writer's purpose, etc.
 - **Visual classification skill:** It refers to the learner's ability to classify two objects or events related to the visual form given.
 - **Visual arrangement skill:** It refers to a learner's ability to sequence the events or components of an illustration, image, chart, or map in order to represent an idea or concept.
 - **Visual prediction skill:** It is the learner's ability to anticipate a certain situation or event based on a picture or illustration, as well as a statement of reasons for the learner's prediction.
9. Furthermore, the researcher of the current study recommends using some useful learning methods in that may develop the students' visual intelligence skills:
- **Visual Imagination:** By closing the students' eyes and imagining what had learnt in class, the content of the story is transformed into a mental image. As a result, they will be able to see all the stored material they want to remember.
 - **Stimulating students' mental abilities:** By presenting situations such as asking students to imagine themselves living through the events of the story and then asking them to describe what they see around them.
 - **Use effective visual aids:** learners with visual intelligence tend to use pictures, illustrations, maps, tables, tablets, smartphones, smartboards, computers, data shows, and videos, so it is recommended to use such means to develop their understanding and visual intelligence.
 - Participating in visiting museums and archaeological sites, then trying to write a trip report in which the student describes what he saw.
 - Focusing on tangible spatial activities through building objects. According to Johns Hopkins University, "games such as blocks can improve and develop visual intelligence".

5.4 Suggestions for Further Studies

To enhance or develop what the current study started, and in the light of the results of this study, the researcher saw the possibility of carrying out other studies in different fields, so that these proposed studies address the following topics:

1. Investigating the effectiveness of ART on developing the skills of other multiple intelligences, such as linguistic intelligence, logical intelligence, natural intelligence, etc.
2. The effectiveness of designing an electronic environment based on ART on developing the visual discrimination skills of learnable mentally handicapped students.
3. The effect of corrective feedback in a learning environment based on ART on developing children's visual attention.
4. Further study is needed to identify the effectiveness of ART compared with the conventional learning methods of Iraqi students in different levels of education. Using some of ART applications to develop curricula of the different academic levels in Iraq.
5. Conducting more empirical research on the effectiveness of training programs and various technologies in developing the skills of producing augmented reality content for teachers of different grades.
6. Further research is needed to investigate the effect of ART on improving students' skills in other areas such as thinking.

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Appendix (1) Permission

Ministry of Higher Education and Scientific Research	جمهورية العراق وزارة التعليم العالي والبحث العلمي
University of Babylon college of Basic Education	جامعة بابل كلية التربية الاساسية

Ref. No.:
Date: / /

العدد: ٢٢٨
التاريخ: ٢٠٢٠/١٢/٢٠

QR Code

إلى / كلية التربية الاساسية / قسم اللغة الانكليزية
م / تسهيل مهمة

تحية طيبة...

بناءً على الطلب المقدم من قبل طالب الدكتوراه (احمد علي علوان) اختصاص طرائق تدريس عاصه لتسهيّل مهمته لغرض اكمال اجراءات بحثه الموسوم (فاعلية برنامج تعليمي مقترح قائم على تكنولوجيا الواقع المعزز في تحصيل الدراسي وتنمية مهارات الذكاء البصري لدى طلبة كلية التربية الاساسية)
للمفضل بالموافقة ... مع الاحترام ...

أ. م. د. اسامة عبد الكاظم مهدي
معاون العميد للشؤون العلمية والدراسات
العليا

٢٠٢٠/١٢/٢٠

نسخة منه الى:
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**Appendix (2) : The Proposed Instructional Program
Based on Augmented Reality Technology**



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The Proposed Instructional Program Based on Augmented Reality Technology

1. Introduction of the proposed program based on Augmented Reality Technology.
2. Philosophy of the proposed program.
3. General objectives of the proposed program.
4. The sources and foundations that were relied upon to prepare the proposed program.
5. Justifications of preparing the proposed program.
6. Components and duration of the proposed program.
7. The target group of the proposed program and its characteristics.
8. Stages of preparing the proposed program.
9. Teacher's guide.
10. The instructional lesson plans.
11. Student's book

1- Introduction of the proposed program based on Augmented Reality Technology:

Today, the use of innovative technologies and modern methods in information communication in all fields of science is growing. The widespread use of modern technologies in all disciplines serves to increase and improve the efficiency of the educational process.

It is known that there are many different types of interactive technological methods today, most of which have been tested and given good results. The following are the main conditions and prerequisites for using instructional technologies in the educational process:

- The development of free communication skills of each student in the acquisition of knowledge in the teaching process.

- The main focus of the educational process is to increase the learner's engagement through the use of methods and modern teaching aids that increase the activity and participation in the classroom.

In all higher education institutions, the instructors are keen to use modern information technologies, multimedia, modern textbooks and manuals based on interactive methods, audio-visual methodical manuals, necessary teaching aids, etc. This will increase interest in ways to expand knowledge and skills in foreign languages.

We live in the 21st century, the age of computerized and automated innovative technologies where everything is digital, and learning a foreign language is no exception. There are many different programs and modern technologies to improve learners' abilities and skills that are available in all grades and ages. In this proposed instructional program, the researcher tries to present ART to develop academic achievement and visual intelligence skills for the 2nd stage students in the department of English in the reading comprehension subject.

Augmented Reality Technology (ART)

Augmented Reality Technology (ART) can engage and motivate students by allowing them to experience content through multiple mediums. ART has gone from science fiction to a functional technological medium that can be used in the classroom. ART, the blending of virtual and physical worlds in real time, can be used in the classroom to supplement physical materials and add new dimensions to classroom learning. It can help users see the virtual objects and the digital information superimposed on the real world. It is construed that ART does not replace reality but supplements and enriches it.

ART is one of the innovations in modern educational technology that allows the individualization and enrichment of educational situations, by feeding them with many different sources and alternatives. ART can form an integrated systemic unit that aims to achieve ideal learning characterized by a great deal of effectiveness, efficiency, and mastery. The following are the characteristics of the proposed ART-based program:

A - The interaction between the learner and the program

The innovations of ART provide a process of mutual active interaction between the learner and the presented educational content (the program). Therefore, the learner can engage in dialogue with the technological device and move between the different parts of the program as s/he chooses many alternatives in the learning situation.

B- ART helps individualize education so that it tends to be self-learning

The innovations of ART allow the individualization of educational situations because they provide sufficient opportunities for the learner, as they enable him/her to control the response time that goes between displaying the educational material on the computer screen or smartphone screen and his/her response to it. Therefore, it can be said that ART helps acquire self-learning skills.

C- ART enriches learning situations through the proposed alternatives.

ART enriches educational situations by providing the learners with many alternatives and varied educational options that represent stimuli that address more than one sense. Among the most important of these alternatives and educational options are the multiplicity of educational activities and their aims as well as the multiplicity of evaluation tools.

D- Quality and proficiency in designing and producing educational materials

ART allows the possibility of the creation and design of high-quality instructional resources and mastery of its production in order to obtain information from several local and international sources, the most important of which is the internet.

E- The integration

ART is characterized by the integration of its various elements; for example, the integration of sound, image, movement, colour, and text.

2- Philosophy of the Proposed Program Based on the Augmented Reality Technology (Learning Theories that Support Augmented Reality)

The current program relies on ART to develop the academic achievement and visual intelligence skills among the second stage students, Department of English language in the reading comprehension subject. It is a technique that studies in the field of education have proven its effectiveness in improving the achievement and performance of learners in general, as well as creativity and visual learning in particular.

Educators point out that the researcher must mention the justifications, principles, psychological and logical foundations, and learning theories on which the educational program is based. Accordingly, the researcher was keen to identify them before presenting the stages of building the proposed program, which are as follows:

- Addressing familiar topics from the students' daily reality in a way that encourages the use of reading comprehension
- Adopting immediate feedback in order to inform the student of his/her level of achievement and progress towards the goals s/he has achieved through continuous evaluation in a way the student's path is corrected and his/her activity is increased.
- Formulating behavioural goals at the beginning of the program ensures the success of the educational process and achieves the goals, as well as organizing the learners' efforts towards achieving those goals.
- Organizing and analysing topics in line with educational goals and students' characteristics is crucial.
- The proposed program was based on logical psychological foundations and principles that were derived from learning theories and learning design models.

In its applications of the educational process, ART is based on a number of learning theories that provide an experimental basis for variables that affect the learning process. The most important of these theories is:

- **Behavioral Theory (Skinner):** This theory is concerned with preparing the educational situation and supporting the learner with stimuli that

benefit him/her for the response, and then this response is strengthened. ART seeks to create these educational situations by using multimedia as learning stimuli. As a result of the learner's continuous interaction with ART, these stimuli push the learner to successive responses based on the nature of the educational situation, which subsequently enhance learning and increase the permanence of its influence on the learner..

- **Constructivism Theory:** Constructive learning environments are closely related to e-learning in general and to ART in particular. Once the subject is presented using multimedia, it allows building the scientific concepts through observation and personal activities within rich interactive environments, which in turn leads to better learning. This is what happens in ART in terms of interactive activities, and that the learner builds knowledge through the activity that s/he performs through his achievement of understanding.
- **Social Theory:** It considers learning as a social practice. Knowledge occurs through communities of practice, and thus learning outcomes imply the learners' abilities to successfully participate in such practices. This is what happens in ART, as most of its applications are based on learning through participation with peers (peer learning).
- **Interconnection Theory:** It focuses on how to learn rather than the quantity of what is taught to an individual. With regard to ART, it refers to the interaction within the electronic scene in which there are virtual objects that enhance the real environment. This interaction represents a set of nodes. Each node represents a linked source of knowledge. Learning takes place through the learner's ability to access those links between nodes and various types of information effectively. ART depends on one of the principles of Interconnection Theory that learning can be presented in non-human devices and tools, smart wearable or portable devices, and a set of educational applications.

3- Scientific Justifications of Building the Proposed Program based on ART:

The difficulty of being familiar with all the requirements of a single specialization, as a result of increased knowledge and tremendous technological development, has led modern educational curricula and cognitive psychology to build educational strategies and programs that

develop thinking and multiple intelligences, which is a broader trend that leads to a comprehensive growth in the learner's personality from all sides, so the researcher built and prepared his proposed program according to the following scientific justifications:

- The low level of learners' familiarity with the skills of the twenty-first century, such as learning and innovation skills, including thinking skills and visual learning skills, learning skills with modern technology; and life-professional skills.
- In order to achieve the goals of the vision of the Ministry of Higher Education and Scientific Research in providing education opportunities for all in an appropriate educational environment, in light of Iraq's educational policy, by raising the quality of teaching outputs, increasing the effectiveness of scientific research, encouraging creativity and innovation, and incorporating modern digital technologies into curricula teaching .
- Based on the results and recommendations of previous studies, which have proven and recommended the need to utilize innovate modern strategies and programs for developing multiple intelligences, including visual intelligence skills.
- The huge transformations in the field of modern digital technologies require the development of visual skills to meet these challenges.
- ART is distinguished from other models and approaches through its clear role in helping students generate new ideas and develop visual intelligence by imagining, solving visual puzzles, using pictures, and watching educational videos. Therefore, ART can help students achieve better results through visualization and a full immersion in the topic. As it is well known, one picture may be worth more than an explanation of a thousand words, so instead of theoretical reading, students can see it with their own eyes as if they were part of reality.
- By reviewing previous studies that examined the building of instructional programs, the researcher did not find a program in reading comprehension based on ART.
- This proposed instructional program can provide educational benefits to teachers because the acquisition of modern teaching skills allows them to perform their professional job while also achieving high productivity for

the educational process, which contributes to the achievement of educational goals.

4- General instructional aims of the proposed program based on ART:

The general aim of the proposed program is to develop the academic achievement and visual intelligence skills of second-stage English Department students in reading comprehension, which leads to further academic progress. This general aim is divided into a set of sub-aims:

- Developing the ability to imagine, visualize and guess, and to reach thinking beyond reality.
- Developing the student's ability to produce the largest number of visual ideas.
- Transforming a static reading comprehension textbook into a lusty book with video, audio, and 3D images
- Participating in the student's intellectual, personal, and professional growth.
- Helping the student to acquire the following skills of language: listening, speaking, reading and writing.
- Developing higher reading comprehension levels.
- Educating the student on the significance of studying reading comprehension as a form of communication.
- Analyzing and discussing the topics with diverse communicative intensions found in the stories.
- Analyzing and applying comprehension strategies to construct meaning and understand texts.
- Discussing words and phrases that capture the interest and imagination in the stories presented.
- Understanding what is read independently by asking questions regarding the text.
- Socializing with peers about texts' insights, points of view, and proposals for solutions to problems.
- Developing the student's positive attitude towards learning comprehension subject.
- Developing the student's linguistic competence, which enables second-stage students to present and explain the topics and ideas needed in life situations.
- Enhancing the idea of cooperation between the students, to develop a spirit of understanding and respect for each other's opinions.

- Providing the students with the technological basis that enables them to participate in conveying of scientific and digital progress in the education process, thus enhancing their progress in the future.
- Encouraging the situational learning, which is one of the important entrances to facilitate the learning process by presenting meaningful situations based on ART, and linking teaching with real-life experiences.
- Reasonable Communication: Communicating with students in a clear, accurate, and appropriate manner, as well as giving arguments and reasons for their opinion and beliefs.
- Active Understanding: Summarizing material, identifying text, and making some inferences from it.
- Refining the skill of critical thinking as it is a useful tool while reading English texts and stories.
- Employing the skills of planning, designing, using and evaluating the technology based teaching- learning process.
- Focusing on the students becoming digital citizens.
- Using technology to increase the process of communication and interaction between learners (students) and between students and teachers.
- Using Augmented Reality Learning Experience (ARLE) to diagnose learning gaps of the students in either self-diagnosis, peer or teacher evaluation.
- Working in physical or virtual groupings utilizing the ARLE to be engaged in visual activities to acquire knowledge, develop skills, and reach desired information.

5- The Sources and Foundations Used in the Preparation of the Proposed Program

- Educational literature, represented in previous relevant research and studies.
- Modern trends in teaching reading comprehension course.
- The objectives of teaching reading comprehension course for second-stage students, Department of English Language.
- Developmental and mental characteristics of second-stage students, Department of English Language.
- Characteristics of special visual intelligence skills in the reading comprehension course.

6- Components of the proposed program

The program consists of two parts:

1. The first part related to the teacher (teacher's guide): It consists of learning strategies, lesson plans, methods, procedures, teaching aids, and evaluation strategies.
2. The second part related to educational outcomes: It is related to students, as it is presented to them through worksheets that include many visual educational activities. These activities were varied between individual activities and group activities in each session (See Appendix 33, p. 441). Moreover, each session is dedicated to achieve a set of sub-objectives of the program, which in turn achieve the general aim of the program, which is the developing of second stage students' achievement and their visual intelligence skills in reading comprehension course.

7- The target group of the proposed program

The augmented reality-based program targets a large number of people in society. It is suitable for use with children from elementary school through university, provided that modifications are made to the activities to suit different age groups. By reviewing the previous studies and the literature related to ART, the evidence does not indicate that it is limited to a specific age or a specific mental level.

Therefore, students of the second stage(Department of English - College of Basic Education) are selected as a target group for the proposed instructional program based on ART. This program is compatible and appropriate to the characteristics of growth for this age group because the students of this stage possess a lot of information that qualifies them to carry out all the knowledge and skills required in the proposed program.

8- Stages of constructing and Preparing the Proposed Program

The educational building process is a systematic process that is organized into successive, integrated, and interconnected steps to design educational programs, educational materials, and models in accordance with a set of foundations and rules, as well as specific goals that can be measured using appropriate evaluation methods.

After reviewing the literature and previous studies on instructional design for ART, the researcher prepared an ART environment according to the ADDIE Model. The model was chosen by the researcher because it is simple in design, easy to use, and appropriate for the students' age group. ADDIE Model is composed mostly of five basic phases: Analysis, Design, Development, Implementation, and Evaluation.

The instructional design is a systematic approach that provides a procedural framework for the designer to ensure that educational products are effective and efficient in achieving goals. In light of ART's instructional design, the following is an explanation of those five stages:

a. Analysis: The analysis phase is the basis for the remaining phases of the instructional design. In this phase, it is necessary to define the nature of the problem, identify its origin, and propose some possible solutions. This phase may include specific research techniques such as user analysis, pedagogical context analysis, and analysis of specific needs. Some usual results of this stage are the educational goals and a list of activities to be developed. These results are the inputs to the Design phase.

The steps of this stage can be explained as follows:

1- Analyzing the students' needs refers to the procedures and survey studies carried out by the designer or preparer of a particular curriculum or program with the aim of revealing the unsatisfied needs that the student suffers from, and working to satisfy these needs in light of the priority ladder.

As a result, as a crucial step in the design of the proposed instructional program, it is required to identify the needs of the students at the second stage in the topic of reading comprehension. The researcher has prepared two survey questionnaires, in each of which he has asked an open question. The first questionnaire is from the students' perspective (Appendix 28, p. 433), while the second questionnaire is from the teachers' perspective (Appendix 29, p. 435). After the two questionnaires were presented to a group of experts and specialists, and their opinions were taken, the researcher distributed them to a sample of 60 third stage students as they had taught the material the previous year. The two questionnaires were also presented to a sample of six instructors. After collecting responses from students and instructors to determine educational needs from their perspective (see Appendix 30, p. 437) and (Appendix 31, p. 438), the researcher arrived at the educational needs of reading comprehension, and it became clear that an instructional program based on ART is urgently needed, as it contributes to organizing subject content and placing it in the correct methodology, organizing information, practicing scientific activities to develop learners' academic achievement and visual intelligence skills, and also to help teachers follow the suitable evaluation methods that can help in achieving the objectives of the desired educational process.

2- Determining the instructional goals: Any construction, development, or design process must begin with a clear definition of the objectives, followed by the selection of the most appropriate ways for the designer or instructor to achieve those objectives, taking into account the available human and physical capabilities. The following are the aims that the researcher employed in the suggested program:

- **General goals:** They are a set of broad-based goals that are attained thorough instructional process or educational program. The researcher created a questionnaire that contains a list of general reading comprehension goals (Appendix 32, p. 439). To demonstrate their relevance to the topics of

reading comprehension, these goals were submitted to a panel of experts and specialists in the fields of curriculum, teaching methods, linguistics, and psychology.

- **Behavioral or procedural Objectives:** They are the expected achieved output of the students after teaching process. They are explicitly specified for the student's ultimate behaviour, i.e., what the student is anticipated to be able to perform at the conclusion of the lecture. They can be seen and measured by the instructor. Therefore, the behavioral objectives were formulated in light of the reading comprehension course's general goals, instructional material, and the requirements and characteristics of the students (See Appendix 10, p.348).

To recap, the process of determining the instructional objectives is one of the most important steps in building the proposed program of ART. It is useful for determining the elements of the appropriate scientific content and the appropriate means and methods to achieve the desired goals of proposed instructional program based on ART. It also helps identify the evaluation methods to determine the extent to which these objectives are achieved.

- 3- **Determining the instructional content:** Instructional content is a set of knowledge, ideas, experiences, values, and skills that must be organized in a logical manner.

Reading comprehension is commonly known to have particular topics. The Ministry of Higher Education and Scientific Research has issued instructions confirming the subject's value and allowing the instructor to teach seven topics during the second semester.

The importance of analyzing the instructional content can be identified as follows:

- Preparing educational plans.
- Choosing educational goals.
- Choosing the appropriate teaching methods and strategies.
- Choosing the appropriate teaching aids and techniques.
- Building achievement tests according to scientific steps.
- Detecting strengths and weaknesses in the instructional content.

The topics of second stage students in the course of study "Reading Comprehension", can be identified in Alexander's textbook entitled *"Developing Skills: An integrated Course for Intermediate Students"*, which is implemented now for those students. Thus, the instructional material or content has been determined (See Appendix 9, p. 341).

- 4- **Analyzing the learners' characteristics:** This age group has a kind of privacy represented in the occurrence of fundamental changes on the student's personality. These changes are mental, emotional, social and psychological at the same time, as the researcher finds that there are changes that have become clear on his interest, inclinations and the nature of his

preparations. At this stage, the student needs activities that help him/her to be emotionally, socially, and professionally independent. As a result, the students' (research sample) characteristics are determined, and the following is discovered::

- Age: The ages range between (20-21) years.
- Gender: Male and female.
- Number: 237 second stage students, Department of English, College of Basic Education.
- Students have smart devices and are able to use various mobile applications.
- The results of the exploratory study indicated that all students own a smartphone, 80% of which run on Google's Android operating system, and 20% work on Apple's iOS system. Also, all students have access to and communication via the Internet, either through their own network or the department network available to them for free.
- They have never undergone any similar instructional program before (no similar instructional program has been applied to them before).

5- Analyzing of the learning environment:

The concept of the learning environment is not limited to the physical location in which students are located, but also includes the psychological, educational, and social factors and conditions that form the learning environment. The interaction of students with the teacher is also an important part of the concept of the learning environment.

After the researcher obtained a letter of approval (permission) from the University of Babylon, College of Basic Education, to facilitate the task (See Appendix 1), the most important requirements necessary to conduct the research experiment are identified, and the following was found

- The target group of the experiment are students of the second stage at the Department of English Language-College of Basic Education.
- The time for teaching reading comprehension is limited to two hours per week.
- The method of implementing the teaching of the instructional program was by a blended learning method: some lectures took place in the classrooms of the English Department, and others were electronic on the Google Classroom platform due to the conditions of the spread of the Corona pandemic (COVID-19), i.e., the learning and teaching process has to be carried out at home to prevent increasing transmission.
- The duration of implementation of the instructional program is a full semester.

- The physical factors, represented by the management of the classrooms, where the students' seats were well arranged, as well as the appropriate lighting and ventilation of the classroom.
- Providing an appropriate classroom environment that is characterized by cooperation, respect, and calm dialogue is key.

Moreover, ART requires the availability of a modern (smart) mobiles to support the learning process so that students can follow the educational multimedia, which the researcher designed and uploaded to the two ART programs (QR Code Reader Application and EyeJack Creator Application). Furthermore, in order to connect to ART apps and acquire the essential instructional information, an internet connection is required.

The work was done in the following learning environments: -

- In the classroom and on the Google Classroom Platform, students may learn in an augmented reality environment.
- Using social media applications to give aid and assistance to students, as well as providing scaffolding for learning, such as textual, audio, video, and visual communication.
- Through the web-based projects learning technique, the learning environment is created using the computerized cloud, Google Drive, by establishing a folder for each group and a folder for each student in the group to upload their tasks, home works and projects.

6- Determining the entrance behaviour of the students: The concept of entrance behavior refers to the level of the learner before education begins, and more precisely, it refers to what the learner has previously learned, his mental abilities, development, motivation, and some social and cultural determinants of his ability to learn. Expert instructors often prepare at the beginning of each semester a test to reveal the extent to which the learner possesses the necessary concepts, principles, and skills in order for the teacher to be able to start teaching successfully, and this test is called the entrance behaviour test.

In order to determine the entrance behaviour, it is necessary to determine the prerequisites that students must possess before starting the new learning, so the instructor can simply ask himself: “What should my students know, or what can they do before I start teaching them?” Despite the question's simplicity, it needs considerable investigation to discover the appropriate skills, knowledge, and attitudes.

The most common method for estimating the knowledge and prerequisite tasks involves taking a pre-test for students (an entrance behaviour test). The items of the test assess (measure) the knowledge and skills that students must possess when starting new learning. Therefore, the researcher has conducted a pre-test to determine the prerequisites.

b. Design: The outcomes of the Analysis phase are used to establish a strategy for developing the instructional process in this phase. It is vital to develop certain pathways to attain and reach the educational goals during this phase. The program's objectives, content, and assessment tools are all aspects of the Design phase. The design phase went through the following steps:

1- Designing and organizing of the digital content: the content was organized according to the order of behavioral objectives through seven lessons:

- Lesson 1: Passage 14 “A Noble Gangster”.
- Lesson 2: Passage 15 “Sixpence Worth of Trouble”.
- Lesson 3: Passage 16 “Mary had a Little Lamb”.
- Lesson 4: Passage 17 “The Greatest Bridge in the World”.
- Lesson 5: Passage 18 “Electric Currents in Modern Art”.
- Lesson 6: Passage 19 “A Very Dear Cat”.
- Lesson 7: Passage 20 “Pioneer Pilots”.

To ensure the authenticity of the digital content, it was presented to some of the experts in the field of methods of teaching and educational technology. The content was chosen on which 80% agreed, with some modifications such as rephrasing and rearranging of some elements to complete the content in its final form.

2- Determining the content presentation methods: Two different design approaches were used to present the digital augmented content:

- QRC Reader (Quick Responses Code): By providing code-augmented content.
- Image Recognition software (EyeJack Creator Application) to display the required content.

3- Designing the instructional activities: A mental effort made by a student or instructor to attain a goal that must be assessed in order to determine the level of its success. The instructional activities were chosen in light of the educational objectives to be reached, i.e. they were determined depending on the educational objectives to be achieved. Two types of activities are presented:

- Classroom activities: These activities take happen in the classroom, for example, assigning students to complete a printed worksheet that supports the story's events.
- Electronic QRC Reader activities: Students are given QR codes to scan in order to solve online questions.

4- Determining the instructional techniques and strategies:

Strategies and techniques are described as steps of the learning and teaching process to achieve the goals. Without a suitable teaching method, educational goals cannot be reached since it determines the roles of both the

instructor and the student in the educational process, as well as the methods and strategies that should be followed and used.

In the current research, the researcher has chosen the blended learning method as a main method in teaching the material. It is more compatible with teaching the proposed program based on ART in light of the spread of the COVID-19 pandemic in Iraq and the whole world. As one of the modern approaches based on the use of educational technology in designing new educational situations, blended learning combines the traditional method of face-to-face learning with e-learning via the internet to guide and assist the learner during each stage of teaching reading comprehension. The instructor may also wonder about his role in the teaching process under the integrated curriculum with an instructional program based on ART, and here he should realize that the appropriate strategies for teaching this program are active learning strategies, as the student is the focus of the educational process. The instructor is a leader, a mentor, and a guide. He manages the educational process and controls it so as not to cause chaos among the students.

The researcher has utilized a variety of integrated strategies based on the integration of classroom learning and AR learning. Each learning strategies has its own set of procedures and steps. The learners' characteristics, the nature of the instructional content, and the available capabilities are all taken into account while integrating. In order to determine the teaching strategies and methods that are compatible with the reading comprehension course, the researcher has prepared a set of strategies and techniques (these strategies are described in detail in the teacher's guide below), and presented them to a group of experts and specialists in curricula, teaching methods, psychology, and measurement and evaluation. These strategies and techniques have been identified for the reading comprehension course. The following are some of the most important educational strategies and techniques that were used:

- Web-based project learning strategy: For each group and student, a folder was created in the computerized cloud (Google Drive).. Students were assigned a project to create a visual representation (story map, making prediction charts, word puzzles, writing a short story, etc.). The project will be available and accessible via the cloud, and then the researcher can continuously evaluate this product.
- Problem-solving strategy.
- Monitoring comprehension strategy.
- Blended learning strategy.
- Recognizing story structure strategy.
- SWBST strategy.
- Get the gist strategy.
- The Round Robins strategy.
- Flipped learning strategy.

- learner-generated visuals strategies: Visual before reading strategies, visual during reading strategies, and visual after reading strategies.
- 5- Determining the instructional resources, aids and multimedia:** It refers to all of the tools, equipment, techniques, and applications that the researcher uses to convey the content of the instructional material to the students in order to improve the educational process' level and effectiveness. In this stage, the multimedia that would be used in the proposed program based on ART was determined. Moreover, a search was conducted by the researcher to determine the appropriate instructional resources that could be used with ART. Written texts, videos, visual texts, audio texts, static and animated images, GIF images, and presentations were among the materials gathered by the researcher to be used in conjunction with the reading comprehension textbook. All these resources were in need of modification and were modified using Adobe Photoshop Cs for images, and Camtasia Studio to process video footage. The researcher also used Google Sites to design and display the required digital instructional content . On the other hand, the most important instructional aids that were used in teaching the proposed program are the smartphones, tablets, computers, and smartboards.

c. Development: This phase is based on the phases of Analysis and Design. Its purpose is to generate the structure of the instruction. All the pedagogical materials such as content, activities, and assessment instruments are created. In this phase, the researcher develops or integrates technologies.

This stage went through the following steps:

- 1- Determining the multimedia programs:** To create and produce the multimedia, the researcher employed a variety of programs and applications, including:
 - Adobe Photoshop Cs5.
 - Word processor MS Word 2013.
 - PowerPoint.
 - Paint program.
 - GIF Maker.
 - QR Code Generator.
- 2- Production of multimedia:** The researcher designed the multimedia required for the proposed instructional program based on ART, which included the following:
 - Texts: Using Microsoft Word to write texts, taking into account the compatibility between the font size and the screen size as a whole, and the area allocated for displaying text on the screen.

- Static and animated images: The researcher used Adobe Photoshop to produce some images and add text and annotations, then save the images with the extension (jpg), which is suitable for publishing on the internet in terms of size and clarity.
- GIF Animated Images.
- QR Codes.

3- Determining the Augmented Reality authoring system: The EyeJack Creator Application and QR Code Reader Application have been identified as a systems for authoring the proposed program based on ART. Both have the advantage of being able to read any real object (book page, image, etc.). These applications also integrate the virtual information with the real world and add a set of useful information to visual perception. The applications are free.

4- Designing a quick response based on QR codes in Augmented Reality Learning (ARL):

QR application was chosen because it allows for creating and sharing an individual's augmented reality experiences in an easy, simple, and interesting way. In addition, it is available on all operating systems of all mobile phone systems. The QR Icons and QR Images based on quick response are designed in ARL through the following steps:

- Selecting the target image or icon (Static or dynamic).
- Merging of the image or icon with the content of the printed material.
- Designing the QR Code through the QR Stuff Code Generator Platform, which allows adding links and code information, the QR Code image appears and downloads in several different formats, as shown in the figure below:



Figure (21): QR Stuff Code Generator Platform

- Downloading the QR Code and save it as an image and merging the code with the content of the printed material.
- Reading and Scanning: The QR code is scanned and read by pointing the smartphone camera at the code, which directs the learner to a website with interactive digital learning resources. The code will be immediately read by the smartphone camera, which will display the digital content on the smartphone's screen. A smartphone with a camera and an Internet connection, as well as one of the QR Code Reader application, are required to use the QR Code Reader. Because of its ease of use and availability on all mobile operating systems, the QR Code Reader application was chosen for all students.

5- Designing of ARL (ART content) based on Google Sites:

Google Sites is a free website builder that can let the educators effortlessly create and share web pages for his/her projects. This tool makes it easier for an educator to lay out the pages without the need for coding. Helpful for educators, and those who work in education field as well, Google Sites is one of the most effective ways to launch educator's online presence. Moreover, The new Google Sites makes the website building task a whole lot easier, letting the instructor accomplish more instructional digital lessons

and projects in the long run. It provides a ready-made platform that consists of a drag and drop feature for all the materials we need, whether it is texts, images, videos or even entire presentations. The researcher designed the digital content of the seven lessons of the reading comprehension course by using Google Site (See Appendix 12).

Once the researcher has created the web page, a QR code can be used to redirect his second-stage students to Google sites. It can be used for interactive learning based on ART. Simply use QR Stuff's Web Page URL data type and see it live upon scanning the QR code.

How to Create a Google Site of Your Own

1. After the researcher sign into his Google account, he goes to the Google Sites homepage.
2. Under the "Start a new site" header, the researcher picks the template he wants to use. Clicking "Template Gallery" will expand his options to show him all templates that Google Sites has available. There are a variety of preset options i.e. to get started on Google Sites and begin creating the website, click the plus sign button located on the lower right-hand corner of the screen. The researcher will be directed to an Untitled page, so he must enter a unique name to keep track of his site. This site document name is only viewable by the researcher, and by others after he has published the site. The researcher needs to have two or more pages in his website for the site name to appear.

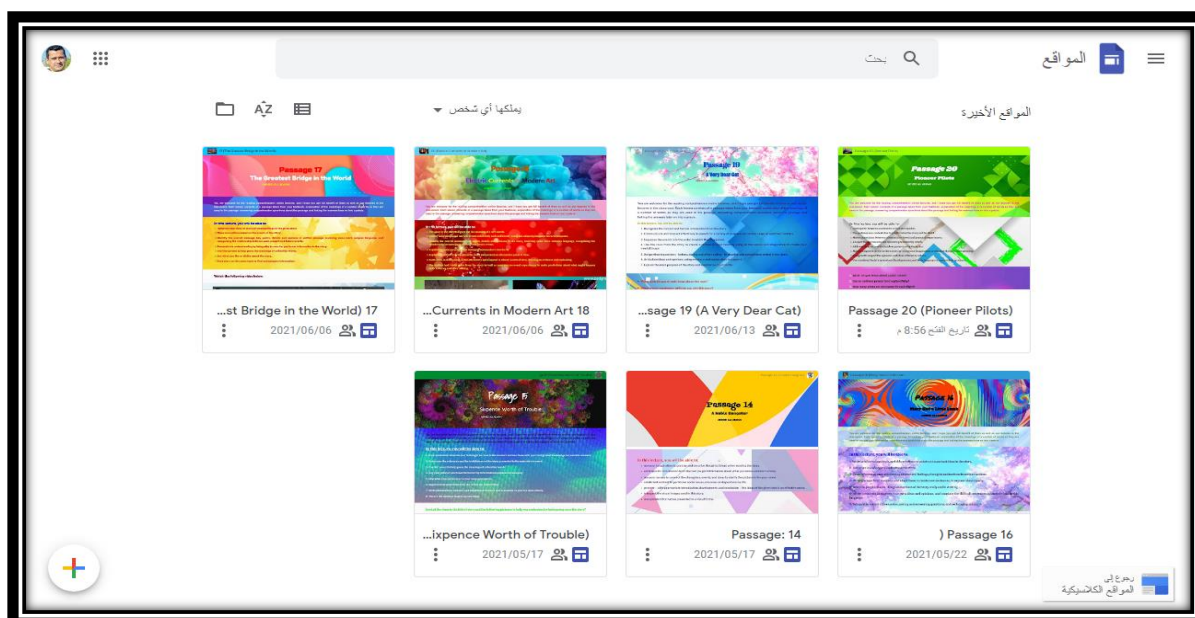
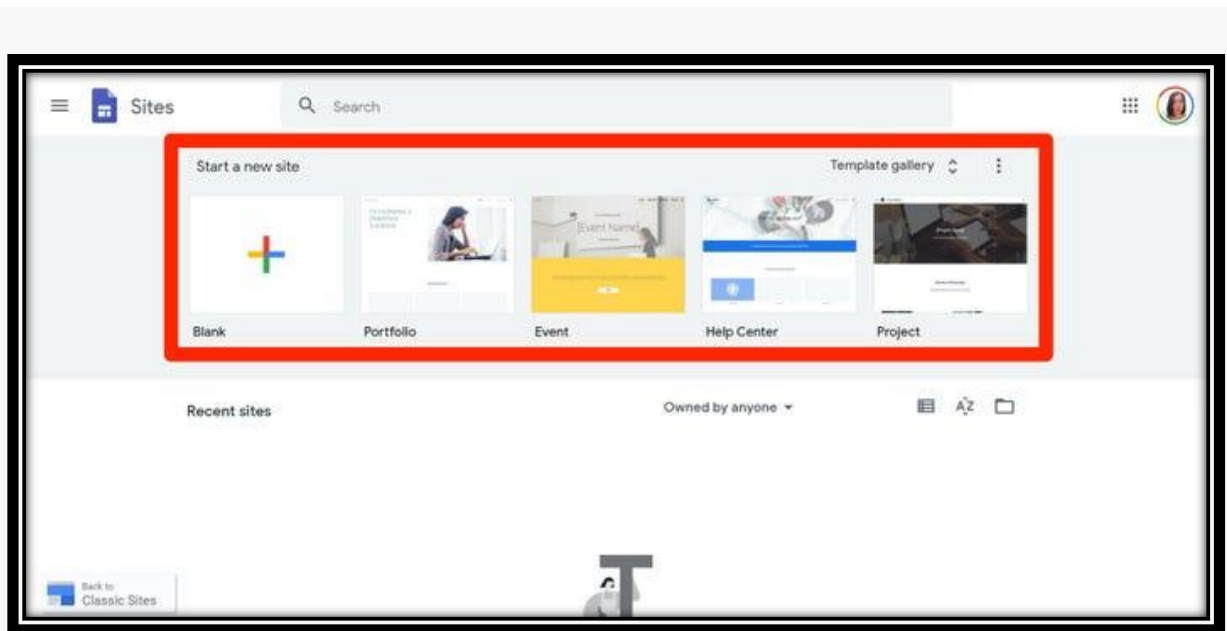
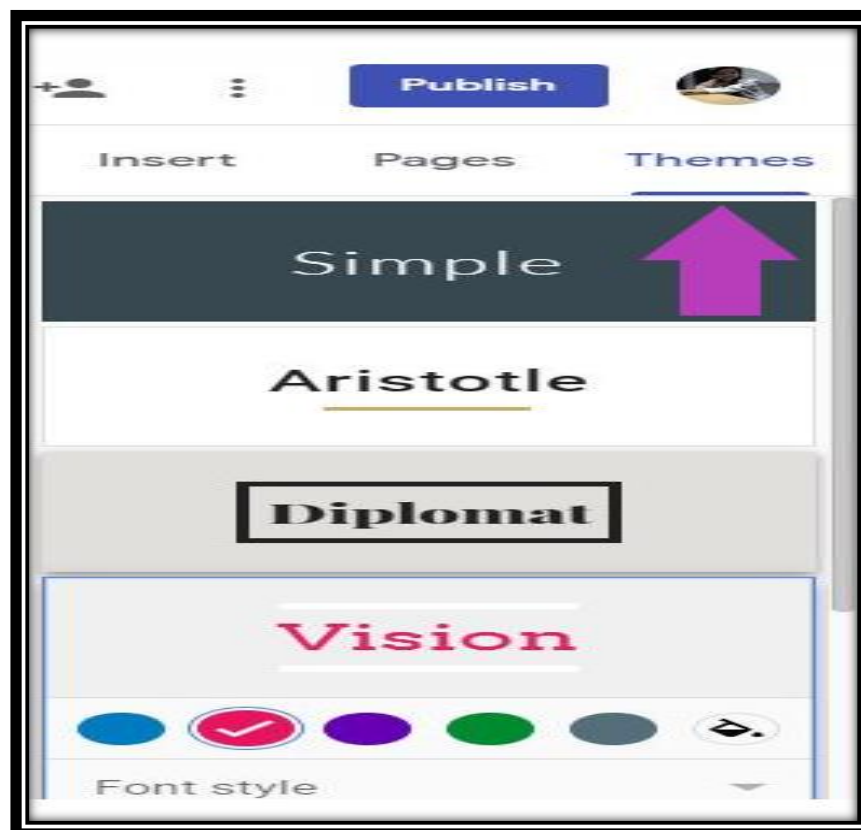


Figure (22): Seven lessons based on ART designed on Google Sites by the researcher



3. In the top-left corner of the page, the researcher enters the name of his site.

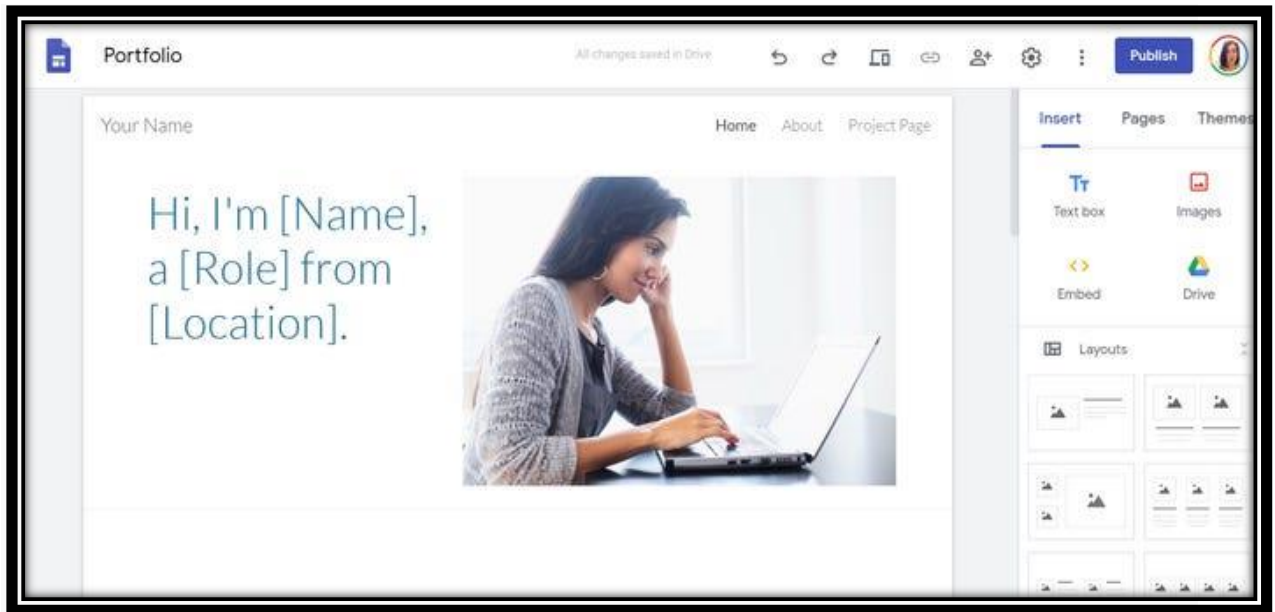
4. The researcher selects a theme: The appearance of his website means a lot. Select from any theme in the Google Sites gallery, which goes along with adjusting font styles, colors and backgrounds.



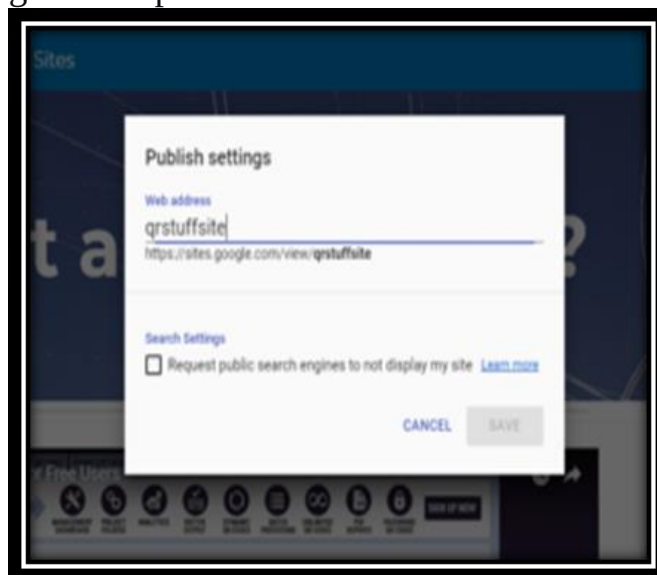
5. Add Content: The researcher clicks “Insert” or double-click on the portion of the page where he wants to add content. He can add texts, URLs of other web pages, photos, videos, documents and files from Google Drive or Google Embeds. Using the toolboxes provided, the researchers can add content to his site. This can include text, photos, and other media. The researcher can add these items by clicking the relevant area on his template, and following the instructions on screen.



- If you get confused, you can find a step-by-step tour by clicking the three horizontally stacked dots in the top-right corner of your screen. Take time to look through the options on the right.

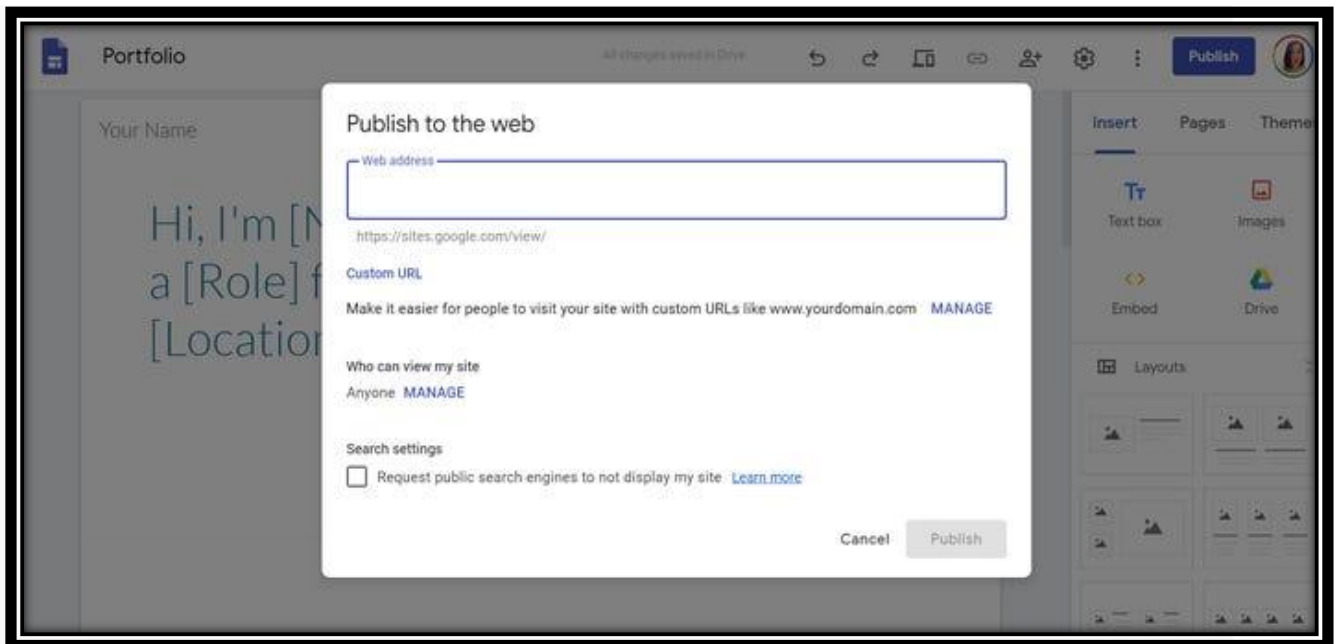


7. Publish the Site: the researcher clicks “Publish” and be re-directed to a pop-up box where he has to enter a unique name to the end of his URL (When he has added all relevant content to his site, hits "Publish" in the top-right). The URL is editable anytime, provided that no other users have registered those particular words in the web domain. The researcher previews his site’s URL to confirm that his site published correctly. There are more functionalities on Google Sites waiting to be explored.



1. In the pop-up box that appears, the researcher chooses the URL he wants. It is worth noting that every Google Sites URL starts with <https://sites.google.com/view>. In other words, if the URL the researcher wanted was “a noble gangster,” your URL would be: <https://sites.google.com/view/anoblegangster>

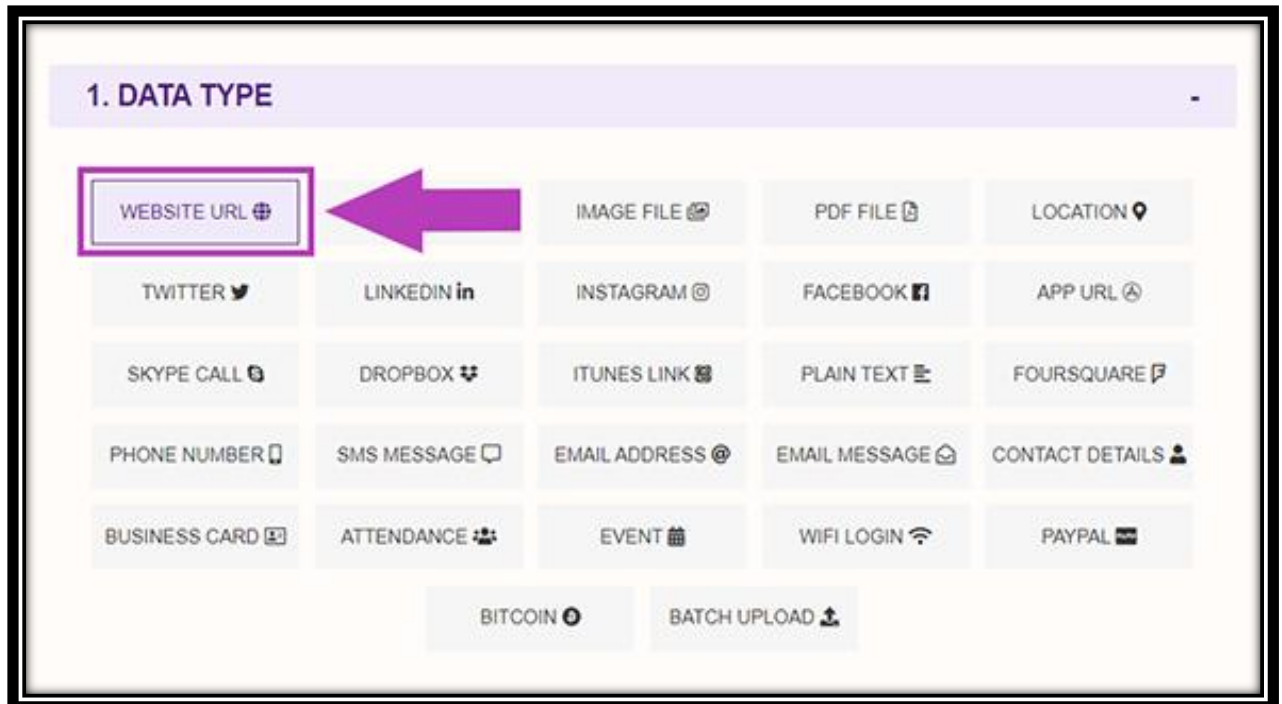
- The researcher can also set who's allowed to see his site, and if it should appear in Google searches. The researcher can give his site a URL, and set the visibility options.



8. Once finished, the researcher clicks “Publish” again to set his site live and make it visible to others.

How to Generate a QR Code for Google Sites

1. Go to <https://www.qrstuff.com/?type=websiteurl> and have the “Website URL” data type pre-selected from the Data Type section.



2. In the Content section, the researcher enters his Google Sites URL.

2. CONTENT

? Website URL

https://sites.google.com/view/qrstuffsite

2 Encoding Options

Static - Embed URL into code as-is

Dynamic - Use our qrs.ly URL shortener

[What's the difference?](#)

Use a dynamic QR code if you require analytics reporting or QR code editing.

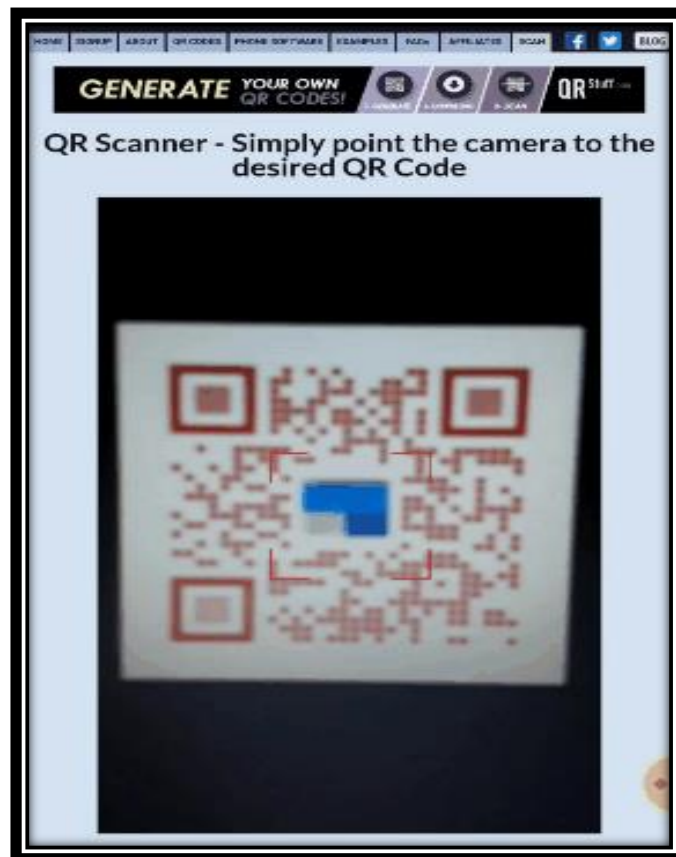
Google Campaign Tracking

Yes, add campaign tracking to this QR Code

No thanks

[What's this?](#)

3. The researcher clicks the “Download QR Code” button and the QR code for Google Sites is ready for use.



QR Code Styling feature: Just use the steps outlined above to create Website URL QR code for Google Sites, and then, before the researcher downloads his finished QR code, he can click the “Style Your QR Code” button to change its appearance.

Here is an example that shows what could be done to the Website URL QR code created above using QR Code Styling feature. Style section allows the researcher to make his QR code more visually distinctive and, by embedding a suitable image, perhaps more intuitive as well.

3. STYLE

Size & Resolution

400

px

72

dpi

File Type

png

Error Correction

Level L - (7%)

[What's This?](#)

SELECT A QR CODE TEMPLATE

Dots

Color

Shape

Squares

Corners

Stroke

Shape

Normal

Fill

☐ Transparent Background

Add a Logo or Image to Your QR Code

Drop Logo To Upload

or

Browse...

No File Uploaded

✓ Your logo will be automatically centered and optimally re-sized

✓ File sizes up to 6MB supported

✓ JPEG, PNG and GIF Files are accepted

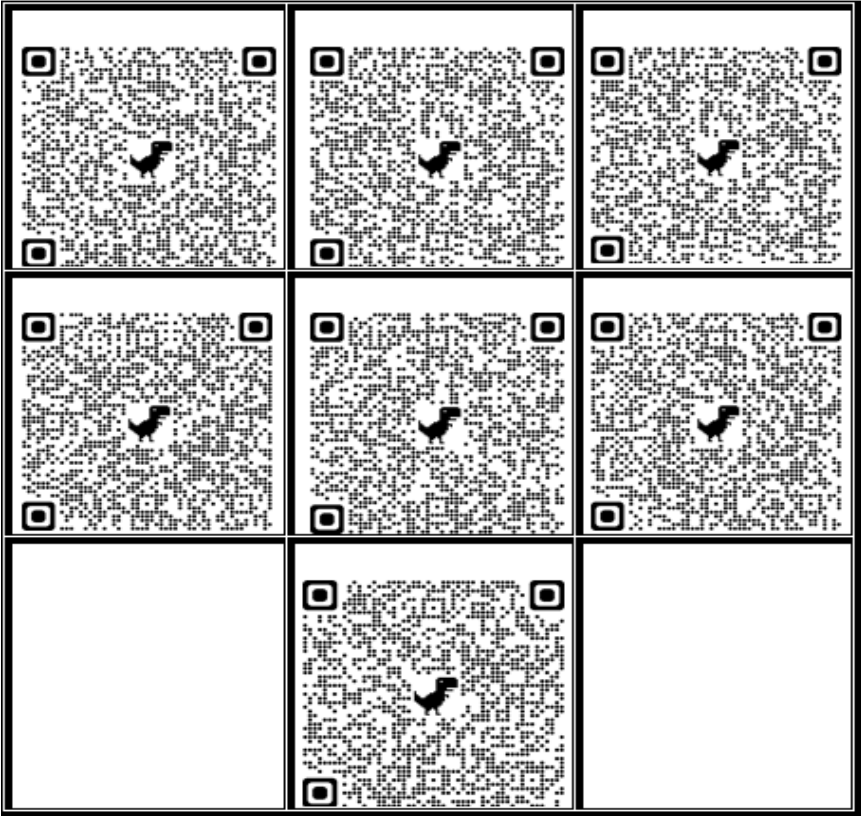


Figure (23): Seven QR Codes Used in the Current Research to Enrich Reading Comprehension Subject with ART-Based Content Designed By The Researcher

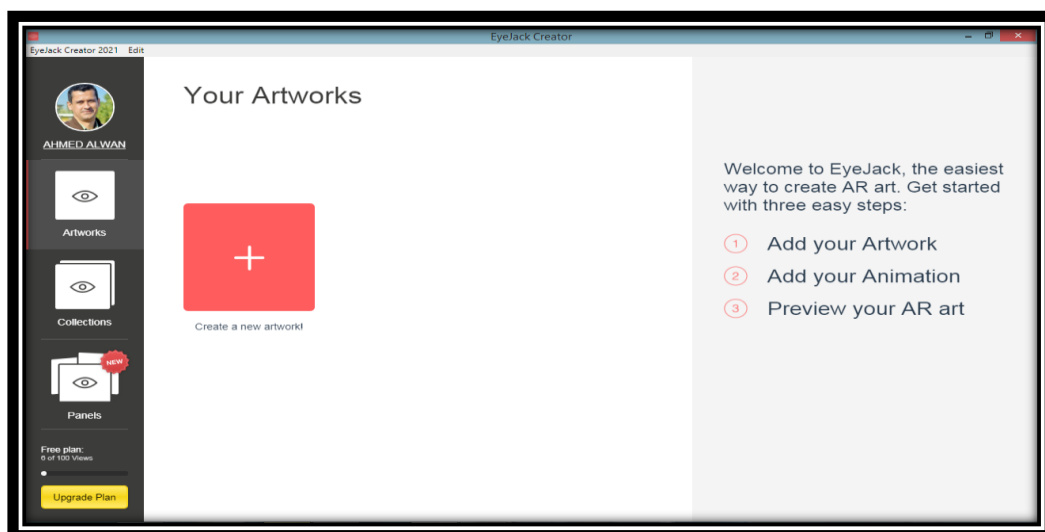
6- Designing of ARL based on EyeJack Creator Application (Image Recognizing):

EyeJack Creator supports videos, animated gifs or PNG sequences. The researcher could create a video using his smartphone or if he wants to try something more advanced, he recommend using programs like Adobe Photoshop, Animate or After Effects to create animations and to help start animating in AR. In ARL, the EyeJack Creator Application is utilized in the following way:

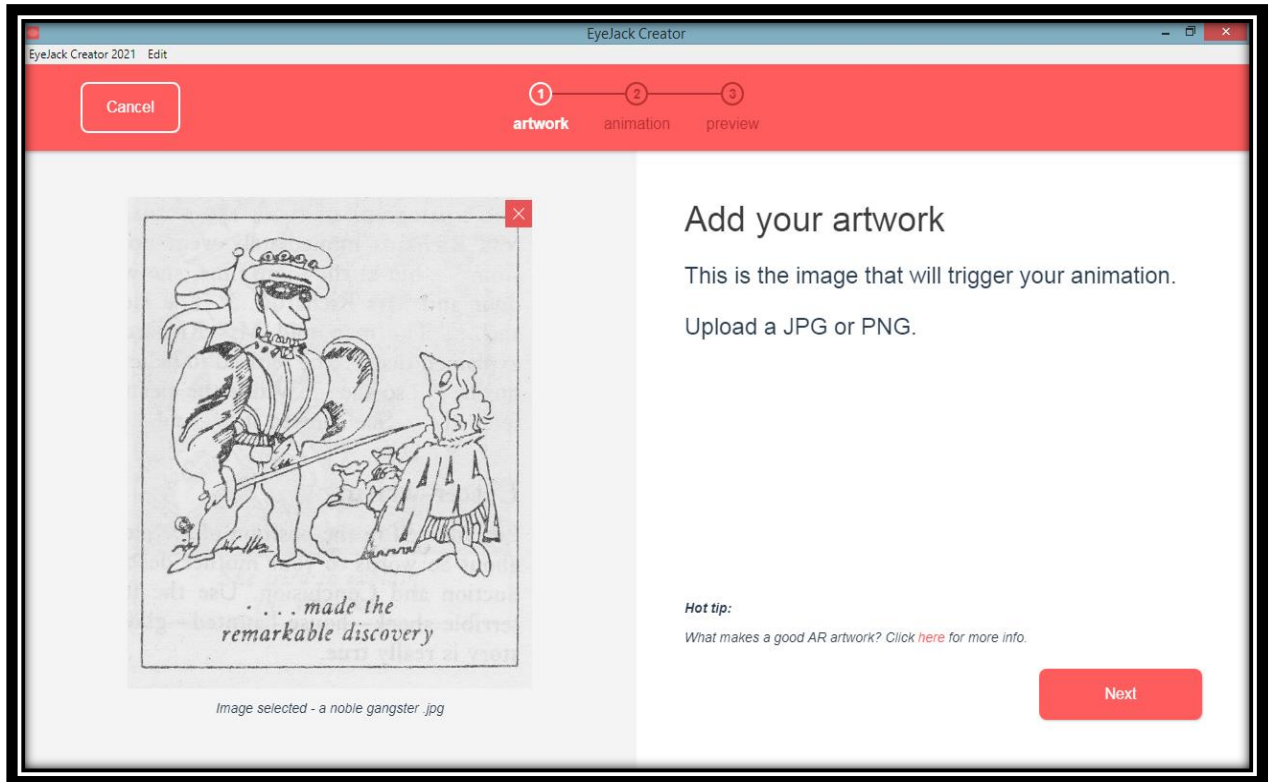
- Downloading the EyeJack Creator application on the computer as well as on the smartphone. It can be downloaded from Google Play or Apple store.



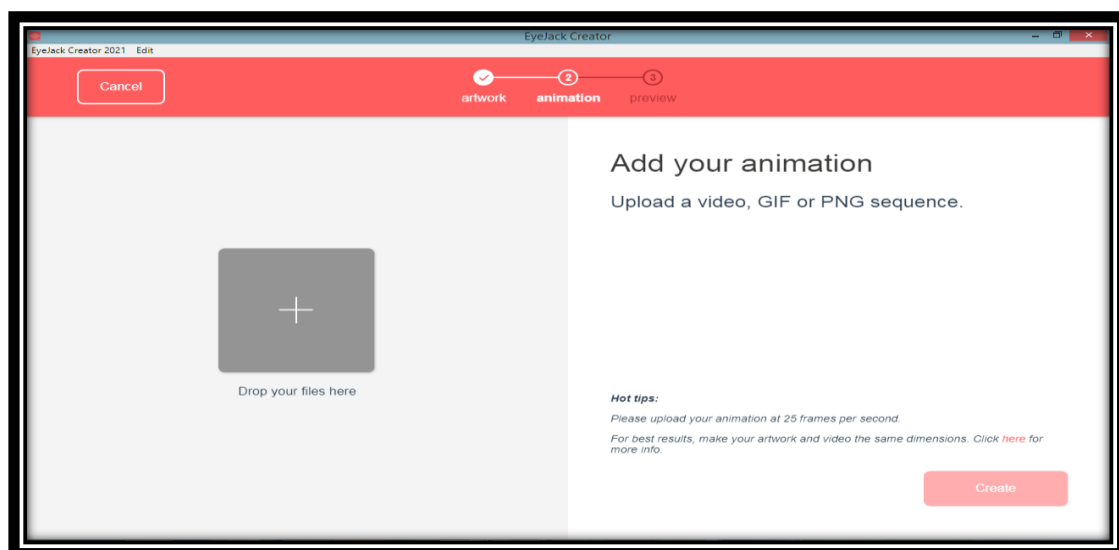
- Opening the EyeJack Creator application on the computer. The following images below explain how the researcher can integrate and combine the content of reading comprehension topics with the EyeJack Creator application to create an interactive ART environment:

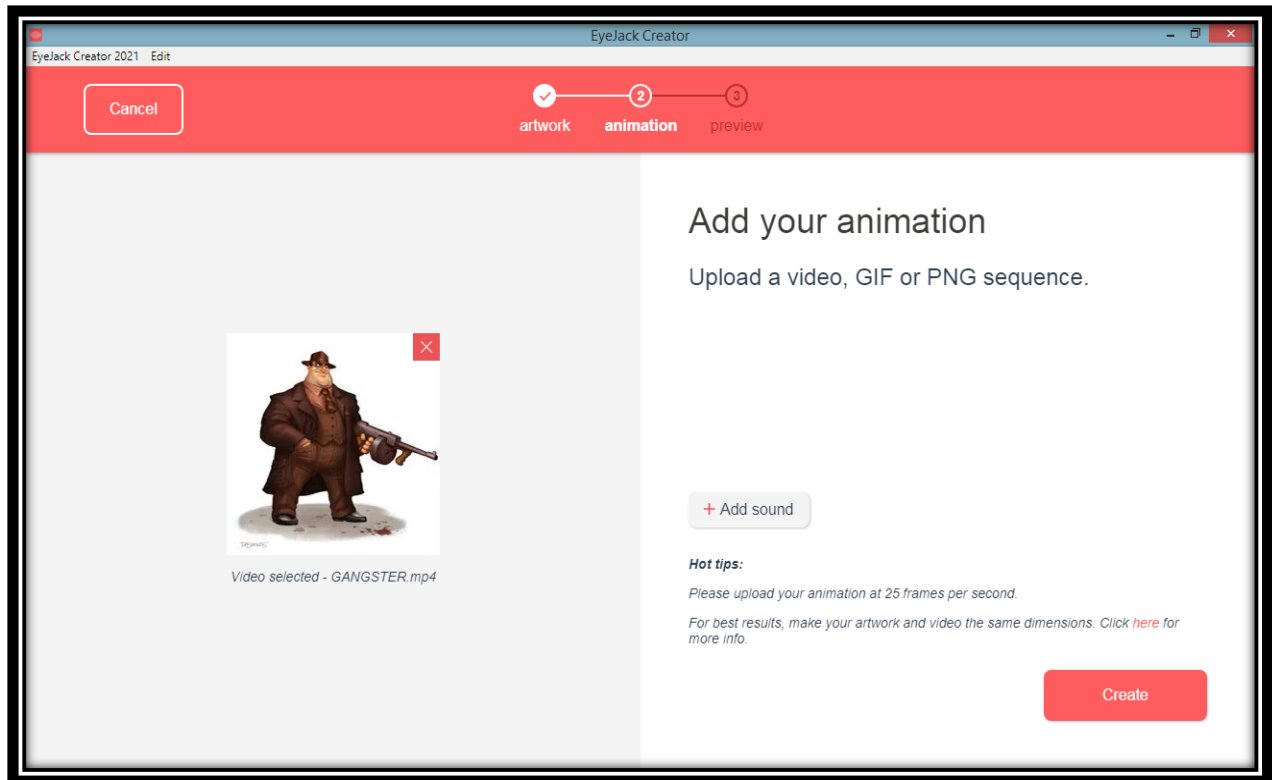


- Uploading one of the images of the stories in the reading comprehension book that is saved on the desktop or anywhere else on the computer, by press in the (+) icon (create a new artwork), then click next.

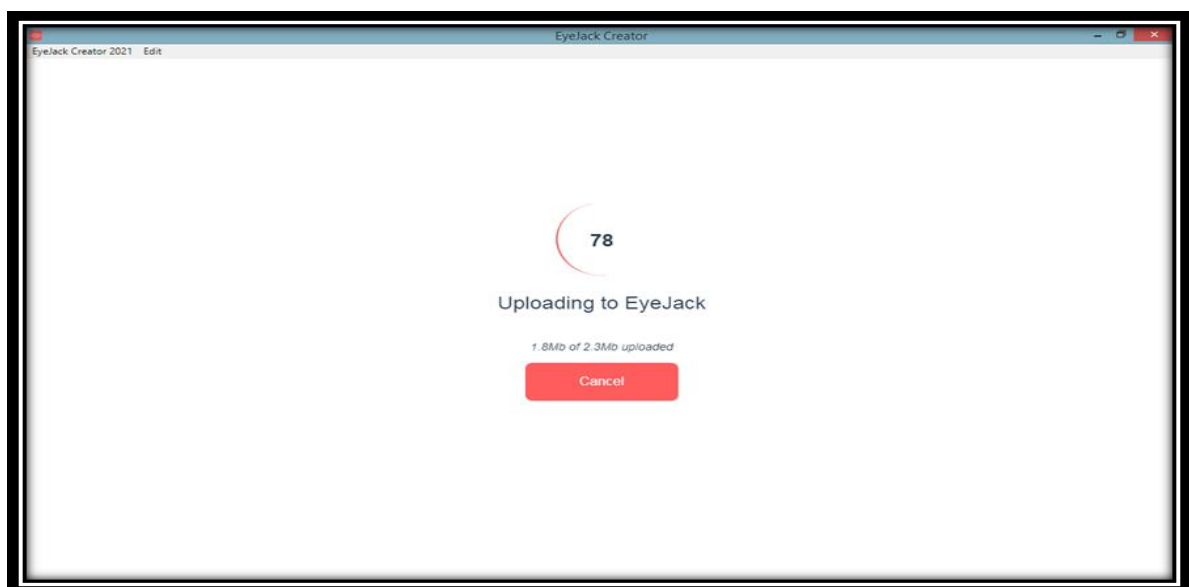


- Uploading a Gif or PNG or vedio to combine it with the selected book image, by clicking on the (+) icon (Drop your file here).



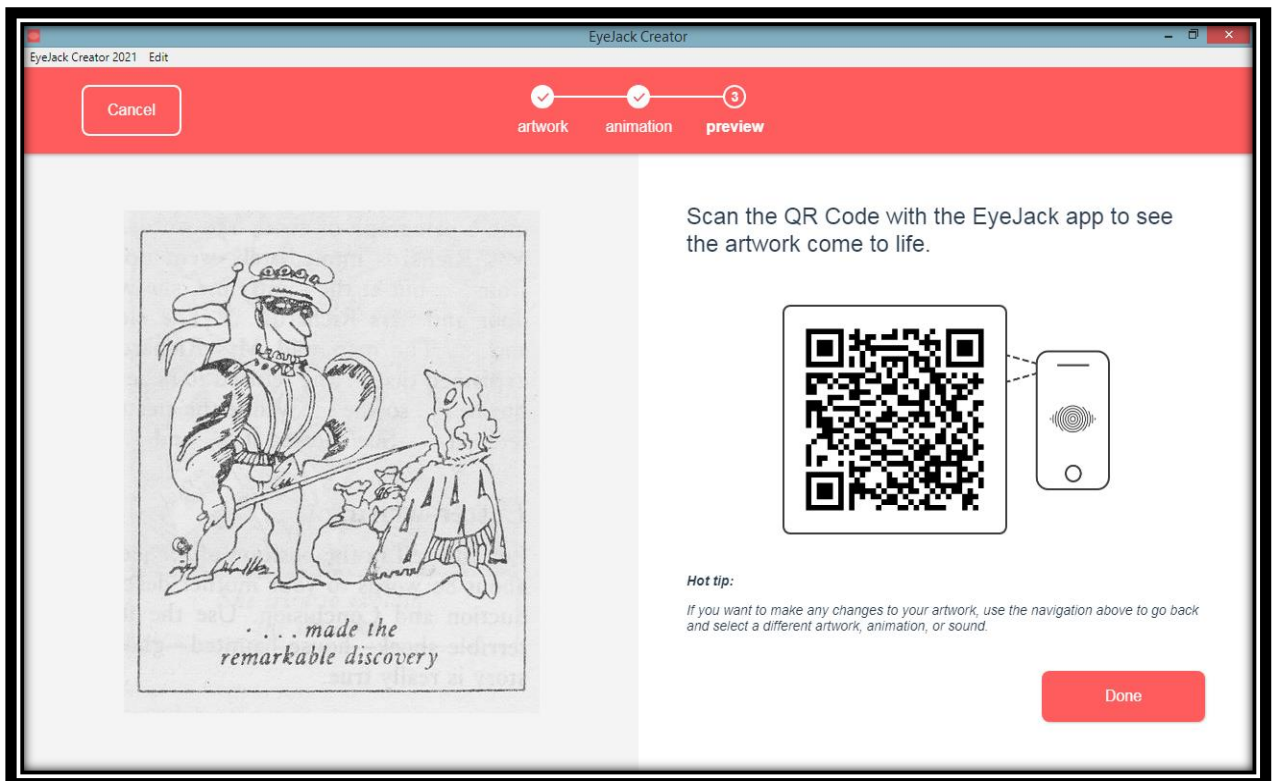


- Clicking on the word (Create) at the bottom right of the screen, where the application performs a process called Transcoding Animation, which processes the image and uploads it to EyeJack, i.e. merging of the image or icon with the content of the printed material

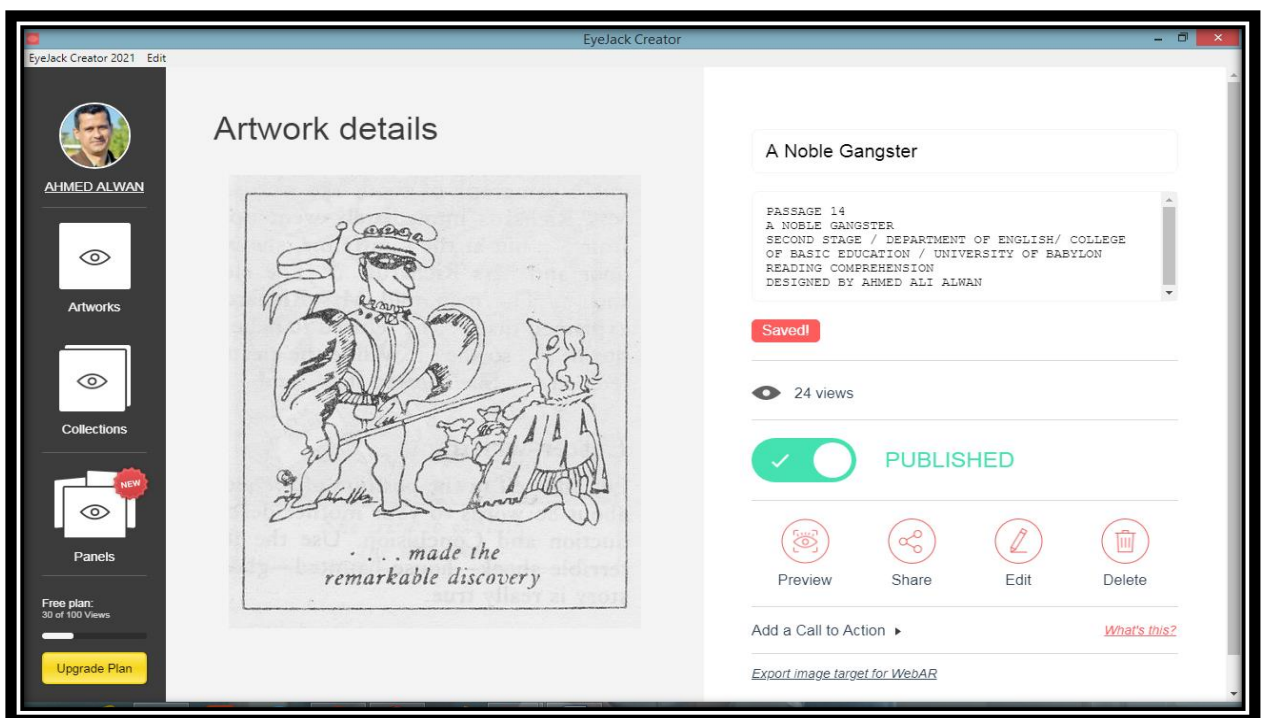


- After completing the uploading process (Processing Sequence), a barcode will appear. When scanning this barcode by opening the

smartphone camera of the EyeJack Creator application, as soon as the barcode is scanned, the Loading Art process begins.



- The next step is to direct the smartphone camera on the selected book page, where the application will open the new augmented reality page of the book image in a format of video or Gif or PNG.



NOTE: Concerning the students, they should upload with their EyeJack Creator Application every barcode related to the stories or passages in the reading comprehension textbook. After that, they can direct their EyeJack camera to any image related to the stories or passages assigned to them in their reading comprehension book, and then they can enjoy the rich AR material displayed on their smartphone screen.

- d. Implementation:** At this stage, whether in a traditional classroom or via e-learning, real teaching takes place. All of the resources developed during the development phase are introduced to the target learners at the start of the learning process. Its main goal is to offer training for both instructor and students. This stage includes conducting a pilot test for educational materials, programs, and multimedia, and planning for long-term employment. The researcher must ensure that the instructional materials and activities work successfully with students at this stage, as well as that the researcher is ready and able to use these materials, programs, and applications. This phase may include re-design work to address problems.

The implementation phase went through the following steps:

- 1- ART relies on linking features from real reality with the appropriate virtual element that is previously stored in its memory, such as geographical coordinates, location information, an introductory video, or any other information and multimedia that enhances and enriches the real-world experience. Augmented reality software works by seeing the actual environment using a camera of a smartphone or tablet, analyzing it according to the program's requirements, and attempting to incorporate virtual elements. Augmented reality software works by seeing the actual environment using a camera on a smartphone or tablet, analyzing it according to the program's requirements, and attempting to incorporate virtual features into. Furthermore, the following technologies are used to link the multimedia to the pages of the printed textbook:
 - QR Code Scanner Application :Every QR code consists of a number of black squares and dots which represent certain pieces of information. The information is translated into something that students can understand when a smartphone scans this code. This is achieved by placing the barcode on the textbook page, which will open a new link on the Google Sites when the camera scans the barcode. After the learner hits the link, the required provided content emerges in the form of texts, videos, images, audio files, or presentations.
 - EyeJack Creator Application: On the previous pages, the researcher discussed how he utilized the EyeJack Creator Application to create digital instructional content based on ART.

- 2- Preparing a guide for using ART:** A guide was created to assist students in using the two ART application. It includes pictures and illustrations that demonstrate how to utilize these applications to meet targeted educational objectives. The guide also includes a variety of enrichment activities and exercises for each of the seven reading comprehension topics. (See Appendix 33).
- 3- Conducting the exploratory experiment on students:** The proposed instructional based on ART was applied to a sample of (25) students from the second stage of department of English (those students were excluded from the whole experiment), in order to ensure the safety of a proposed program and make the necessary adjustments to be applicable (to identify the problems that students may face in learning with proposed instructional program based on augmented reality technology).

e. Evaluation: This phase measures the effectiveness of the instruction. The evaluation can be formative, within each phase of the process, or summative, at the end of the implementation of the instruction.

The evaluation phase went through the following step:

- Presenting the proposed program based on ART to a jury of specialists in methods of teaching and educational technology to verify its validity and modifying it according to their suggestions and recommendations. In light of the opinions of experts, some backgrounds of ART have been modified to be suitable for images displayed.

Among the most important criteria that must be taken into account in constructing the proposed program based on ART are the following:

- Safety of educational content.
- Relevancy of goals and the possibility of achieving them.
- Appropriateness of activities to the level of the target group (second stage students - Department of English Language - College of Basic Education).
- Submitting any suggestions that contribute to enrich ART-based program.

In addition, the researcher evaluated the effectiveness of the proposed educational program by applying the types of evaluation, whether in terms of when to conduct it or in terms of the types of tools used, and these types are:

Formative evaluation:

It is a systematic evaluation process that occurs during teaching with the goal of assisting the student in improving the learning process and correcting its path, knowing the extent of the student's progress in learning the scientific material and the extent of his progress towards achieving the educational goals, preparing a set of activities for each lesson, performing

these activities and exercises, and checking the extent to which students absorb the information.

Final evaluation:

The goal of the final evaluation is to identify the effectiveness of the proposed educational program at the end of the experiment. To measure the effectiveness of proposed program on the dependent variables and to find the difference between the scores of the experimental and control groups, the researcher used the achievement post-test for reading comprehension (See Appendix 13, p.370) and the visual intelligence post-test (See Appendix 17, p. 393). After finishing the experiment, the researcher also conducted a 35-items opinion questionnaire regarding the effectiveness and usefulness of using ART in learning the topics of reading comprehension to know the students' opinions about this technology (See Appendix 34, p. 385). The researcher also asked three open-ended questions to get the students' point of view on the use of ART in teaching reading comprehension course for second-stage students in the Department of English language. The results of this questionnaire revealed that the experimental group students who were taught using ART had a positive and significant interaction level, as the percentage of students who benefited from this technology reached about 82% (See Appendix 35, p. 489).

Feedback:

The feedback is related to the comprehensive concept of evaluation, it is a set of information received by the learner regarding his/her performance and results so as to explain to him/her the mistakes s/he made, the amount of his progress, the amount of what he learned, and the suitability of his/her performance to the goal that should be reached.

The following are some of the sources from which the researcher received feedback:

- Consultations, comments, and opinions are obtained through personal interviews with a group of experts.
- Questions that students ask about the instructional material.
- Prepared instructional questions and activities.

The researcher continued to give feedback until the end of the results analysis process and beyond, because it helps him carry out the processes of developing and preparing the proposed educational program for final implementation.

9- Teacher's Guide:

The researcher prepared a teacher's guide to teach the seven topics of the comprehension course based on ART for students of the second stage. These topics are found in the first unit of textbook *"Developing Skills: An*

integrated Course for Intermediate Students", " by L. G. Alexander. The textbook is recommended by the Ministry of Higher Education and Scientific Research .

▪ **Contents of the Teacher's Guide**

The guide includes a general idea of ART and visual intelligence skills, general aims, behavioural objectives, teaching methods and strategies, educational activities, teaching aids and tools, program implementation timetable, lesson outlines, and evaluation methods.

▪ **Target Sample**

Second stage university students - Department of English in the Faculties of Education and Basic Education.

▪ **Foundations of the Teacher's Guide**

The following foundations were taken into consideration in preparing the teacher's guide:

- Review the educational literature related to the topic.
- Survey of previous studies and research on ART.

▪ **The Educational Products of the Guide**

- Achieving educational outcomes for second-stage pupils in the reading comprehension course's first unit.
- Students practice a set of visual learning skills, such as visual intelligence skills, through using the proposed instructional program based on ART.
- Students enjoy changing ideas and events through integration, modification, and replacement.
- Students use digital multimedia to connect prior learning and new learning based on ART in several ways. Multimedia is based on the superimposing of digital content (audio, images, and text) over real-life scenes.

Application Framework of the Instructional Program

Dear Teacher,

The first decade of the current century witnessed great developments in the fields of communications and information technology. This rapid development has led to clear changes in various aspects, activities, and areas

of our daily life, whereby access to information and its circulation has become available to all. This is clearly reflected in the educational systems around the world.

The growing role of technology and information technology has had a clear impact on everything related to educational curricula, teaching methods, the language used in the teaching process, specializations, and educational and pedagogical plans.

This requires the instructors to have a scientific base that qualifies them to keep pace with educational challenges, knowledge accumulation, and the contribution of the use of knowledge for a better future. Education is not limited to merely obtaining information, it also provides educational strategies, different teaching methods for students, and how to benefit from this knowledge accumulation.

In light of the strong presence of technology in the twenty-first century, and the fact that it has become an essential part of our lives, the instructors must also pay attention to it in the educational process, as 75% of teachers (according to IT Trade Association, CompTIA) agree that technology has a positive impact on the educational process. The entry of technology has affected both the instructor and the learner alike, which pushed the instructor to acquire teaching skills using new technologies, such as smartphones, tablets, digital cameras, and computers. The same applies to the learner, as s/he uses advanced technology during the educational process, which contributed to raise his/her ability to deal with technology at an early time and providing him/her with important skills towards a successful life.

Therefore, educational scientists and specialists in educational affairs have made continuous attempts to develop teachers' preparation and improve their performance to suit the developments of the current era. The teacher's role is not only to convey information; s/he also becomes an organizer, facilitator, and guide for students' behaviour. On the other hand, the teacher becomes an assistant to students to produce knowledge and develop their thinking and intelligence through the use of effective teaching strategies. These strategies aim to develop the thinking and intelligence of students in our educational institutions..

No matter how diverse and different modern teaching strategies are, the quality and nature of the educational session, its purpose, content, level of

learners, and the specificity of each educational environment remain the determinant of any strategy used by the instructors. It is, of course, up to the instructor, as long as s/he is most knowledgeable with his class's requirements.

The other truth, dear teacher, is that intelligence is one of the important educational topics, as its importance stems from being one of the main goals that the educational process seeks to achieve. Therefore, teaching according to the program that is in your hands provides your students with the various capabilities that help to build their minds' ability to think, create, criticize, develop, and invent new ones.

Minds are the real wealth, and investing in them leads to development. So, the best way that can be used to achieve this is learning with Augmented Reality Technology. The learning with this technology makes the students ponder, interact, think, and conclude to gain knowledge. At the same time, it provides students with feedback that helps them come up with new ideas. Moreover, Augmented Reality Technology proposes solutions in light of which teachers can design new curricula, and it provides them with a framework through which they can address any educational content and present it in several different ways.

The Aim of the Guide

Dear teacher,

The program - that you have in your hands- represents the road map (lesson plans) that will be applied in order to achieve the desired goals.

Therefore, the guide aims to help you facilitate the teaching process by using a set of targeted, organised procedures that have been established and prepared in advance. This process is planned to address various educational content. It also suggests the appropriate teaching methods, a set of instructional activities and strategies for learning with ART, and feedback and evaluation methods.

Guide components

1. Teaching Strategies and Methods:

Dear teacher,

The teaching strategy is a set of procedures and practises that the teacher uses in the classroom to easily deliver the educational content of knowledge, information, and skills to students in such a way that they grasp the instructional material and are encouraged to interact with the instructor and other students. In short, it is the teacher's advanced preparation and planning for achieving instructional objectives. The current instructional program is based on some of the teaching strategies. The following is an explanation of each strategy and how to implement it:

a- Problem-Solving Strategy

It is a student-centered strategy that encourages students to take an active role in the learning process. It is a teaching strategy that searches for knowledge and information using the scientific method. The following are the basic steps in the problem-solving strategy:

- Feeling and identifying the problem.
- Exploring information and creating ideas.
- Formulating hypothesis.
- Testing the likely hypothesis.
- Analysis, interpretation and evaluation of evidence.
- Formulating conclusions.
- Evaluation.
- Homework.

b- Monitoring comprehension strategy

It is a process for students to determine and judge whether or not they understand what they're reading. If they realize that they cannot articulate the main idea of the passage, they can take steps to repair their comprehension before continuing to read. The following are the steps in this strategy:

- Stop at the end of a paragraph, section, or page.
- Think about whether the information presented has been understood (e.g., generate a main idea).

- Utilize various fix-up strategies, if necessary. Examples of fix-up Strategies:
 - Re-read the paragraph (silently or aloud)
 - Look up unfamiliar terms.
 - Find more information (e.g., seek out electronic or print references, ask someone for help with an unfamiliar topic).
 - Reference an adjacent graph, chart, or picture.
 - Reconstruct information in chart, image, concept map, etc.
 - Search for upcoming headings that will provide clarification.
- Evaluation.
- Homework.

c- Blended Learning strategy

Oxford Dictionary definition of Blended Learning: a style of education in which students learn via electronic and online media as well as traditional face-to-face teaching. It is an approach that integrate online with traditional face-to-face class activities in a planned, pedagogically valuable manner. The steps of blended learning strategy are as follow:

- Class starts with a bell ringer activity the teacher found on the Internet.
- The teacher instructs students to read a section of the textbook.
- A teacher-led discussion follows.
- Students break into groups to complete a related activity the teacher have created.
- The teacher ends the class assigning homework from textbook or eBook.

d- Recognizing Story Structure Strategy

Recognizing story structure is a strategy that aids comprehension by guiding students in analyzing the plot, characters, setting, and conflicts. By isolating these components of the story, students become more aware of foreshadowing, and engage at a deeper level. This strategy could be incorporated in lessons by splitting students into groups, and assigning each group one component of story structure. Each group could then share about plot, setting, time, etc. Also, Students could create a poster or presentation outlining these elements.

e- SWBST Strategy

The “Somebody Wanted But So Then” strategy provides a framework for summarizing a story by identifying and describing key story elements.

Using a table like the one below, have students fill in each box with a brief summary from the story. The teaching steps of this strategy are as follow:

- Model the ‘Somebody Wanted But So’ strategy by reading a selection of text aloud or retelling an event of story. Complete the SWBS four column chart: *Somebody* (character/figure), *Wanted* (goal/motivation), *But* (conflict), *So/So then* (resolution/outcome). Point out that there can be more than one ‘Somebody Wanted But So’ in a text selection/chapter and show how a second SWBS statement can be generated, if applicable.
- Read aloud a second text selection or retell an event. Ask students to identify the Somebody from the event. Write down the name of the person in the first column. Explain that the *Wanted* represents the plot or motivation of the person/people and complete the second column. Explain that the *But* is the conflict or challenge the person/people faced and record the student responses in the third column. Finally, explain that the *So* column is to record the outcome or resolution and complete this column. Then read aloud the summary statement.
- Assign another selection of text or retell an event and in pairs/groups students complete a SWBS chart. Share SWBS statements in small groups and discuss the similarities and differences in the statements, as well as evidence in the text used to support each statement. Continue to guide students until they can use the strategy independently.

Somebody Who is the main character?	Wanted What does the main character want?	But What is the problem or conflict?	So How does the problem get solved?	Then What is the result or outcome?

f- Get the Gist Strategy

It is a comprehension strategy that is used both during and after reading. It is an approach to summarize a text. It is a reading comprehension practice to help students identify and write brief main idea statements about sections of text. When using GIST, students create summaries that are 20 words or less for increasingly large amounts of text. The end product is a 20 word summary that is tight and precise. Students identify the most important idea in the story by using the following steps:

- Identify whether the paragraph is primarily about a person, place, or thing.
- Identify *which* person, place, or thing is being discussed.
- Identify what is being said *about* the person, place, or thing that the paragraph is principally about (i.e., identify the basic argument, angle, spin, or perspective that the section adopts regarding its topic).
- Restate the essence of the paragraph in a sentence containing ten words or fewer.
- Evaluation.
- Homework.

g- The Round Robin strategy

It is a brainstorming strategy where students are situated around a table in an academic discussion. Like other brainstorming sessions, students generate ideas on a specific topic or question. However, with this strategy, there is equal participation among students as well as multiple discussions taking place. Follow these steps to effectively use the Round Robin Discussion strategy in classroom:

- The best way to implement this strategy into classroom is to first think of the topic that the researcher wants students to discuss.
- Next, decide on the amount of questions or topics the researcher would like to be discussed so he knows how many tables/groups he will need.
- Arrange the desks or tables so that discussion flows nicely and students can move about easily. Also, consider the placement so that groups won't be distracted by other groups.
- Give each table one discussion sheet (preferably a different color) along with a variety of different-colored pens (this will help distinguish groups from one another). Assign one person the leader of the group and another the recorder.
- Set a timer for each group. Also, give groups tokens so when it's each student's turn to talk, they must turn in a token. This helps the groups move along.
- Once each group has gone (and before they move to the next group), have the leader present their group's ideas.
- Evaluation.
- Homework.

Tips to Make it Effective

Follow these tips to ensure that the researcher is implementing an effective brainstorming discussion strategy:

- Try to make groups as diverse as you can. Do not make them too small or too large. The ideal size is about four students to a group, two boys and two girls.
- After posing the question or topic idea, make sure that the researcher gives students a few minutes to think about it versus having them answer right away. The ideal think time is about one to three minutes.
- Use the three-step method when implanting this strategy:
 - Pose the question (What.....?).
 - Have students take turns brainstorming the answers.
 - Have the recorder write down the answers then the leader read them back to the group.
- Evaluation.
- Homework.

h- Flipped Classroom Strategy

The flipped classroom is defined as an educational model that aims to use modern technologies and the Internet in a way that allows the teacher to prepare the lesson through videos, audio files, or other media, so that students can see it in their homes or anywhere else using their computers, smartphones or tablets before attending the lesson. The video is an essential element in this style of education, where the teacher prepares a video of 5-10 minutes and shares it with students on a website or social network. The Four Pillars of F-L-I-P are: Flexible Environment, Learning Culture, Intentional Content, and Professional Educator.

Jeff Dunn (2014) has wrote a short piece on “The 6-step guide to flipping the classroom”, which presented 6 easy steps for implementing flipped classroom strategy.

- Plan: Figure out which lesson in particular the teacher want to flip. Outline the key learning outcomes and a lesson plan.
- Record: Instead of teaching this lesson in-person, make a video. A screencast works. Make sure it contains all the key elements the instructor would mention in the classroom.
- Share: Send the video to the students. Make it engaging and clear. Explain that the video’s content will be fully discussed in class.
- Change: Now that the students have viewed the lesson, they are prepared to actually go more in-depth than ever before.
- Group: An effective way to discuss the topic is to separate into groups where students are given a task to perform. Write a short story, a paragraph, make a video, etc.

- Regroup: Get the class back together to share the individual group's work with everyone. Ask questions, dive deeper than ever before.

After the six steps, Review, Revise, and Repeat.

Learning with ART:

Learning with ART confirms that teaching should include the following procedures: -

- **Working mechanism of ART:** There are two types of ART used in this proposed program. The first of which is Marker Based Augmented Reality or MBAR, and the simplest example of this type is the QR codes that we see almost everywhere in our time. In this type, for example, the smartphone scans QR codes, and then enters it in a graphic processing process in order to convert what we see on the camera into a digital image, whether it is static or moving. The second type is Recognition Based Augmented Reality RBAR, which depends on the EyeJack Creator Application by scanning the image of the passage or story by the camera, and then displaying the required information on the smartphone screen.
- **View Mechanism of ART:** ART is presented in this proposed instructional program by smartphones and tablets. It is possible to use applications such as (EyeJack App and QR Code Reader App) with these devices that allow to display an interactive augmented environment.
- **Time:** The lessons are designed to take (120) minutes for each.
- **Teaching:** The teaching plans included (8) strategies and learner-generated visuals strategies that the researcher used in teaching the instructional program based on the experts' selection of these strategies, namely (Problem-Solving Strategy, Monitoring comprehension strategy, Blended Learning strategy, Recognizing Story Structure Strategy, SWBST Strategy, Get the Gist Strategy, The Round Robin strategy, and Flipped Classroom Strategy).

Note: the researcher was free to use the strategies to teach the topics of reading comprehension.

2. The instructional Activities Used in the Current Proposed Program:

The aim of the activities used in the current proposed program is to achieve meaningful understanding, retention, application, and practice with

feedback. Visual Reading Comprehension activities depend upon sufficient development of decoding skills and language comprehension skills. If a learner is having trouble with a reading comprehension activity, it is probably because he needs more instructional support focused on helping him to develop language comprehension and/or decoding skills.

Comprehension activities involve helping learners to fluently read and understand connected text. The text can be expository or narrative, and the instructional activity may focus their attention on different levels of comprehension (explicit, implicit, etc.). Further, reading comprehension instruction may focus on helping the students learn to preview selections, anticipate content, or make connections between what they will read and what they already know. Similarly, instruction that focuses on comprehension might focus on helping students learn to compare pictures, diagrams, illustrations, graphic organizers, characters, events, and themes of different stories. Activities were selected based on:

- Correlation to the cognitive framework of comprehension to develop the achievement and visual intelligence skills of the target research sample.
- Utility in the classroom.

Some of the most effective ways to engage the students are interactive teaching activities to encourage reading, speaking and writing in the classroom. Among these activities are:

- a. teacher-student interaction activities
- b. student-student interaction activities
- c. audio, visuals, video activities
- d. Individual student activities
- e. Student pair activities
- f. Student group activities

Therefore, the instructional program consists of a group of visual enrichment activities (See Appendix 33) which are as follows:

- a. Introductory activities:** They are assigned to students before the start of the lesson. They are to prepare students psychologically, physically, and mentally. They may be related to previous learning that leads to new learning.
- b. Formative activities:** They are instructional learning activities performed by each of the instructors and students during the presentation of the lesson.

- c. **wrap-up activities:** They are carried out at the end of the each lesson, taking into account individual differences between students. Students can perform them as homework.

The instructional program is also included the following visual activities :

- Graphic Organizers
- Diagrams.
- Mental and conceptual maps.
- Videos.
- Pictorial stories
- Puzzles
- Pictures.

3. Instructional Tools and Means Used in the Proposed Program:

The means of the instructional program varied, addressing more than one of the students' senses. They are as follows:

- Automatic devices: internet, smartphones, tablets, laptops, audio files, videos, and data show).
- Non-automatic devices: whiteboard ,markers, and worksheets).

4. Teacher's Guide Directions and Instructions:

Dear teacher

This guide has been prepared for you so that you can guide it through your steps, and you must ensure that:

- The obligation to implement the steps of the instructional lesson at a time commensurate with the level of your students and the nature of the strategies. The times set approximately for each of these steps may help you control the lesson.
- Taking into account the different needs of your students and their diversity, such as types of intelligence, learning styles, their previous experiences, tendencies and interests.
- You have to present the instructional content to your students in a variety of ways, as learning with ART requires positive participation by students in planning, decision-making, and evaluation processes.
- Focusing on big ideas and concepts is more important than the details that do not add scientific value to the subject of learning.

- Helping students to understand and create meaning in the sense of converting information into knowledge, which the student can use and employ in multiple situations.
- Learning with ART builds on the premise that students are different and learn in different ways.
- Activating group dialogue, which is one of the best activities that work to strengthen the bonds of love and understanding between your students, respect each other, and strengthen social relations between them.
- The evaluation process is a continuous process before, during and after teaching with ART. On the basis of the evaluation results, you can identify the level of your students and plan to meet their needs.

5. Instructional Lessons:

Dear teacher,

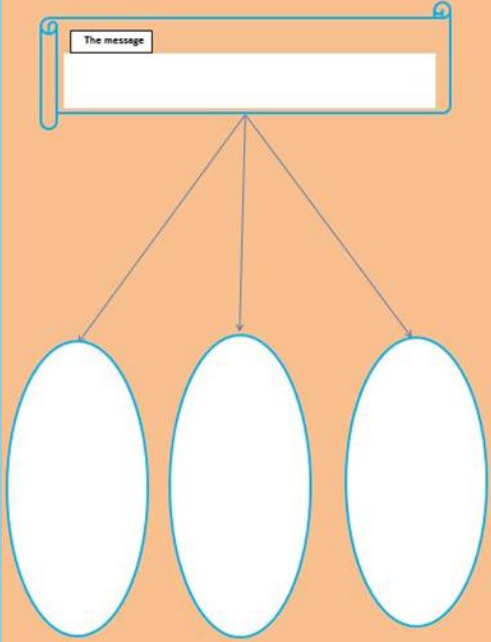
The following are planned lessons according to the instructional program for teaching reading comprehension subject for second stage students in the Department of English Language:

Teacher: Ahmed Ali Alwan		Date: / / 2021		Overall Time: 120 min.	
Level : 2 nd Stage University Students			Department: English Language, College of Basic Education		Story Title: A Noble Gangster
Lesson Focus: Comprehension.					
Lesson Skills Emphasized: Visual intelligence skills, Reading, speaking, writing, listening & understanding.					
Objectives/ Standards: By the end of the lesson, students will be able to: • Use their imagination to portray and describe thoughts (ideas) when reading the story. • Elicit specific information from the text (to get information about what you know and don't know). • Use their senses to connect the characters, events, and ideas to clarify the picture in their mind. • Relate text content to particular social issues, concerns or dispositions in life. • Present – with appropriate introduction, development, and conclusion – the ideas of the assigned story in an effective order. • Interpret the visual images used and manipulate information presented in this story.					
Materials and Aids Used:					
Lesson Outline					
Stages	Procedures		Techniques, teaching Strategies & methods	Interaction	Time
	Teacher's Activities (T)	Students' Activities (Ss)			
Warm up	• T greets Ss and welcomes them with smile. • T: How are you today? As T learns more about his Ss, he can vary his questions depending on their activities and interests. • T: I'm happy that you are here. • T tells Ss what your expectations are for the day? • Checking attendance (T checks the Ss' attendance) by asking: who is missing today?	• Ss: We are doing well! Thanks for asking. And how about you?		T ↔ Ss	10 min

Preparation	• T makes sure that all Ss downloaded the QR Code Reader app and Eye Jack app. • T makes sure that all Ss connected to internet network and they are online. Note: this lecture was in classroom.	• Ss make sure that these apps are available on their smartphones. • Ss do all T's instructions and directions .			20 min.
Presentation : pre-reading stage	• T asks Ss to open their textbook on the story “A Noble Gangster” on page (38). • T asks them to look at the QR code, that they pasted it before in the top right of the page. • T asks them to open their smartphones cameras and scan the QR Code to open the augmented reality link related to the story. • After opening the link, a new interactive Google site page will display on the screens of Ss' phones. (See Appendix 12). • T makes sure that the Ss scanned the required QR Code and the new Google site page is opened. • Now T introduces Ss to the topic of the story. • T asks Ss: Can you tell me what this picture is about?  				20 min.

	After answering the above question, T asks another question: Based on the title of the story above, what is the hardest part for this character of being in gang?	Ss work in groups to answer the questions, grasp meaning and analyse it using life experience knowledge.		T ↔ Ss Ss ↔ Ss	
Practice : while reading stage	- T gives Ss a vocabulary bank chart to help them know the difficult and new words in the story. - T asks Ss to look at another two pictures. He tells Ss: this will give you hints about the information of the story. Moreover, it will make you ready to use your prior knowledge to talk about what is going to happen in the story? - Now play this video to watch the whole story of "A NOBLE GANGSTER". - For more understanding, Please press on the link of following audio recording to listen to the whole story of "A NOBLE GANGSTER": http://www.listeningexpress.com/nce-a/book3/14-A-Noble-Gangster.html	- Ss individually read the vocabulary bank and the teacher asks if there is any question. - Ss in pair work look at pictures presented and do the associated activities by inferring, justifying and comparing their prior knowledge. - Ss listen and watch the video, extract specific details in the video, classify them and rely on them to interact with the T. Or their peer about the video.	Blended learning		35 min.
Production: post- reading	- Encourage Student Participation: While some students willingly speak up, others have difficulty sharing their ideas so try to keep student voices balanced. Asking open-ended questions is also a good way to get the class talking. - After watching the video and listen to the audio recording above, try to answer the following questions: 1- Scan and analyse the story by identifying and summarizing required information, such as similarities and differences, problem and solution, and causes and effects. 2- Determine and respond to main idea of the	Ss work in groups of 3 Or 4 to answer the post-reading questions, and to elicit information from their classmates about the current story, classify them in a chart, produce a short note or a report about what they found and be ready to present it to the whole class.	Discussion	Ss ↔ Ss	30 min

	story, such as follow the sequence and argument, identify conclusion, distinguish fact from opinion, and give a personal response to the theme of the story. 3- What do you think is going to happen next if Hawkwood did not die at the age of eighty? Make a prediction and share it with your group. 4- Use the information and notes given in question (2) above to write a summary of (80) words about the story. 5- What is the intention of the author when he writes "obtaining protection money is not a modern crime". 6- What a message or theme have you communicated in this story? Write the theme (message) of the story in the scroll at the top of the page below. Then write three examples that demonstrate the theme:				

					
Homework	• T tells Ss to solve the exercises in page 39 in student's textbook.				
Wrap-up	• Have Ss evaluate the lesson. " Did you enjoy the activities". • T asks Ss " what are your feelings about today's lesson?" • Elicit the answers. • Say goodbye.				5 min

As for EyeJack Creator Application:

For more benefit, the teacher asked the students to open the second application EyeJack Creator and point the camera of the smartphone or tablet at the image of the story No. (14). When scanning and reading this image by the smartphone camera, the application will display a text with short video on the screen of the smartphone which explained and gave more information related to the topic of the story.



Teacher: Ahmed Ali Alwan		Date: / / 2021		Overall Time: 120 min.	
Level : 2 nd Stage University Students			Department: English Language, College of Basic Education		Story Title: Sixpence Worth of Trouble
Lesson Focus: Comprehension.					
Lesson Skills Emphasized: Visual intelligence skills, Reading, speaking, writing, listening & understanding.					
Objectives/ Standards: By the end of the lesson, students will be able to: - Find information from the text that might be clues to the answers and use these with their background knowledge for possible answers. - Determine the relevance and the truthfulness of the ideas presented in the material reviewed. - Use the context to help guess the meanings of unfamiliar words. - Say their point of view towards the text by reformulation of ideas in a new way. - Link what they read or hear to their own experiences. - Begin to draw inferences from the text or the illustrations. - Write phrases from memory, and adapt these to create new sentences, to express ideas and events of the story clearly. - Picture the words as images in their mind.					
Materials and Aids Used:					
Lesson Outline					
Stages	Procedures		Techniques , teaching Strategies & methods	Interaction	Time
	Teacher's Activities (T)	Students' Activities (Ss)			
Warm up	- T greets Ss and welcomes them with smile. - T: How are you today? As T learns more about his Ss, he can vary his questions depending on their activities and interests. - T: I'm happy that you are here. - Checking attendance (T checks the Ss’ attendance) by	Ss: We are doing well! Thanks for asking. And how about you?		T ↔ Ss	10 min

	asking: who is missing today?				
Preparation	- T makes sure that all Ss downloaded the QR Code Reader app and Eye Jack app. - T makes sure that all Ss connected to internet network and they are online. Note: this lecture was in classroom.	- Ss make sure that the apps are working on their smartphones. - Ss do all T's instructions and directions .			15 min.
Pre-Reading Stage	- T asks Ss to open their textbook on the story "Sixpence Worth of Trouble" on page (40). - T asks them to look at the QR code that they pasted it before in the top right of the page. - T asks them to scan the QR Code by their cameras to open the augmented reality link related to the story. - T makes sure that the Ss scanned the required QR Code and the new Google site page is opened. (See Appendix 12) The lesson goes through the following steps: 1- Sensing and identifying the problem :T begins the lesson asking the Ss to look at the clues in the title of story and the pictures below to help them understand what is the problem? what is going on in the story? And What information do they get from these pictures?  	- Ss do T's instructions and directions. 2- Exploring information and creating ideas: Ss work in groups, discuss orally, try to explore information and create ideas, to reach a solution of the problem, so that in the end, each student is able to give his answer or opinion. - Ss suggest and gather some information about these pictures. Student 1: The boy was	Problem Solving Strategy	T ↔ Ss Ss ↔ Ss	25 min.

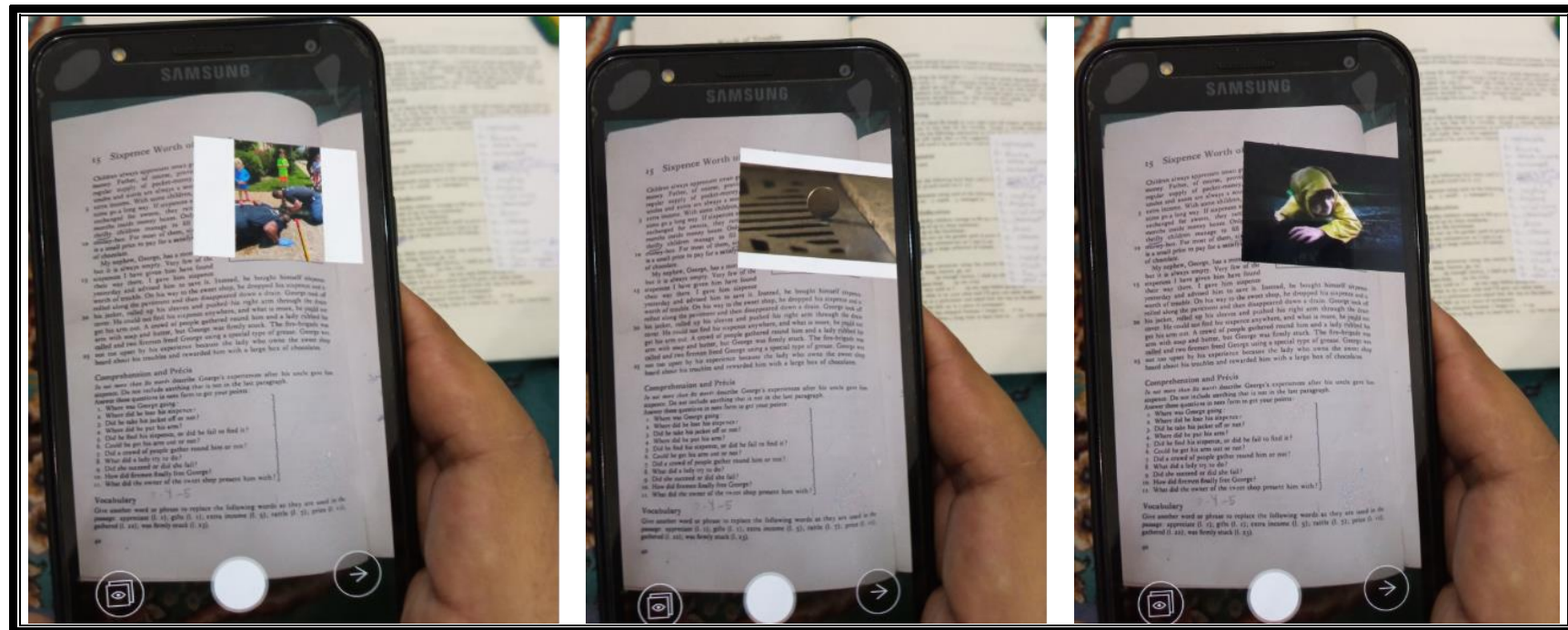
	T thanks Ss and tells them that the problem is: The boy dropped his money in the drain. He pushed his right arm through the drain cover but he could not get his arm out. 3- Suggestion of the solution plan: T asks some questions: Have you seen a similar problem before that is related to the current problem? And what was its solution? Can you use this solution to solve the current problem?	injured. Student 2: the boy fell into the mud. Student 3: The boy dropped his money in the drain. He pushed his right arm through the drain cover but he could not get his arm out. - Ss' own suggestions about the solution plan. - Ss in pair work look at pictures presented and do the associated activities by inferring, justifying and comparing their prior knowledge.			
While-Reading Stage	4- Implementation of the solution plan : T asks Ss: Have you used in the solution plan all the information given to you? Did you take into account all the conditions and realize all the relationships? 5- Achieving the solution: T asks Ss the following: Does the solution reached fulfill all the conditions mentioned in the problem? Are there solutions other than the solution you have reached? Now T asks Ss to listen to the following audio recording of the story "Sixpence Worth of Trouble" by clicking on the link below: http://www.listeningexpress.com/nce-a/book3/15-Fifty-Pence-Worth-of-Trouble.html	- Ss work in groups of 4 to answer the questions and suggest a solution to the problem. - Ss listen to the audio, extract specific details in the audio, classify them and rely on them to interact with the T. Or their peer about the video.			35 min.

Post-Reading Stage	- After listening to the story, T asks to answer the following questions: 1- What did the author try to tell us? 2- How did this story make you feel? 3- Is there anything else you still to know about this story? What is it? 4- With your own words, write a summary of about (80) words about this story? Restate the important events or facts from the story? 5- Describe the following pictures. Write three sentences about each:  picture 1 picture 2 picture 3 6-Make connections about how did the story remind you of yourself, another text, or the world? *T provides Ss with a making connection worksheet. 7- Create a story map of what occurred during the story? * T provides Ss with a story map graphic organizer.	Ss work in groups of 3 Or 4 to answer the questions.	Discussion	Ss ↔ Ss	30 min
Homework	- T asks Ss to solve the exercises on page (41) in student's textbook. - T asks Ss to write a short story of (200) words about the following topic: "All people must help each other".				
Wrap-up	- T distributes "Exit Tickets" on the Ss that are short writing tasks by asking them to complete before the end of a class. The tickets provide teachers with a quick feedback on students' learning progress. By collecting the tickets from students, you can: ❖ get feedback from students (about their understanding				5 min

	of a certain topic/ feeling about the class/ muddiest point etc.) ❖ require students to apply what they have learnt. some possible questions are: 1. Name one important thing you learned in class today. 2. Write one question still in your mind after today's lesson. 3. Do you have any suggestions for how today's class could have been improved? 4. We had a learning activities in class today. Were these useful learning activities for you? Why or why not? 3 Things I Learned Today 1. _____ 2. _____ 3. _____ 2 Things I Found Interesting 1. _____ 2. _____ 1 Question I Still Have 1. _____				

As for EyeJack Creator Application:

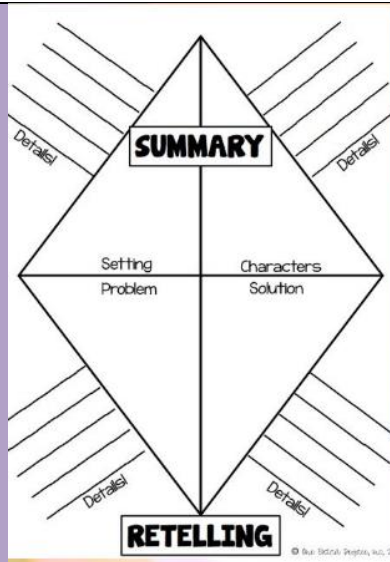
For more benefit, the teacher asked the students to open the second application EyeJack Creator and point the camera of their smartphone or tablet at the image of the story No. (15). When scanning and reading this image by the smartphone camera, the application will display a presentation of a set of images on the screen of the smartphone which explained and gave more information related to the topic of the story.



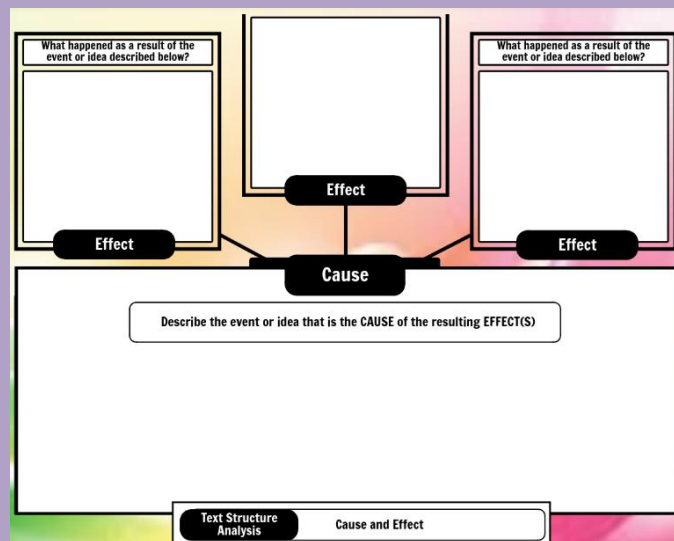
Teacher: Ahmed Ali Alwan		Date: / / 2021		Overall Time: 120 min.	
Level : 2 nd Stage University Students			Department: English Language, College of Basic Education		Story Title: Mary Had a Little Lamb
Lesson Focus: Comprehension. Lesson Skills Emphasized: Visual intelligence skills, Reading, speaking, writing, listening & understanding.					
Objectives/ Standards: By the end of the lesson, students will be able to: • Write brief notes, symbols, and abbreviations to point out important ideas in the story. • Use prior knowledge to understand the story. • Draw inferences such as inferring characters' feelings, thoughts and motives from their actions. • Write phrases from memory, and adapt these to create new sentences, to express ideas clearly. • Describe people, places, things and actions of the story orally and in writing. • Write creatively to express their own ideas and opinions, and translate the difficult sentences accurately into Arabic language. • Take part in a short conversation, asking and answering questions, and exchanging opinions.					
Materials and Aids Used:					
Lesson Outline					
Stages	Procedures		Techniques, teaching Strategies & methods	Interacti on	Time
	Teacher's Activities (T)	Students' Activities (Ss)			
Warm up	• T greets Ss and welcomes them with smile. • T: How are you today? As T learns more about his Ss, he can vary his questions depending on their activities and interests. • Checking attendance (T checks the Ss' attendance) by asking: who is missing today? • Homework check: T checks Ss' homework answers of the previous lesson and supply correct answers.	• Ss: We are doing well! Thanks for asking. And how about you?		T ↔ Ss	15 min

Preparation	- T makes sure that all Ss downloaded the QR Code Reader app and Eye Jack app. - T makes sure that all Ss connected to internet network and they are online. Note: this lecture was in the classroom.	- Ss make sure that the apps are working on their smartphones. - Ss do all T's instructions and directions .	Blended learning		5 min
Presentation/ Pre-Reading Stage	- T shows Ss three photos related to the topic.  Photo #1 Photo #2 Photo #3 - T makes a brainstorm activity about these photos? - T asks Ss what can you see in these photos? Can you describe them? - T gives Ss an activity: In groups of 4 people, write the related words that you think will appear in the story? let's see how many words can you find?				25 min.
Practice/ While-Reading Stage	- T asks Ss to open their textbook on the story “Mary Had a Little Lamb” on page (42). - T asks them to look at the QR code that they paste it before in the top right of the book page. - T asks them to scan the QR Code by their smartphones or tablets cameras to open the augmented reality link related to the story. - T makes sure that the Ss scanned the required QR Code and the new AR content is displayed on Google site page. 	- Ss do T's instructions and directions. - Ss will watch the captioned video twice.	Blended learning	T ↔ Ss Ss ↔ Ss	30 min.

	(See Appendix 12) The lesson goes through the following steps: 1- T asks Ss: Now, try to watch the video about the story " Mary Had a Little Lamb" by clicking on the following link: https://edpuzzle.com/assignments/602593d20f669942ad4ecb15/watch 2- A teacher-led discussion is followed. 3- T elicits what the story is about?				
Production / Post-reading stage	4- T writes a list of questions about the story on the board. Read the questions with Ss and makes sure they understand them before beginning. 5- T seats Ss in two circles or rows facing each other. He asks them to discuss the first questions on the list for two minutes. After two minutes, the Ss move seats so they are sitting facing another person and can discuss the next questions on the list. 6- T continues until Ss have had a chance to discuss all the questions. Some of the proposed questions are: • Try to guess the meaning of the following words: tiny, tied to, acquired, stealing. • What message does the writer want us to know? • What background knowledge do you have that relates to this story? • Write what happened in the story using the following graphic organizer to help organize your ideas:	• Ss in group work answer the questions.		Ss ↔ Ss T ↔ sS	35 min



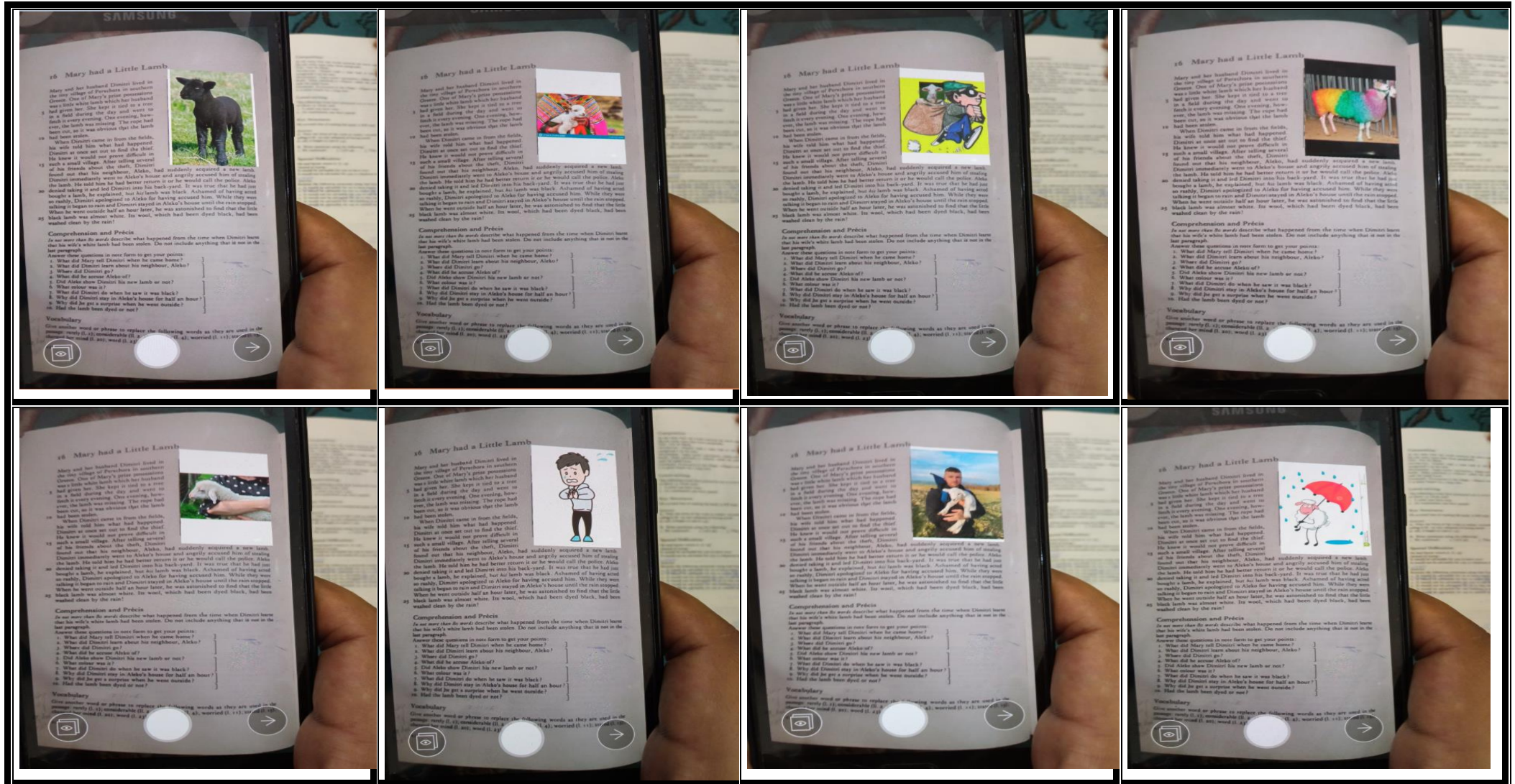
- One of the most important patterns of the story structure analysis is cause and effect. Determine the causes and effects of the story, and write them in the diagram above.



	• In not more than (80) words describe what happened from the time when Dimitri learnt that his wife's white lamb had been stolen. • What did Dimitri do when he saw the lamb was black? • Why did he get a surprise when he went outside? • Had the lamb been painted or not? • Write sentences using the following words: ✓ We continued..... ✓ Let's go ✓ This shirt needs ✓ Excuse me • Give the opposite of the following words: ✓ Return ✓ missing ✓ accused				
Homework	• T asks Ss to solve the exercises in page 43 in student's textbook. • T asks Ss to choose a picture from an online magazine and instruct them to use the outline for short stories as a guide to write a short story about the picture selected.				
Wrap-up	• T asks Ss the following questions : ❖ How does today's lesson impact your understanding? ❖ What was one think you were unsure about in the today's story? ❖ What was the most difficult concept in today's lesson.			T ↔ Ss Ss ↔ Ss	10 min

As for EyeJack Creator Application:

For more benefit, the teacher asked the students to open the second application EyeJack Creator and point the camera of their smartphone or tablet at the image of the story No. (16). When scanning and reading this image by the smartphone camera, the application will display an audio recording with a set of images on the screen of the smartphone which explained and gave more information related to the topic of the story.



Teacher: Ahmed Ali Alwan		Date: / / 2021		Overall Time: 120 min.	
Level : 2 nd Stage University Students			Department: English Language, College of Basic Education		Story Title: The Great Bridge in the World
Lesson Focus: Comprehension.					
Lesson Skills Emphasized: Visual intelligence skills, Reading, speaking, writing, listening & understanding.					
Objectives/ Standards: By the end of the lesson, students will be able to: • Generate new ideas or ways of viewing things in the given story. • Make connections based on the events of the story. • Identify the overall message, key points, details and opinions in written passage, involving some more complex language, and recognizing the relationship between past, present and future events. • Demonstrate understanding by being able to scan for particular information in the story. • Use the context to help guess the meanings of unfamiliar words. • Say what they like or dislike about the story. • Read a story on the same topic to find and compare information.					
Materials and Aids Used:					
Lesson Outline					
Stages	Procedures		Techniques, teaching Strategies & methods	Interacti on	Time
	Teacher's Activities (T)	Students' Activities (Ss)			
Warm up	• T greets Ss and welcomes them with smile. • T: How are you today? As T learns more about his Ss, he can vary his questions depending on their activities and interests. • Checking attendance (T checks the Ss’ attendance) by asking: who is missing today?	• Ss: We are doing well! Thanks for asking. And how about you?		T ↔ Ss	20 min

	Homework check: T checks Ss' homework answers of the previous lesson and supply correct answers. Note: this lecture was taken place in the classroom.				
Preparation	- T makes sure that all Ss downloaded the QR Code Reader app and EyeJack app. - T makes sure that all Ss connected to internet network and they are online. - Before a day of our lecture, the T uploads a video on their Whatsapp group. Have Ss watch the video entitled " China Has Opened the World's Longest Sea Bridge". The video can be found at: https://www.youtube.com/watch?v=jLCxIB2PwMM&t=23s - The second day and after watching the video, T distributes the class into 4 groups. Then he asks them the following question: What did you see ?Write a description of 5 sentences about this video. - T arranges the desks or tables so that discussion flows nicely and students can move about easily. Also, consider the placement so that groups won't be distracted by other groups. - T gives each table one discussion sheet (preferably a different color) along with a variety of different-colored pens (this will help distinguish groups from one another). He Assigns one person the leader of the group and another the recorder. - Set a timer for each group. - The first student -in each group- begins writing his answer	- Ss make sure that the apps are working on their smartphones. - Ss do all T's instructions and directions .	The Round Robin strategy	T ↔ Ss Ss ↔ Ss	25 min.

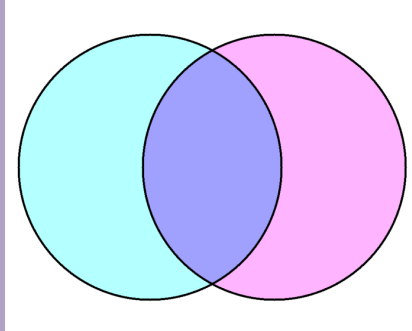
	on the sheet and passes it on to his classmate. - The second student -in each group- reads his colleague's answer and adds new information without modifying the errors, then passes the sheet and so on. - The answers are presented by the leader of each group in front of the class, and the discussion takes place.				
Presentation/ Pre-reading stage	- T asks Ss to open their textbook on the story " The Great Bridge in the World " on page (44). - T asks them to look at the QR code in the top right of the page. - T asks them to scan the QR Code by their smartphones cameras to open the augmented reality link related to the story. - T makes sure that the Ss scanned the required QR Code and the new Google site page is opened. (See Appendix 12). 	Ss do T's instructions and directions.	Blended Learning	T ↔ Ss Ss ↔ Ss	30 min.
Practice/ While- Reading Stage	The lesson went through the following steps: - T asks Ss: Now, try to watch the video about the story " The Great Bridge in the World " that is prepared and modified by the teacher with help of edpuzzle.com Site. It is found on the Internet- by clicking on the following link: https://edpuzzle.com/media/6026f0d8116a6f42652b4af5 NOTE: Edpuzzle is a free assessment-focused tool that allows teachers and students to create interactive online videos by including open-ended or multiple-choice questions, audio notes, or video comments. Edpuzzle's interactive videos can be created using videos from a number of websites, including YouTube, TED, Vimeo, and National Geographic. - After watching the video related to the story, T asks Ss to		Monitoring Comprehension Strategy		

	think about whether the information presented has been understood. - T makes sure that his Ss understood the information presented, T utilizes various fix-up strategies by asking them to: ✓ Re-watch the video. ✓ Look up unfamiliar words such as agreeable, immortal, span, immense, suspended. ✓ Reconstruct information in concept map.				
Production / Post-reading stage	- T asks Ss to answer the following question related to our today's story: - Re-tell the story in your own words trying to generate new ideas and events. - Does this story remind you of something else you have read? Is it similar to something else happening in the world right now? How does it relate to your life? (Draw a diagram to explain your answer). - How far above the surface do the towers of the bridge rise? - Sometimes when reading, we come across a word that we don't quite know the meaning of. Use the context clues in the sentence to find the meaning of the following unknown red words: - I don't wish to impede your progress, I was merely trying to make sure you understand the instructions. - Slow - Improve - Exaggerate - She showed great prowess in the engineering competition and won first prize. - Anxiety - Patience - Skill - The coach admonished her for picking daisies when she should have been defending the goal. - Criticized - Praised - Listened - Read the following text about the bridges. By using Venn Diagram try to find and compare information with today's story: The Golden Gate Bridge in San Francisco took four years to			Ss ↔ Ss T ↔ sS	35 min

build, costing \$35 million and finally opened in 1937. It has remained one of the engineering world's most famous poster boys since. But it's not the only bridge that merits celebration. Here are 23 others (plus San Fran's Golden Gate) that are worth a look. Now over 75 years old, San Francisco's Golden Gate Bridge is arguably the most recognizable bridge in the world. While some may not be inspired by the industrial age suspension bridge design, it is undeniable that the San Francisco we know today would not be the same without its skyline being graced by this beauty.

In parts of China many bridges had to stand in the spongy silt of river valleys. As these bridges were subject to an unpredictable assortment of tension and compression, the Chinese created a flexible masonry-arch bridge. Using thin, curved slabs of stone, the bridges yielded to considerable deformation before failure.

In the Great Stone Bridge (also called the Zhaozhou Bridge) in southern Hebei province, China, built by Li Chun between 589 and 618 CE, the single span of 37 metres (123 feet) has a rise of only 7 metres (23 feet) from the abutments to the crown. This rise-to-span ratio of 1:5, much lower than the 1:2 ratio found in semicircular arches, produced a large thrust against the abutments. To reduce the weight, the builders made the spandrels (walls between the supporting vault and deck) open. The Great Stone Bridge thus employed a form rarely seen in Europe prior to the mid-18th century, and it anticipated the reinforced-concrete designs of Robert Maillart in the 20th century.



Homework	T asks Ss to solve the exercises in page 45 in student's textbook.				
Wrap-up	- Have Ss write "I can" statements on a worksheet. This will help to recognize what Ss are learning and what they would like to know, respectively. The suggested statements are: ✓ I can find examples of cause and effect in the story. ✓ I can identify the author's purpose in the story. ✓ I can determine and clarify the meaning of unknown and multiple – meaning words and phrases. ✓ I can refer to details and examples in the story when explaining what the story says and when drawing inferences from the story. ✓ I can demonstrate understanding by being able to scan for particular information in the story. ✓ I can carry out my assigned discussion role. ✓ I can participate collaboratively in a range of discussion.			T ↔ Ss Ss ↔ Ss	10 min

Teacher: Ahmed Ali Alwan		Date: / / 2021		Overall Time: 120 min.	
Level : 2 nd Stage University Students			Department: English Language, College of Basic Education		Story Title: Electric Currents in Modern Art
Lesson Focus: Comprehension.					
Lesson Skills Emphasized: Visual intelligence skills, Reading, speaking, writing, listening & understanding.					
Objectives/ Standards: By the end of the lesson, students will be able to: • Use visual context clues to figure out the meaning of unfamiliar or new words. • Convey information and narrate events coherently and confidently, using and adapting language for new purposes. • Identify the overall message, key points, details and opinions of the story, and recognize the relationship between past, present and future events. • Explain the main purpose of the story and summarize it succinctly. • Explain the author’s viewpoint in the story and present an alternative point of view. • Participate in discussions, listen attentively and respond to others’ points of view, draw on evidence and explaining. • Use written and visual clues from the story as well as your own personal experiences to make predictions about what might happen before, during and after reading.					
Materials and Aids Used:					
Lesson Outline					
Stages	Procedures		Techniques, teaching Strategies & methods	Interacti on	Time
	Teacher's Activities (T)	Students' Activities (Ss)			
Warm up	Note: this lecture was online (electronic) taking place on Google Classroom Platforms. • T greets Ss and welcomes them with smile. • T: How are you today? As T learns more about his Ss, he can vary his questions depending on their activities and interests. • Checking attendance (T checks the Ss’ attendance) by asking: who is missing today?	• Ss: We are doing well! Thanks for asking. And how about you?		T ↔ Ss	20 min

	Homework check: T asks Ss to upload their previous homework on Google classroom platform page to check Ss' homework answers of the previous lesson and supply correct answers.				
Preparation	- T asks Ss to open and check their Google classroom application to start the lecture. - T makes sure that all Ss are ready to play the QR Code Reader app and EyeJack app. - T makes sure that all Ss connected to internet network and they are online.	- Ss make sure that the apps are working on their smartphones. - Ss do all T's instructions and directions .		T ↔ Ss Ss ↔ Ss	25 min.
Presentation/ Pre-reading stage	- Firstly, T tells Ss to make a list of their favourite modern arts. Then he gives them some time to do it individually without discussing it with other Ss. Later Ss are divided into 5 groups and begin to discuss their answer with the classmates by reading all their answer together. After T tells every group to choose the best art by discussing with the classmates, the groups leaders share their ideas with the classmates about why they choose that art as the best among other modern arts. - Then T starts to talk about modern sculptures and ask if they know anything about it. He shows them some pictures of modern sculptures and paintings samples to understand better and he may be choose some students to describe these artworks and discuss the features of them with the classmates. Also, the T asks them about how they can classify the modern art movements.	- Ss make discussion to share their ideas and information related to the topic of the story. - Some of Ss begin to give their answer. Among the suggested answers were: The modern art movements include Neo-Impressionism, Symbolism, Fauvism, Cubism, Futurism, Expressionism, Suprematism, Constructivism, Metaphysical painting, De Stijl, Dada, Surrealism, Social	Discussion technique	T ↔ Ss Ss ↔ Ss	30 min.

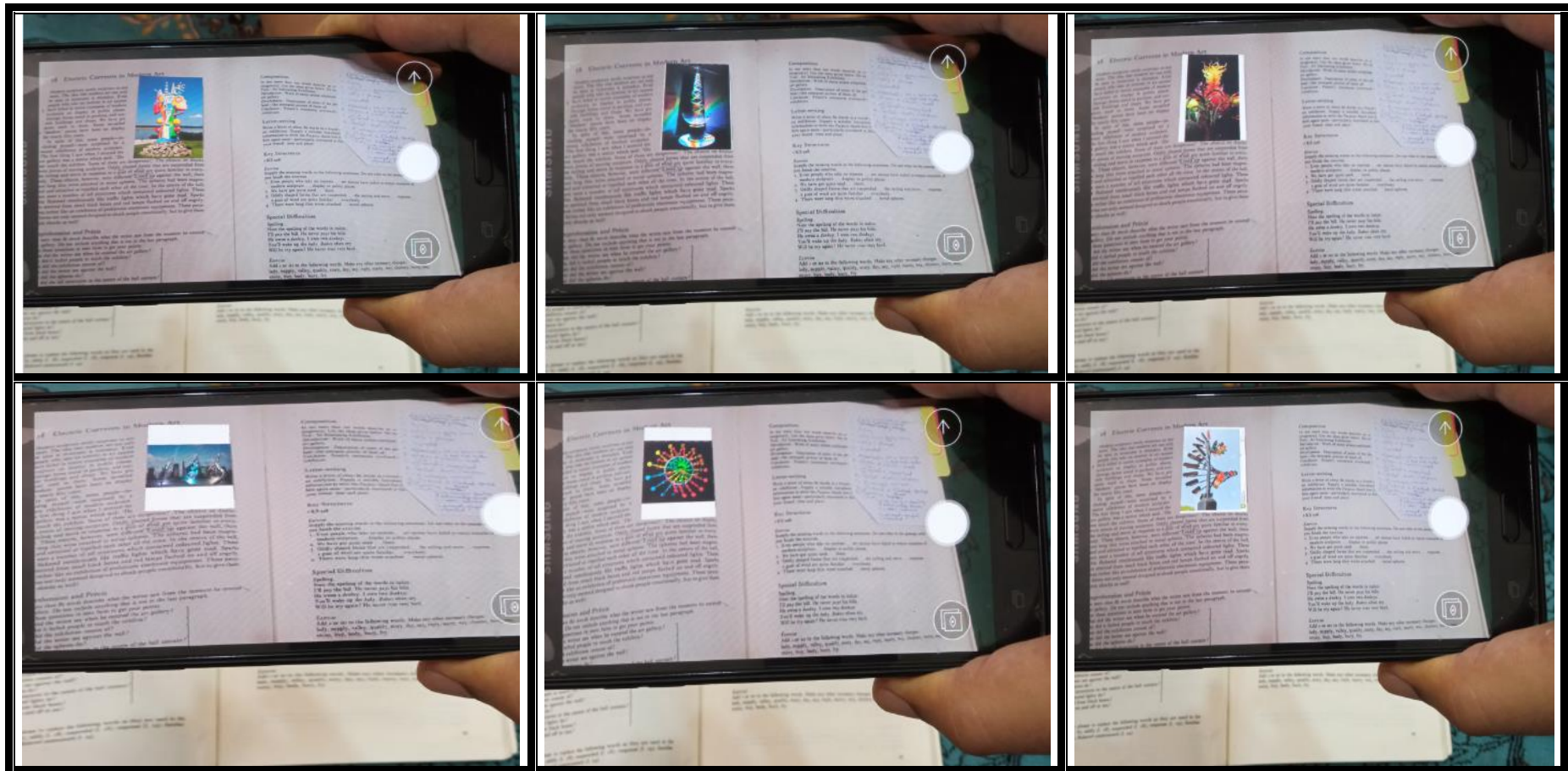
		Realism, Abstract Expressionism, Pop art, Op art, Minimalism, and Neo-Expressionism. Some answer were: the types of plastic art include: painting, sculpture, ceramic art, collage, paper art, Origami paper folding; metalworking, glass blowing art, mosaics; wood-working, and sand art.			
	- On the Google Classroom, T uploads the QR Code related to the AR content of the story No. (18) “Electric Currents In Modern Art” on page (46). - T asks them to scan the QR Code by their smartphones cameras to open the augmented reality link related to the story. - T makes sure that the Ss scanned the required QR Code and the new Google site page is opened. (See Appendix 12). - T tells Ss to read the story below in a silent way. After finishing, T asks them some questions about the story: Modern sculpture rarely surprises us anymore. The idea that 	Ss do T's instructions and directions.			

Practice/ While- Reading Stage	modern art can only be seen in museums is mistaken. Even people who take no interest in art cannot have failed to notice examples of modern sculpture on display in public places. Strange forms stand in gardens, and outside buildings and shops. We have got quite used to them. Some so-called 'modern' pieces have been on display for nearly eighty years. In spite of this, some people—including myself—were surprised by a recent exhibition of modern sculpture. The first thing I saw when I entered the art gallery was a notice which said: 'Do not touch the exhibits. Some of them are dangerous!' The objects on display were pieces of moving sculpture. Oddly shaped forms that are suspended from the ceiling and move in response to a gust of wind are quite familiar to everybody. Q/ Share with your classmates what you already know about the modern sculpture, then write three questions you think will be covered in this story? These objects, however, were different. Lined up against the wall, there were long thin wires attached to metal spheres. The spheres had been magnetized and attracted or repelled each other all the time. In the centre of the hall, there were a number of tall structures which contained coloured lights. These lights flickered continuously like traffic lights which have gone mad. Sparks were emitted from small black boxes and red lamps flashed on and off angrily. It was rather like an exhibition of prehistoric electronic equipment. These peculiar forms not only seemed designed to shock people emotionally, but to give them electric shocks as well! Q/ Here are some red Italic words appearing in this paragraph. Work with a partner and explain what they mean? Q/ Work in pairs (Oral Practice): Student A: In your own words, try to use your notes to tell student B first paragraph today's story. Student B: Check A's accuracy and correct any gaps/errors.		Blended learning + Lecture technique		

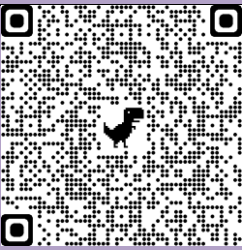
	When they finish, switch the roles and cover the second paragraph of the story?				
Production / Post-reading stage	- After Ss read the story, the T plays a funny game with Ss. They are divided into two groups and they choose a group name. Then the T asks some questions from the story. The first student who takes his or her hand answer the question and take one point. It continues like that. - After that the T gives Ss a worksheet. This time they should do it themselves. They try to answer the questions which are given in these worksheets until the class finishes. Then the teacher collects the worksheets to check them later. - Using pictures is a great way to help my visual learners build a mental image of the different multiple meaning words or homonyms. Have students fold a sheet of paper in half. Then on each side, let them illustrate the meaning of the word. For example, with the word <i>sculpture</i>, students will draw a simple statue on the left side of the paper. On the right side, they may give more details about this word” Many of my students really enjoy these drawing activities. I extend the activity and incorporate context clues by having the student write a sentence about their picture that includes a context clue.	- Ss in group work answer the questions. - Ss respect everyone's opinion. - Ss use evidence to support their opinions.		Ss ↔ Ss T ↔ sS	35 min
Homework	T asks Ss to solve the exercises on page (47) in student's textbook.				
Wrap-up	- T asks Ss to talk with a partner about the following 3 prompts: ✓ What? – What did we learn today? ✓ So What? – Why is it important? ✓ Now What? – How does this fit into our learning? Does it affect our thinking? Can we predict where we are going? T asks Ss : Do you think the title is appropriate for the story? What does the story mean to you?	- Ss think about what is implied or not directly stated. - Ss use their own experiences (prior knowledge) to fully understand author's message.	Expanding Meaning by Inferring Technique	T ↔ Ss Ss ↔ Ss	10 min

As for EyeJack Creator Application:

For more benefit, the teacher asked the students to open the second application EyeJack Creator and point the camera of their smartphone or tablet at the image of the story No. (18). When scanning and reading this image by the smartphone camera, the application will display a short video on the screen of the smartphone which explained and gave more information related to the topic of the story.



Teacher: Ahmed Ali Alwan		Date: / / 2021		Overall Time: 120 min.		
Level : 2 nd Stage University Students			Department: English Language, College of Basic Education		Story Title: A Very Dear Cat	
Lesson Focus: Comprehension.						
Lesson Skills Emphasized: Visual intelligence skills, Reading, speaking, writing, listening & understanding.						
Objectives/ Standards: By the end of the lesson, students will be able to: - Recognize visually the correct and factual information of the story. - Communicate and interact effectively in speech for a variety of purposes across the range of specified contexts. - Sequence the events into the order in which they happened. - Use the visual clues of the story to create a picture in their head by using all the senses and imagination to create their mental image. - Ask pertinent questions - before, during and after reading - to develop and extend ideas stated in the story. - Articulate ideas and opinions, using evidence and explanation to support. - Explain the main purpose of the story and summarize it succinctly.						
Materials and Aids Used:						
Lesson Outline						
Stages	Procedures			Techniques, teaching Strategies & methods	Interacti on	Time
	Teacher's Activities (T)		Students' Activities (Ss)			
Warm up	Note: this lecture was online (electronic) taking place on Google Classroom Platforms. - T greets Ss and welcomes them with smile. - T: How are you today? - T says: Dear Ss, I've noticed that you've been on time for the last two weeks. I really appreciate the effort you've made to do this. Thanks for participating in the discussions we've been having. Your questions have challenged all of us to be really clear about what we mean.		Ss: We are doing well! Thanks for asking. And how about you?		T ↔ Ss	20 min

	• Checking attendance (T checks the Ss' attendance) by asking: who is missing today? • Homework check: T asks Ss to upload their previous homework on Google classroom platform page to check their homework answers of the previous lesson and supply correct answers..				
Preparation	• T makes sure that all Ss are ready to play and use the QR Code Reader app and EyeJack app. • T makes sure that all Ss do not have any problem with connected to internet network and they are online	• Ss make sure that the apps are working on their smartphones. • Ss do all T's instructions and directions .		T ↔ Ss Ss ↔ Ss	25 min.
Presentation/ Pre-reading stage	• On the Google Classroom, T uploads the QR Code related to the AR content of the story No. (19) "A Very Dear Cat" on page (48). • T asks them to scan the QR Code of the story by their smartphones cameras to open the augmented reality link related to the story. • T makes sure that the Ss scanned the required QR Code and the new Google Site page is opened. (See Appendix). Here, the new AR content will display on their screens. • T asks Ss: What ideas do you already know about this topic? What known vocabulary will help you with this story? • T says that images in stories help us to better understand the information the writer is trying to convey. Look at the images below. How do you think they would contribute to and clarify the current story? What could you learn from these images?		• They look at the pictures and talk about it trying to find out what the story is about. • Ss tell their answers.	Blended learning	T ↔ Ss Ss ↔ Ss 30 min.

	<table><tr><th>IMGES</th><th>HOW MIGHT IT HELP CONTRIBUTE TO (ADD TO) OR CLARIFY THE STORY (MAKES THE STORY MORE UNDERSTANDING?)</th><th>WHAT COULD YOU LEARN FROM THE IMAGES</th></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table> Please, for more information, listen to the audio recording by clicking on the link below: http://www.listeningexpress.com/nce-a/book3/19-A-Very-Dear-Cat.html	IMGES	HOW MIGHT IT HELP CONTRIBUTE TO (ADD TO) OR CLARIFY THE STORY (MAKES THE STORY MORE UNDERSTANDING?)	WHAT COULD YOU LEARN FROM THE IMAGES										Ss listen to the audio recorder.			
IMGES	HOW MIGHT IT HELP CONTRIBUTE TO (ADD TO) OR CLARIFY THE STORY (MAKES THE STORY MORE UNDERSTANDING?)	WHAT COULD YOU LEARN FROM THE IMAGES															
																	
																	
																	
Practice/ While- Reading Stage	- T models the ‘Somebody Wanted But So’ strategy by listening to the story or retelling an event of story. Complete the SWBS four column chart: <i>Somebody</i> (character/figure), <i>Wanted</i> (goal/motivation), <i>But</i> (conflict), <i>So/So then</i> (resolution/outcome). - T asks students to identify the Somebody from the event. Write down the name of the person in the first column. Explain that the Wanted represents the plot or motivation of the person/people and complete the second column. Explain that the But is the conflict or		SWBST Strategy														

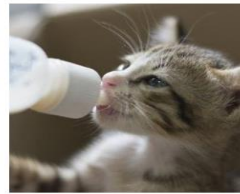
	challenge the person/people faced and record the student responses in the third column. Finally, explain that the So column is to record the outcome or resolution and complete this column. Then read aloud the summary statement. In groups, T asks Ss to complete a SWBS chart. Share SWBS statements in small groups and discuss the similarities and differences in the statements, as well as evidence in the story used to support each statement. Continue to guide Ss until they can use the strategy independently.														
Production / Post-reading stage	- T tells Ss to answer the following questions: - Summarize the story by using SWBST Strategy the following worksheet: <table border="1"><thead><tr><th>Somebody Who is the main character?</th><th>Wanted What does the main character want?</th><th>But What is the problem or conflict?</th><th>So How does the problem get solved?</th><th>Then What is the result or outcome?</th></tr></thead><tbody><tr><td></td><td></td><td></td><td></td><td></td></tr></tbody></table> - When did Mrs Ramsay receive an anonymous letter? - How much money did the kidnapper demand for the return of the cat? - What would happen if she went to police? - Write a description for the following images that related to the current story:	Somebody Who is the main character?	Wanted What does the main character want?	But What is the problem or conflict?	So How does the problem get solved?	Then What is the result or outcome?						- Ss in group work answer the questions. - Ss respect everyone's opinion. - Ss use evidence to support their opinions. - They do the task first individually, and then they share their answer with the whole class.	Discussion Technique	Ss ↔ Ss T ↔ sS	35 min
Somebody Who is the main character?	Wanted What does the main character want?	But What is the problem or conflict?	So How does the problem get solved?	Then What is the result or outcome?											



Picture # 1

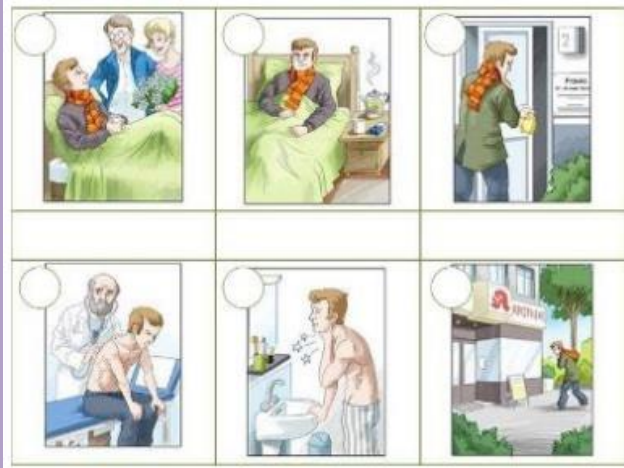


picture # 2



picture # 3

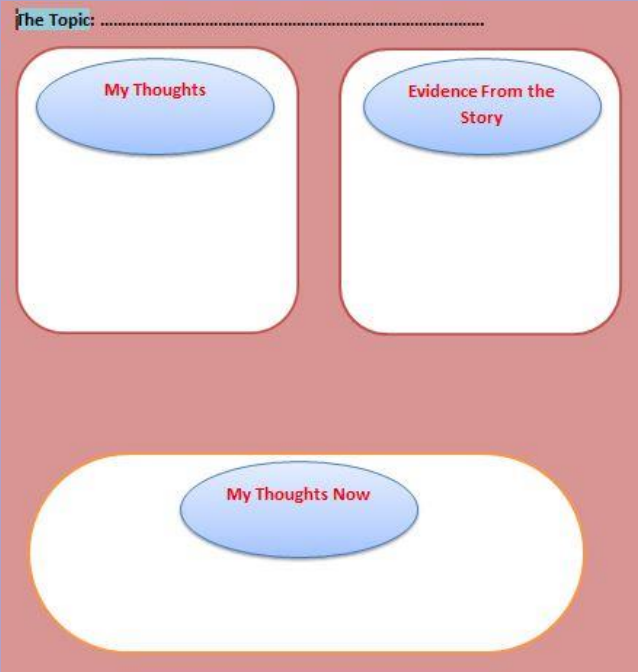
6. Rastus arrived punctually at 7 o'clock that morning. (T/F)
7. 6- Re-order the following pictures and then write the story:



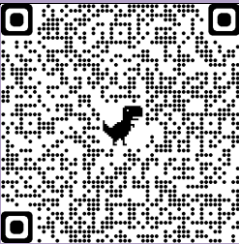
8. Write a story using the clues given below to create a picture in your head. Add some details to make it more interesting. Remember to give it a suitable title:

Lady become blind - calls the doctor - agrees to pay handsomely if cured otherwise nothing - doctor starts treatment at her house - covets her furniture - steals one piece at a time - finally treatment over - lady refuses to pay - says not fully cured - doctor goes to court - judge asks why she refused - lady answers sight not fully restored - cannot see her furniture - judge decide in her favour.

9. After reading the story of " A Very Dear Cat", Write your thoughts about the given topic in the top left box. In the top right box, write evidence from the story that support your thoughts. Lastly, in the lower box you must write your final thoughts after speaking with a partner about your initial

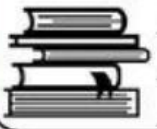
	thoughts and story evidence. 				
Homework	T asks Ss to solve the exercises in page 49 in student's textbook.				
Wrap-up	- T asks Ss the following questions: ❖ What was the most important thing did you learn? ❖ How would you summarize today's story for someone who wasn't here?	- Ss organize information by stating the main ideas or the most important parts of the story in their own words. - Ss determine what is important, omitting extra details, and keep it brief.	Expanding Meaning by Summarizing Strategy	T ↔ Ss Ss ↔ Ss	10 min

Teacher: Ahmed Ali Alwan		Date: / / 2021		Overall Time: 120 min.	
Level : 2 nd Stage University Students			Department: English Language, College of Basic Education		Story Title: Pioneer Pilots
Lesson Focus: Comprehension.					
Lesson Skills Emphasized: Visual intelligence skills, Reading, speaking, writing, listening & understanding.					
Objectives/ Standards: By the end of the lesson, students will be able to: • Distinguish between statements of fact and opinion. Make comparison between fact and opinion using comparison table maker. • Use pictures as a context clue to predict what the story will be about. • Make connections between information viewed and personal experiences by using connection maker. • Analyse the discussions and opinions presented by others. • Add new ideas or modify the ideas presented by the writer depending on the image of the story presented on page (50) . • Make a judgment on the written story by using their imagination to visualize thoughts when reading . • Accept with respect the opinions and ideas offered by others. • Use emotional facial expressions, hand gestures, and body language to convey ideas to others.					
Materials and Aids Used:					
Lesson Outline					
Stages	Procedures		Techniques, teaching Strategies & methods	Interacti on	Time
	Teacher's Activities (T)	Students' Activities (Ss)			
Warm up	Note: this lecture was online (electronic) taking place on Google Classroom Platforms. • T greets Ss and welcomes them with smile. • T: How are you today? • T says: • Checking attendance (T checks the Ss' attendance) by asking: who is missing today? • Homework check: T asks Ss to upload their previous	• Ss: We are doing well! Thanks for asking. And how about you?		T ↔ Ss	20 min

	homework on Google classroom platform page to check their homework answers of the previous lesson and supply correct answers. T asks Ss some questions to activate their minds and encourage discussion: What do you know about a pilot career? Can an ordinary person land a plane? How many pilots are necessary for each flight? Does the pilot eat the same food as the passengers? Can a commercial pilot fly all aircraft models?				
Preparation	- T makes sure that all Ss are ready to play the QR Code Reader app and Eye Jack app. - T makes sure that all Ss connected to internet network and they are online.	- Ss make sure that the apps are working on their smartphones. - Ss do all T's instructions and directions .		T ↔ Ss Ss ↔ Ss	25 min.
Presentation/ Pre-reading stage	- T uploads the QR Code related to the AR content of the story No. (20) "Pioneer Pilots" on page (50). - After uploading the QR code, T asks them to scan the QR Code by their smartphones cameras to display AR content related to the story. - Moreover, the T provides students with a video about the story of " Pioneer Pilots" that contains all the essential elements of the lesson. (It is assumed that he sent the video a week ago). - The teacher sent this video to his students, and tells them that the content of video will be discussed in the classroom.	 Ss watch the video presented.	Flipped Learning Strategy	T ↔ Ss Ss ↔ Ss	30 min.

	- Preparing students to delve deeper into the content than ever before. - The teacher divides the students into groups, and assigns each group to perform a specific task.				
Practice/ While- Reading Stage	- After assigning each group to perform a specific task, the groups share their work with whole class. - T engages Ss in focused discussion. - T scaffolds Ss' attempts. - T provides opportunities to rethink and revise Ss' understanding and work.	- Ss share their learning and thinking process with each other. - Ss work to apply and refine new learning independently.			
Production / Post-reading stage	- Here the T begins this stage by asking Ss questions related to the story to make sure that they understood the lesson. Some of these questions are: - Who set off from the French coast in his plane? - After flying seven miles across the channel, what did happen next? - On what date did Bleriot and Latham arrive at Calais? - Why did Latham not take part in the race? - Did Bleriot make a short test flight before setting out or not? - How long did it take him to fly across the Channel? - Who greeted him when he arrived at Dover? - How near to Dover did Latham fly the following week? - Why did he have to land on the sea for the second time? - Read each sentence. Determine if it is a fact or an opinion and write it on the line: ❖ Latham was landed on the sea because there was an engine failure. ❖ Bleriot took off an hour after flying a long test at 4.15 a.m. - Is the setting effective or useful making you visualize the scenes? (Cite some lines that appeal to your senses).	- Ss in group work answer the questions. - Ss respect everyone's opinion. - Ss use evidence to support their opinions. - They do the task first individually, and then they share their answer with the whole class.	Discussion Technique	Ss ↔ Ss T ↔ sS	35 min

12) As you read, take notes about how the story connects to each of the following:

13) Put the illustrations in order to tell the following story:

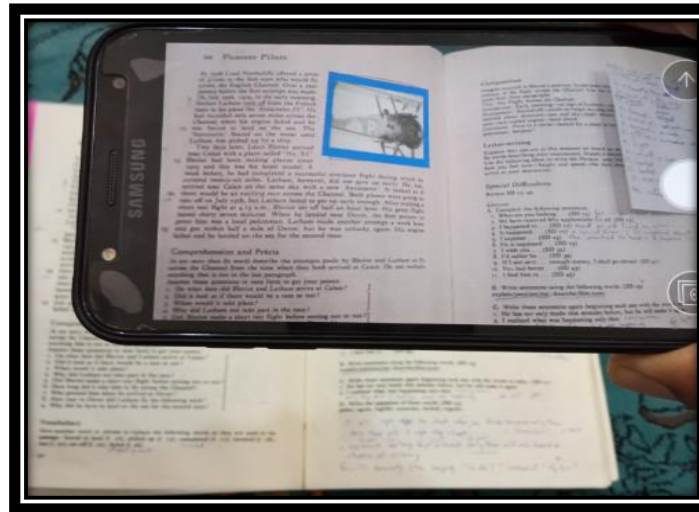


	14) Read the passage carefully. Then answer the questions below about the passage. Choose the best answer to each question. Mark the letter of the answer you have chosen: To the Editor, The issue about what to do with Palmer's Pond has arisen once more. Some people think that we should allow motorboats on Palmer's Pond. But independent studies have shown that oil from the boats would put fish in danger. So we should keep motorboats out of the pond. We should also be wary of the plan to build a hotel near the pond. a hotel would destroy the quiet that we love. For the same reason, we should not build a new beach. No matter what the mayor's study says, we don't need a new beach yet. My family has lived on Palmer's Pond for 100 years. I know what the pond needs. To save the pond, we need to keep it the same. Sincerely Sally Brown ▪ When the author says that motorboats should be kept off the pond, she a- does not support her opinion. b- uses an independent study to support her opinion. c- is only stating facts. d- is ignoring facts. ▪ The author's opinion about a new hotel is				

	 a- supported by a study. b- supported by facts. c- not supported. d- contraindicated by other statements in the article. ▪ When the author says that a new beach should not be built, she a- uses a study to support her opinion. b- seems free of bias. c- lists facts. d- ignores a study.				
Homework	T asks Ss to solve the exercises in page 51 in student's textbook.				
Wrap-up	- T asks students to summarize the lesson as they would explain it to a classmate who was absent. Give them a some minutes and then either have them turn in the summaries for you to read or have a few present their writings to the class. - T asks students to imagine they have to write an email to a friend or family member and tell them what they did today in their class. Students have a chance to summarize what they've learned in written form.	- Ss demonstrate increased engagement and participation in classroom activities. - They do the task first individually, and then they share their answers with the whole class.	Expanding Meaning by Summarizing Strategy	T ↔ Ss Ss ↔ Ss	10 min

As for EyeJack Creator Application:

For more benefit, the teacher asked the students to open the second application EyeJack Creator and point the camera of their smartphone or tablet at the image of the story No. (20). When scanning and reading this image by the smartphone camera, the application will display a short video on the screen of the smartphone which explained and gave more information related to the topic of the story.



Conclusion

In conclusion, visual intelligence skills are among the skills that must be taken care to teach and develop for students of the second stage - Department of English - College of Basic Education, in order to interact with many experiences that they will encounter, and to realize the elements of the educational situation to reach a new understanding or a new production. This understanding leads to a solution to their problem or discover of something new of value to them and to the society in which they live. ART is one of the most important modern technologies that help to interact and achieve better results through visualization and full immersion in the required subject.

Appendix (3)

The students' Ages Measured in (Months) of the Two Research Groups Students

Experimental Group		Control Group	
No.	Age	No.	Age
1.	281	1.	262
2.	255	2.	245
3.	304	3.	258
4.	247	4.	252
5.	260	5.	256
6.	251	6.	246
7.	251	7.	256
8.	304	8.	287
9.	238	9.	302
10.	235	10.	255
11.	246	11.	258
12.	244	12.	281
13.	255	13.	266
14.	247	14.	245
15.	238	15.	235
16.	250	16.	244
17.	246	17.	259
18.	250	18.	242
19.	247	19.	249
20.	258	20.	235
21.	256	21.	244
22.	256	22.	250
23.	244	23.	236
24.	240	24.	253
25.	246	25.	242
26.	260	26.	241
27.	247	27.	236
28.	257	28.	258

29.	304	29.	263
30.	241	30.	243
31.	241	31.	259
32.	242	32.	272
33.	252	33.	248
34.	250	34.	235
35.	259	35.	258
36.	235	36.	237
37.	236	37.	300
38.	266	38.	239
39.	261	39.	266
40.	258	40.	248
41.	281	41.	251
42.	241	42.	238
43.	293	43.	242
44.	240	44.	241
45.	259	45.	254
46.	248		

Appendix (4 a) : Intelligence Test (IQ Test)

Ministry of Higher Education and Scientific Research

Babylon University

College of Basic Education

Higher Studies Department

General Teaching Methods

A Letter to the Respectful Jury Members

Dear Sir, Mrs, Miss:

The researcher is conducting an experimental study for a Ph.D. dissertation in Education (General Teaching Methods) entitled "*The Effectiveness of a Proposed Instructional Program Based on Augmented Reality Technology on Academic Achievement and Developing Visual Intelligence Skills for College of Basic Education Students*".

To achieve the aims of the research, the researcher adopted the intelligence test developed by Philip Carter (2005). He defined intelligence as it is a general ability to assimilate, elicit information, analyze it accurately and quickly, and use it correctly in situations that require intellectual discoveries in the numerical, spatial, linguistic aspects and abstract thinking.

You are kindly required to examine and referee the test. I would be so grateful for recording your observations and comments on its suitability, items validity, relevance, linguistic correctness and the importance of each procedure.

As a specialist in the field, you are kindly requested to pass judgment on the validity and suitability of the study instruments.

Any comments and modifications will be taken into consideration and highly appreciated.

With respect and gratitude.

Thank you for your efforts.

The researcher

Ahmed Ali Awan

Full Name				
Stage				
Group	A		B	
Date and Time				
Total Time	60 Minutes			

NOTE: The test begins with about 10 minutes to read the instructions and the sample questions. Students will then have 50 minutes to answer the test items.

A. Instructions

1. You have 50 minutes to answer the 50 questions. Do not exceed this time limit.
2. Each question carries 1 mark.
3. Answer all questions. If you do not know the answer - guess. Guessing has been considered in the scoring. Do not leave any questions unanswered.
4. If a question seems to have more than one answer or no correct answer at all, pick what you consider to be the best of the choices given. These questions are purposely designed to test your ability to think and reason.

A. Sample Questions

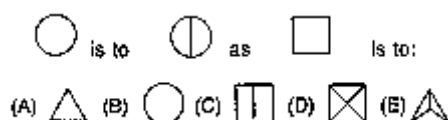
Carefully study the following sample questions before beginning the test.

- I.** In some questions you will be asked to make a comparison.
 Example: Which one of the five makes the best comparison?
 Boat is to water as airplane is to:
 SUN - GROUND - WATER - SKY - TREE

The answer is sky. A boat travels through water. This can be compared to an airplane which travels through the sky.

You will also be asked to compare designs.

Example: Which one of the five makes the best comparison?



The answer is C. A circle which is divided into two parts can be compared to a square which is also divided into two parts.

- II.** In some questions, you will be given a group of five things. Four of them will have something in common; they will be similar in some way. You will be asked to choose the one which is not similar to the other four.

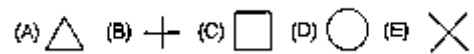
Example: Which one of the five is least like the other four?

DOG - CAR - CAT - BIRD - FISH

The answer is car. The others are all living animals. A car is not alive.

These questions may also have designs.

Example: Which one of the five is least like the other four?



The answer is D. The others are all made with straight lines. A circle is a curved line.

III. In some questions you will be given numbers, or letters, which are in a certain order. They follow some pattern of arrangement. However, one of them will not fit. You will be asked to choose the one which does not fit into the pattern.

Example: Which one of the numbers does not belong in the following series?

1 - 3 - 5 - 7 - 9 - 10 - 11 - 13

The answer is 10. Starting with 1, the odd numbers are arranged in order, 10 is an even number which does not fit in the series.

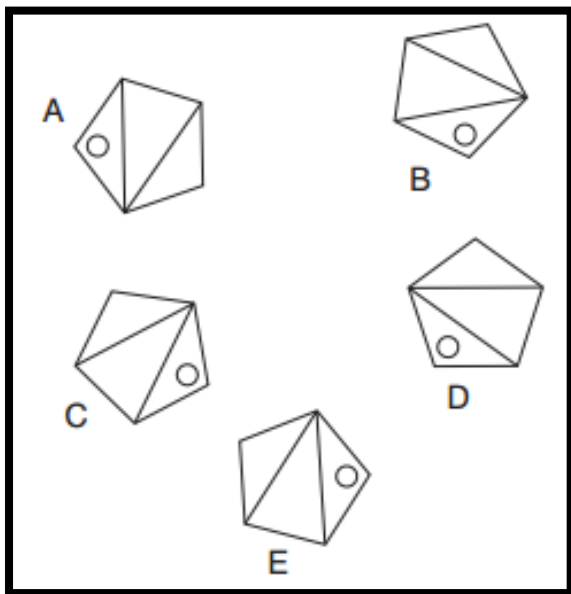
IV. There will also be some problems which you will be asked to solve. These will not require any difficult math. Instead, they will be testing how logical you are - that is, how well do you think.

You are now ready to begin the test. Read each question carefully and write your answers on a piece of paper and compare your results with the correct ones AFTER you have completed the test. You have 45 minutes.

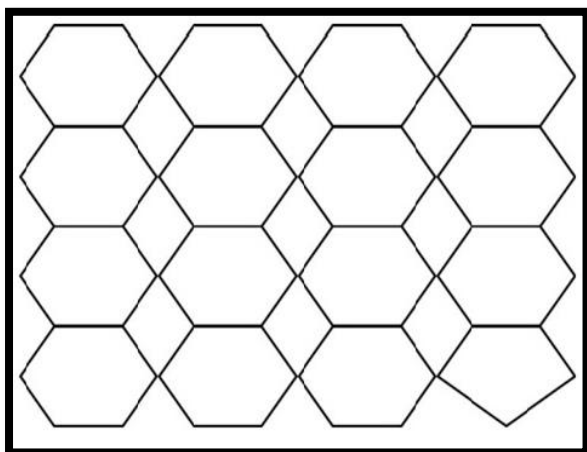
Questions:

1. If in a certain code of the word ANT has been written as 678, how would TAN be written?
A. 768 B. 867 C. 687 D. 768
2. Today is Thursday. I came home from a trip 3 days before the day after last Monday. How many days have I been home?
A. 1 days
B. 2 days
C. 3 days
D. 6 days

3. Which is the odd one out?



4. How many hexagon (six sided figures) can you find here?

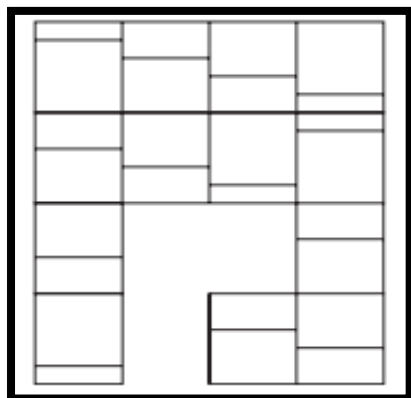


- A. 20 B. 21 C. 22 D. 23
5. Select two words that are synonyms, plus an antonym of these two synonyms, from the list of words below:
A. Flower, bloom, wither.
B. Force, struggle, fight.

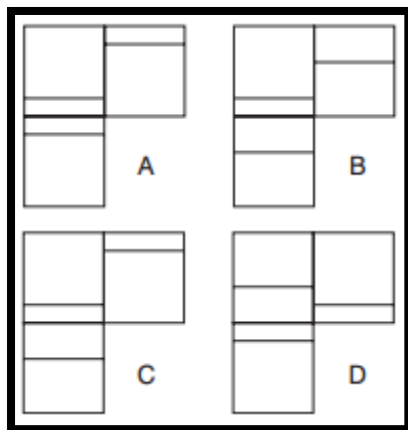
C. choke, grow, leave.

D. sprout, dry, water.

6.



Which is the missing section?



7. What are the two numbers that must replace the two question marks?

30, 13, 32, ? , ? , 38, 40, 42

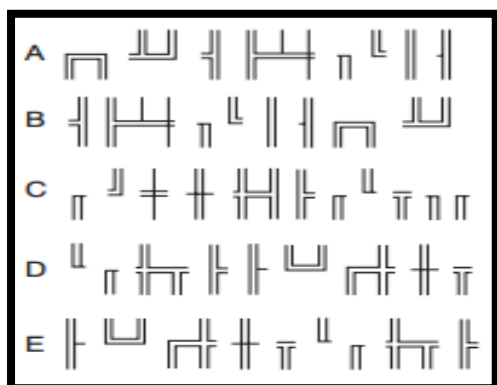
A. 34, 35.

B. 34, 36.

C. 33, 34.

D. 36, 37.

8. Which is the odd one out?



9. Select two words that are synonyms, plus an antonym of these two synonyms, from the list of words below.

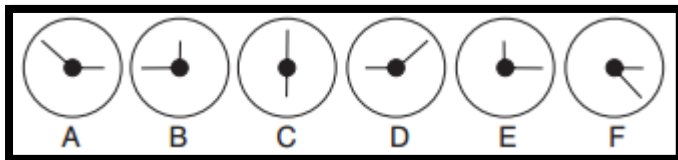
A. Escort, partol, vanguard.

B. Spearhead, space, stern.

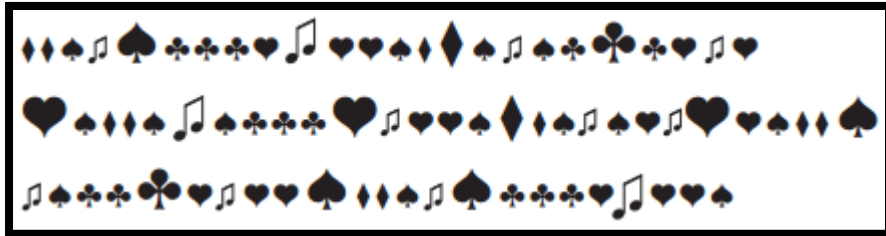
C. Vanguard, stern, spearhead.

D. Patrol, space, escort.

10. Which does not belong in this sequence?



11.



Which three symbols are missing?

A

B

C

D

E

12. Which two words are closest in meaning?

- A. rude, impolite
- B. impolite, smart
- C. forward, cheeky
- D. rude, smart

13. If you rearrange the letters "BARBIT", you would have the name of a/ an:

- A. OCEAN B. COUNTRY C. STATE D. CITY E. ANIMAL

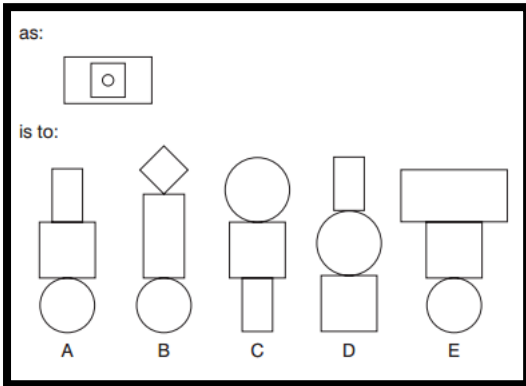
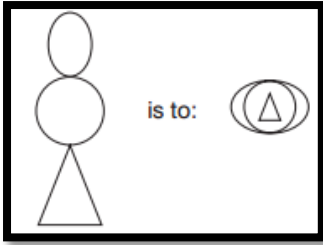
14. Which of the words in brackets is closest to the meaning of the word outside the bracket?
Common (A. similar B. valid C. control D. familiar)

15. What day comes three days after the day which comes two days after the day which comes immediately after the day which comes two days after Monday?

- A. SUNDAY B. MONDAY C. TUESDAY D. WEDNESDAY E. THURSDAY F. FRIDAY G. SATURDAY

What day comes three days after the day which comes two days after the day which comes immediately after the day which comes two days after Monday?

16.



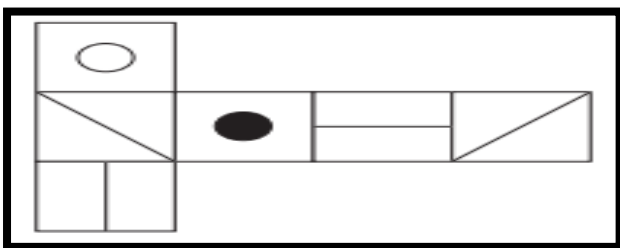
17. What is the alternative that contains two opposite words in the meaning?

- A. acquired, innate.
- B. expanded, primary.
- C. large, expander.
- D. vague, ambiguous.

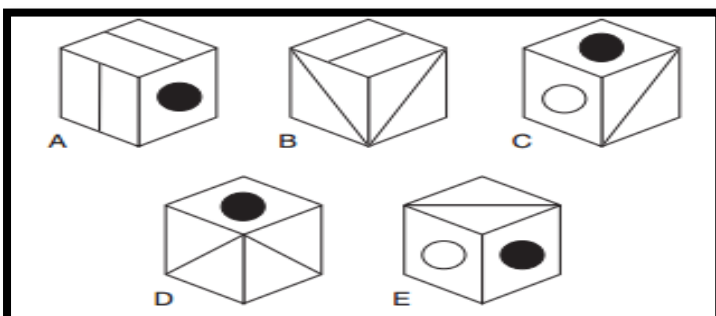
18. If 4 apples and 6 bananas cost £1.56 and 9 apples and 7 bananas cost £2.60, what is the cost of one apple and one apple?

- A. 1 apple costs £0.20 and 1 banana costs £0.15.
- B. 1 apple costs £0.18 and 1 banana costs £0.14.
- C. 1 apple costs £0.8 and 1 banana costs £0.4.
- D. 1 apple costs £0.19 and 1 banana costs £0.17 .

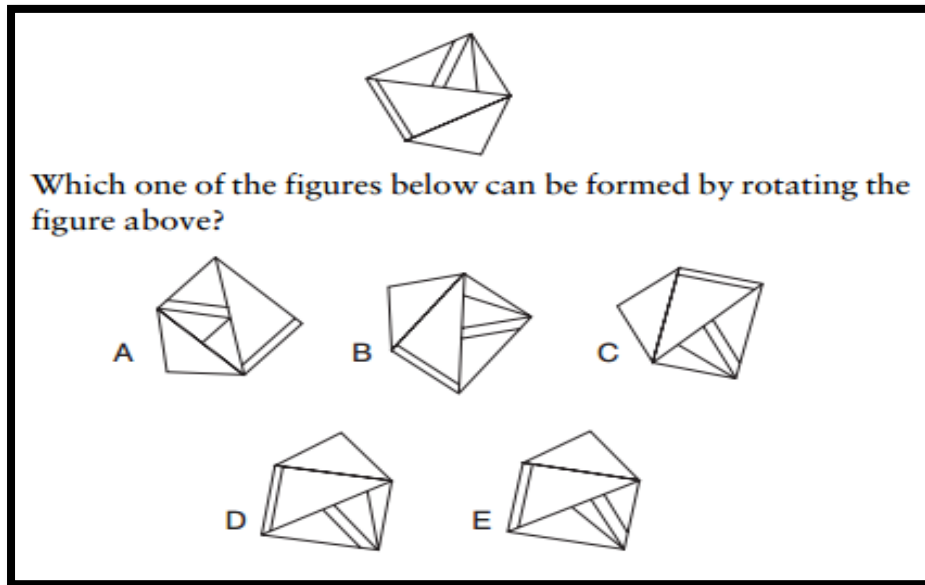
19.



When the above is folded to form a cube, just two of the following can be produced. Which two?



20.



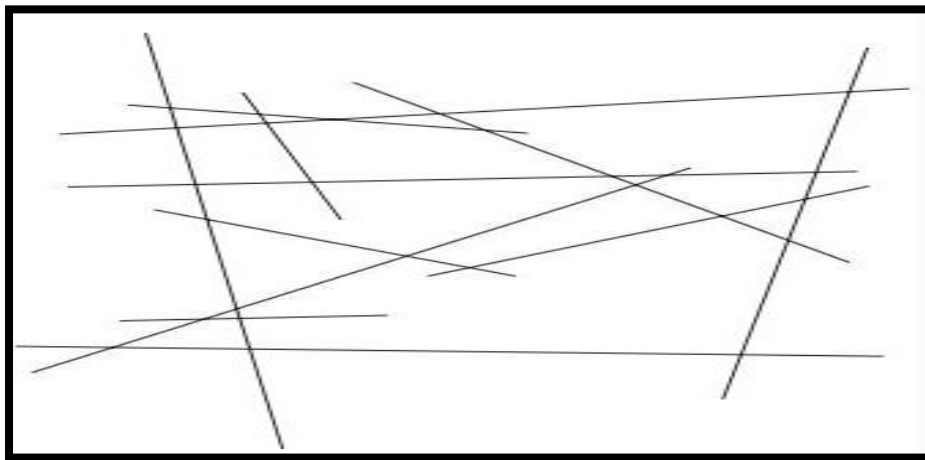
21. Gordon is twice as old as Tony was when Gordon was as old as Tony is now. The combined age of Gordon and Tony is 112 years. How old are Gordon and Tony now?

- A. Gordon 64, Tony 48.
- B. Gordon 48, Tony 64.
- C. Gordon 64, Tony 64.
- D. Gordon 48, Tony 48.

22. At college, 70% of the students studied Maths, 75% studied English, 85% studied French and 80% studied German. What percentage at least must have studied all 4?

- A. 10
- B. 20
- C. 15
- D. 12

23. How many lines appear below?



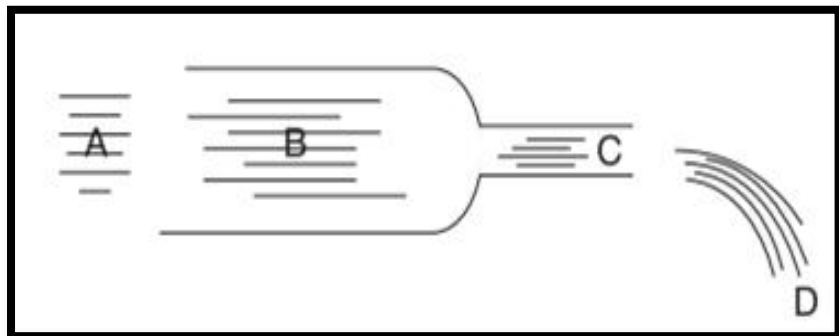
24. Which word in brackets is closest in meaning to the word in capitals?

HERMETIC (A. sealed B. reclusive C. audacious D. sceptic E. close)

25. Which word in brackets is most opposite in meaning to the word in capitals?

INDIGENT (A. rich B. peaceful C. eager D. decorous E. powerful)

26. A large volume of water is gushing through a pipe which narrows at the outlet. At which point, A, B, C or D will the water flow fastest?



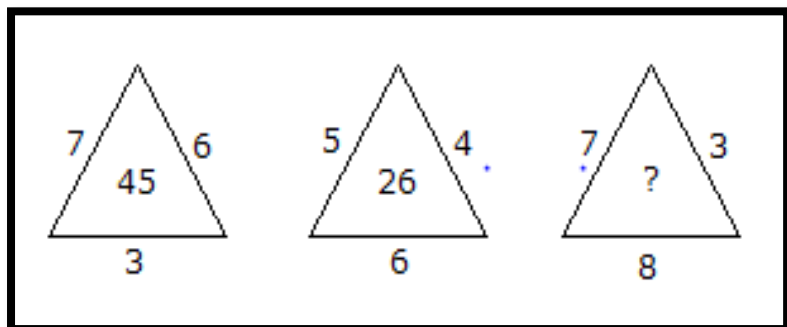
27. In a party of 35 people there are twice as many women as children and twice as many children as men. How many of each are there?

- A. 10 men, 20 children and 5 women.
- B. 5 men, 10 children and 20 women.
- C. 20 men, 5 children and 10 women.
- D. 15 men, 15 children and 5 women.

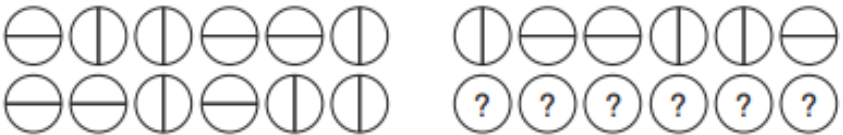
28. Which is the odd one out?

- A ♡«£¢μ¶▶*
- B Πμ¶£▶Ω⚙️🎵
- C Ω&Π⚙️🎵¶μ¶
- D *▶¶μ¢£«♡
- E ¶μ¶🎵⚙️Π&Ω

29. What number should replace the question mark?



30.



Which set of diagrams below should replace the question marks?

A 

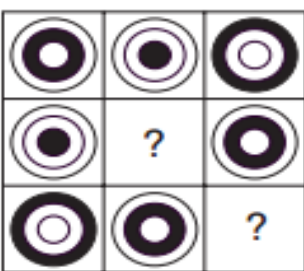
B 

C 

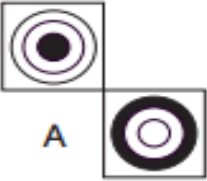
D 

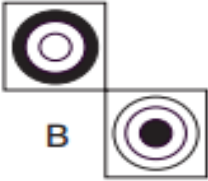
E 

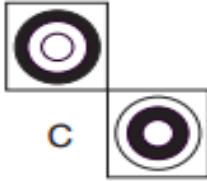
31.

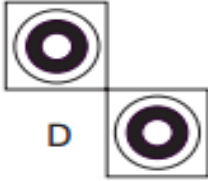


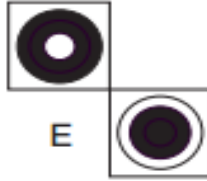
Which two squares are missing?

A 

B 

C 

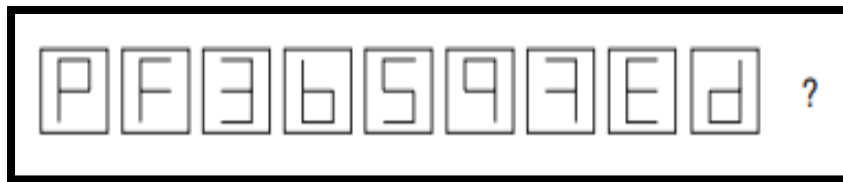
D 

E 

32. The average of three numbers is 29. The average of two of these numbers is 38. What is the third number?

- A. 9
- B. 10
- C. 11
- D. 12

33.



What comes next in the above sequence?

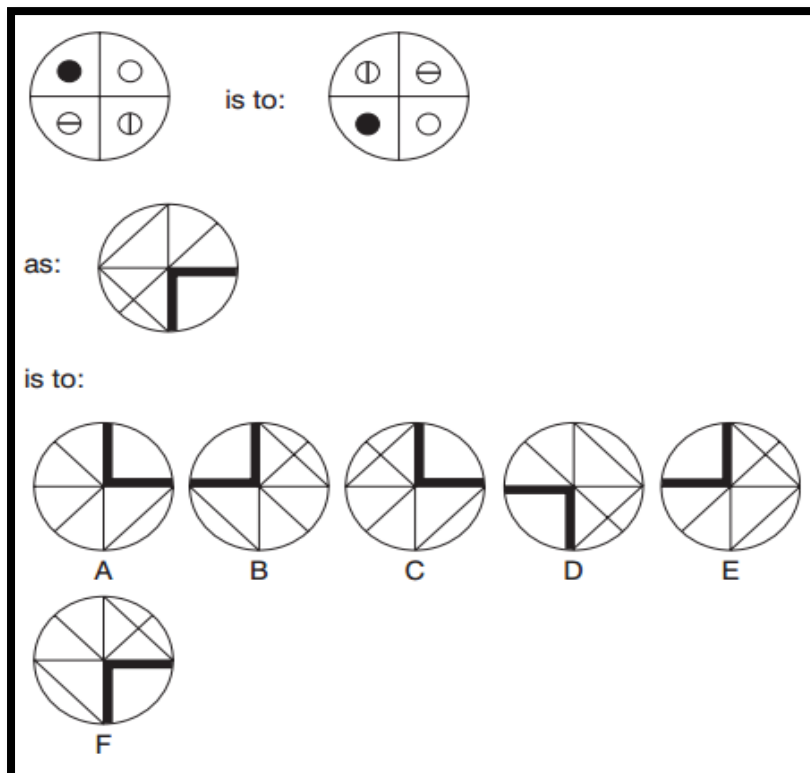


34. A B C D E F G H

What letter is two letters to the left of the letter immediately to the right of the letter three letters to the right of the letter A?

- A. B
- B. C
- C. D
- D. E

35.



36. Which is the odd one out?

- A ◀#●&*▼#◀◀Ω●○○▶◀◀
 ◀#●&▼
 ▼#Ω●○○▶◀
- B ◀#●&*▼▼#◀◀Ω●○○***○▶◀◀
 ◀#●&▼
 ▼#Ω●○○▶◀
- C ◀#●&*▼▼#◀◀Ω●○○***○▶◀◀
 ◀#●&▼
 ▼#Ω●○○▶◀
- D ◀#●&*▼▼#◀◀Ω●○○▶◀◀
 ◀#●&▼
 ▼#Ω●○○▶◀
- E ◀#●&*▼#◀◀Ω●○○▶◀◀
 ◀#●&▼
 ▼#Ω●○○▶◀

37. What number should replace the question mark?

8	6	2	9	10
6	4	4	3	8
5	7	3	6	?

- A. 6
 B. 7
 C. 8
 D. 9
 E. 10

38.

A Z B Y D W G T ? ?

Which two letters come next?

- A. LM
 B. ST
 C. KP
 D. OP

39. 34, 48, ?, 79, 96 What number should replace the question mark?

- A. 60
 B. 61
 C. 62
 D. 63

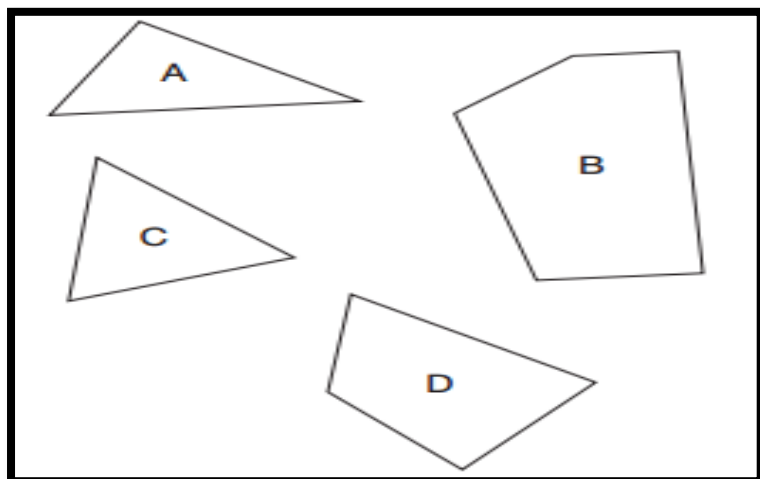
40. What is the longest word in the English language that can be produced from the ten letters below? No letter may be used more than once.

H T E R C I K F A O

41. Which word in brackets is most opposite in meaning to the word in capitals?

PROTRUBERANT (A. brief B. proud C. concave D. calm E. smooth)

42. Which three pieces below can be fitted together to form a perfect square?



- A. CBD
- B. ABC
- C. CBA
- D. ACD
- E. DAC

43.

6	4	2	5	4	1		7	2	4	3	5	6
9	8	5	9	7	5		?	?	?	?	?	?

The top set of six numbers has a relationship to the set of six numbers below. The two sets of six boxes on the left have the same relationship as the two sets of six boxes on the right. Which set of numbers should therefore replace the question marks?

A

11	5	8	7	9	9

B

9	7	6	8	7	11

C

10	6	7	7	8	10

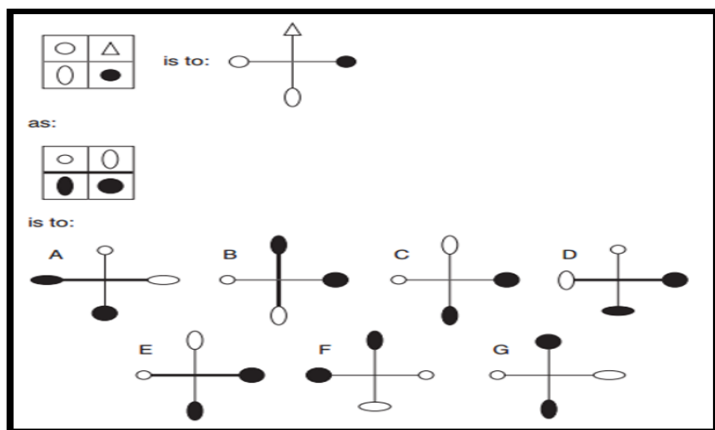
D

10	6	7	8	9	11

E

1	1	1	1	1	10

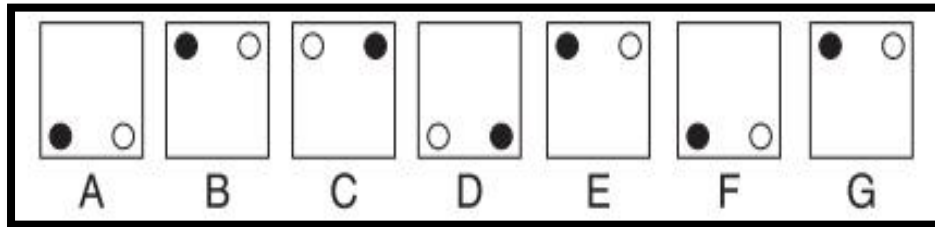
44.



45. The day after the day after tomorrow is four days before Monday. What is today?
 A. Friday B. Saturday C. Monday D. Sunday F. Thursday

46. Which one of the five is least like the other four?
 A. Baseball B. Billiard C. Football D. Golf E. Badminton

47. Which does not belong in this sequence?



48. Which one of the following choices makes the best comparison? PEACH is to HCAEP as 46251 is to;
 A. 51463 B. 15264 C. 26451 D. 12654

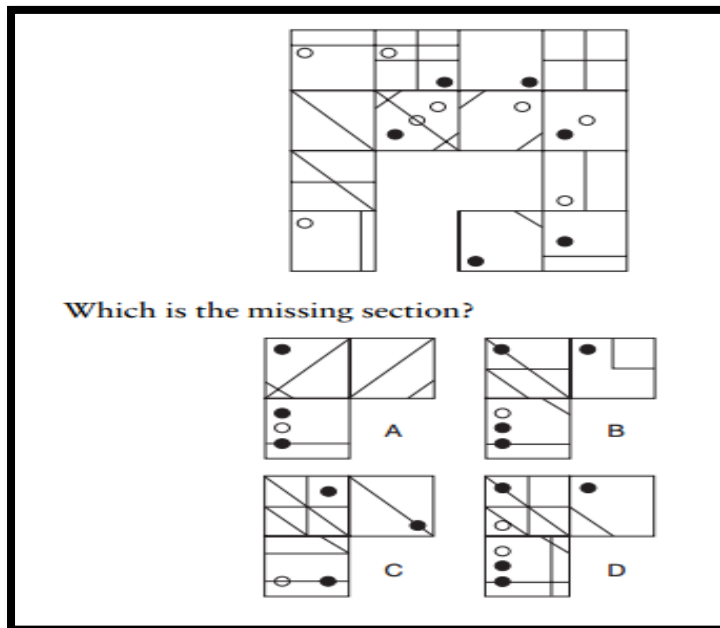
49. Identify two words (one from each set of brackets) that form a connection (analogy), thereby relating to the words in capitals in the same way.

*LETTUCE (flower, leaf, stalk, vegetable)

*POTATO (root, pulse, jacket, tuber)

- A. lettuce- leaf- potato- tuber.
- B. Lettuce-flower- Potato- stalk.
- C. Lettuce- stalk- potato- jacket.
- D. lettuce vegetables potato pulse.

50.



Appendix (4 b): IQ Answer Sheet

Full Name				
Stage				
Group	A		B	
Date and Time				
Total Time	60 Minutes			

Number of Item	Answer	Number of Item	Answer
1		26	
2		27	
3		28	
4		29	
5		30	
6		31	
7		32	
8		33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Total: ()

Appendix (5)

The Two Research Groups students' Scores in Intelligence Test

Experimental Group		Control Group	
No.	Scores	No.	Scores
1.	31	1.	23
2.	27	2.	25
3.	22	3.	31
4.	30	4.	26
5.	36	5.	35
6.	28	6.	38
7.	21	7.	12
8.	17	8.	15
9.	20	9.	21
10.	39	10.	33
11.	31	11.	29
12.	19	12.	29
13.	23	13.	24
14.	29	14.	16
15.	13	15.	36
16.	22	16.	34
17.	32	17.	6
18.	37	18.	20
19.	32	19.	10
20.	23	20.	18
21.	35	21.	28
22.	20	22.	22
23.	26	23.	32
24.	21	24.	16
25.	34	25.	30
26.	36	26.	36
27.	40	27.	18
28.	38	28.	25
29.	33	29.	21
30.	21	30.	41
31.	16	31.	37

32.	22	32.	32
33.	15	33.	39
34.	12	34.	37
35.	23	35.	23
36.	17	36.	17
37.	25	37.	15
38.	33	38.	27
39.	31	39.	18
40.	24	40.	14
41.	13	41.	25
42.	24	42.	33
43.	26	43.	30
44.	23	44.	11
45.	19	45.	22
46.	27		

Appendix (6)

The Two Research Groups Students' Scores in Achievement Pre-Test

Experimental Group		Control Group	
No.	Scores	No.	Scores
1.	32	1.	28
2.	29	2.	24
3.	17	3.	32
4.	33	4.	17
5.	36	5.	15
6.	34	6.	36
7.	10	7.	14
8.	18	8.	8
9.	19	9.	23
10.	35	10.	31
11.	25	11.	23
12.	10	12.	24
13.	22	13.	23
14.	28	14.	17
15.	8	15.	19
16.	23	16.	30
17.	23	17.	29
18.	34	18.	18
19.	24	19.	33
20.	14	20.	35
21.	17	21.	23
22.	24	22.	21
23.	22	23.	35
24.	28	24.	17
25.	26	25.	17
26.	20	26.	10
27.	38	27.	17
28.	30	28.	35
29.	32	29.	28
30.	15	30.	40
31.	21	31.	20

32.	23	32.	19
33.	19	33.	20
34.	23	34.	23
35.	27	35.	24
36.	19	36.	17
37.	23	37.	13
38.	26	38.	33
39.	35	39.	28
40.	25	40.	20
41.	17	41.	9
42.	31	42.	35
43.	22	43.	20
44.	15	44.	29
45.	37	45.	38
46.	34		

Appendix (7)

The Two Research Groups students' Scores in Visual Intelligence Skills Pre-Test

Experimental Group		Control Group	
No.	Scores	No.	Scores
1.	55	1.	44
2.	48	2.	35
3.	41	3.	42
4.	60	4.	25
5.	57	5.	46
6.	63	6.	64
7.	25	7.	33
8.	44	8.	48
9.	36	9.	41
10.	68	10.	53
11.	39	11.	39
12.	34	12.	65
13.	46	13.	45
14.	53	14.	46
15.	45	15.	19
16.	55	16.	71
17.	48	17.	60
18.	62	18.	40
19.	45	19.	58
20.	29	20.	74
21.	40	21.	27
22.	54	22.	17
23.	49	23.	55
24.	44	24.	51
25.	50	25.	50
26.	36	26.	40
27.	72	27.	53
28.	58	28.	77
29.	55	29.	61

30.	32	30.	80
31.	21	31.	45
32.	28	32.	27
33.	49	33.	59
34.	18	34.	44
35.	37	35.	33
36.	38	36.	37
37.	43	37.	30
38.	10	38.	67
39.	57	39.	46
40.	36	40.	20
41.	24	41.	55
42.	56	42.	58
43.	39	43.	46
44.	25	44.	60
45.	65	45.	81
46.	70		

Appendix (8): Topics Distribution Table

Day and Date	Time	Sessions	Topics
Wednesday 12/5/2021	8:30 – 10:30	First week	A Noble Gangster Comprehension and Précis
Wednesday 19/5/2021	8:30 – 10:30	Second week	A Noble Gangster Homework: vocabulary, composition, letter-writing, key structures, special difficulties.
Wednesday 26/5/2021	8:30 – 10:30	Third week	Sixpence Worth of Trouble Comprehension and Précis
Wednesday 2/6/2021	8:30 – 10:30	Fourth week	Sixpence Worth of Trouble Homework: vocabulary, composition, letter-writing, key structures, special difficulties.
Wednesday 9/6/2021	8:30 – 10:30	Fifth week	Mary Had a Little Lamb Homework: vocabulary, composition, letter-writing, key structures, special difficulties.
Wednesday 16/6/2021	8:30 – 10:30	Sixth week	The Greatest Bridge in The Word. Homework: vocabulary, composition, letter-writing, key structures, special difficulties.
			Electric Currents in Modern Art

Wednesday 23/6/2021	8:30 – 10:30	Seventh week	Homework: vocabulary, composition, letter-writing, key structures, special difficulties.
Wednesday 30/6/2021	8:30 – 10:30	Eighth week	A Very Dear Car Homework: vocabulary, composition, letter-writing, key structures, special difficulties.
Wednesday 7/7/2021	8:30 – 10:30	Ninth week	Pioneer Pilots Homework: vocabulary, composition, letter-writing, key structures, special difficulties.

Appendix (9)

The Instructional Material of Reading Comprehension Course

14 A Noble Gangster

There was a time when the owners of shops and businesses in Chicago had to pay large sums of money to gangsters in return for 'protection'. If the money was not paid promptly, the gangsters would quickly put a man out of business by destroying his shop. Obtaining 'protection money' is not a modern crime. As long ago as the fourteenth century, an Englishman, Sir John Hawkwood, made the remarkable discovery that people would rather pay large sums of money than have their life work destroyed by gangsters.

Six hundred years ago, Sir John Hawkwood arrived in Italy with a band of soldiers and settled near Florence. He soon made a name for himself and came to be known to the Italians as Giovanni Acuto. Whenever the Italian city-states were at war with each other, Hawkwood used to hire his soldiers to princes who were willing to pay the high price he demanded. In times of peace, when business was bad, Hawkwood and his men would march into a city-state and, after burning down a few farms, would offer to go away if protection money was paid to them. Hawkwood made large sums of money in this way. In spite of this, the Italians regarded him as a sort of hero. When he died at the age of eighty, the Florentines gave him a state funeral and had a picture painted which was dedicated to the memory of 'the most valiant soldier and most notable leader, Signor Giovanni Hawkodue'.



Comprehension and Précis 2-5

In not more than 80 words write an account of Sir John Hawkwood's career from the time he arrived in Italy. Do not include anything that is not in the last paragraph. Answer these questions in note form to get your points:

1. Where did Sir John Hawkwood settle six hundred years ago?
2. Whom did he hire soldiers to in times of war?
3. Would he threaten to destroy a city-state in times of peace or not?
4. When would he spare a city-state?
5. Did the Italians regard him as a hero in spite of this or not?
6. How old was he when he died?
7. Who gave him a state funeral when he died?
8. Did they have a picture painted or not?
9. What was it dedicated to?

Vocabulary 2-4-5

Give another word or phrase to replace the following words as they are used in the passage: sums (l. 3); promptly (l. 5); obtaining (l. 7); remarkable (l. 11); settled (l. 17); hire (l. 19); demanded (l. 20).

15 Sixpence Worth of Trouble

Children always appreciate small gifts of money. Father, of course, provides a regular supply of pocket-money, but uncles and aunts are always a source of extra income. With some children, small sums go a long way. If sixpences are not exchanged for sweets, they rattle for months inside money boxes. Only very thrifty children manage to fill up a money-box. For most of them, sixpence is a small price to pay for a satisfying bar of chocolate.

My nephew, George, has a money-box but it is always empty. Very few of the sixpences I have given him have found their way there. I gave him sixpence yesterday and advised him to save it. Instead, he bought himself sixpence worth of trouble. On his way to the sweet shop, he dropped his sixpence and it rolled along the pavement and then disappeared down a drain. George took off his jacket, rolled up his sleeves and pushed his right arm through the drain cover. He could not find his sixpence anywhere, and what is more, he could not get his arm out. A crowd of people gathered round him and a lady rubbed his arm with soap and butter, but George was firmly stuck. The fire-brigade was called and two firemen freed George using a special type of grease. George was not too upset by his experience because the lady who owns the sweet shop heard about his troubles and rewarded him with a large box of chocolates.



The fire-brigade was called

Comprehension and Précis

In not more than 80 words describe George's experiences after his uncle gave him sixpence. Do not include anything that is not in the last paragraph.

Answer these questions in note form to get your points:

1. Where was George going?
2. Where did he lose his sixpence?
3. Did he take his jacket off or not?
4. Where did he put his arm?
5. Did he find his sixpence, or did he fail to find it?
6. Could he get his arm out or not?
7. Did a crowd of people gather round him or not?
8. What did a lady try to do?
9. Did she succeed or did she fail?
10. How did firemen finally free George?
11. What did the owner of the sweet shop present him with?

Vocabulary

Give another word or phrase to replace the following words as they are used in the passage: appreciate (l. 1); gifts (l. 1); extra income (l. 5); rattle (l. 7); price (l. 11); gathered (l. 22); was firmly stuck (l. 23).

16 Mary had a Little Lamb

Mary and her husband Dimitri lived in the tiny village of Perachora in southern Greece. One of Mary's prize possessions was a little white lamb which her husband
5 had given her. She kept it tied to a tree in a field during the day and went to fetch it every evening. One evening, however, the lamb was missing. The rope had been cut, so it was obvious that the lamb
10 had been stolen.

When Dimitri came in from the fields, his wife told him what had happened. Dimitri at once set out to find the thief. He knew it would not prove difficult in
15 such a small village. After telling several of his friends about the theft, Dimitri found out that his neighbour, Aleko, had suddenly acquired a new lamb. Dimitri immediately went to Aleko's house and angrily accused him of stealing the lamb. He told him he had better return it or he would call the police. Aleko
20 denied taking it and led Dimitri into his back-yard. It was true that he had just bought a lamb, he explained, but *his* lamb was black. Ashamed of having acted so rashly, Dimitri apologized to Aleko for having accused him. While they were talking it began to rain and Dimitri stayed in Aleko's house until the rain stopped. When he went outside half an hour later, he was astonished to find that the little
25 black lamb was almost white. Its wool, which had been dyed black, had been washed clean by the rain!



the little black lamb was almost white

Comprehension and Précis

In not more than 80 words describe what happened from the time when Dimitri learnt that his wife's white lamb had been stolen. Do not include anything that is not in the last paragraph.

Answer these questions in note form to get your points:

1. What did Mary tell Dimitri when he came home?]
2. What did Dimitri learn about his neighbour, Aleko?]
3. Where did Dimitri go?]
4. What did he accuse Aleko of?]
5. Did Aleko show Dimitri his new lamb or not?]
6. What colour was it?]
7. What did Dimitri do when he saw it was black?]
8. Why did Dimitri stay in Aleko's house for half an hour?]
9. Why did he get a surprise when he went outside?]
10. Had the lamb been dyed or not?]

Vocabulary

Give another word or phrase to replace the following words as they are used in the passage: rarely (l. 1); considerable (ll. 2-3); wealthy (l. 4); worried (l. 11); stated (l. 15); changed her mind (l. 20); word (l. 23).

17 The Greatest Bridge in the World

Verrazano, an Italian about whom little is known, sailed into New York Harbour in 1524 and named it Angoulême. He described it as 'a very agreeable situation
5 located within two small hills in the midst of which flowed a great river.' Though Verrazano is by no means considered to be a great explorer, his name will probably remain immortal, for on November
10 21st, 1964, the greatest bridge in the world was named after him.

The Verrazano Bridge, which was designed by Othmar Ammann, joins Brooklyn to Staten Island. It has a span
15 of 4260 feet. The bridge is so long that the shape of the earth had to be taken into account by its designer. Two great towers support four huge cables. The towers are built on immense underwater platforms made of steel and concrete. The platforms extend to a depth of over 100 feet under the sea. These alone took
20 sixteen months to build. Above the surface of the water, the towers rise to a height of nearly 700 feet. They support the cables from which the bridge has been suspended. Each of the four cables contains 26,108 lengths of wire. It has been estimated that if the bridge were packed with cars, it would still only be carrying a third of its total capacity. However, size and strength are not the only
25 important things about this bridge. Despite its immensity, it is both simple and elegant, fulfilling its designer's dream to create 'an enormous object drawn as faintly as possible'.



Comprehension and Précis

Describe the Verrazano Bridge in not more than 80 words. Do not include anything that is not in the last paragraph.

Answer these questions in note form to get your points:

1. What is the name of the bridge which joins Brooklyn to Staten Island? *Verrazano*
2. What is its span? *4260*
3. How many towers has it got? *Two*
4. What do these towers support? *4 huge cables*
5. What are the towers built on? *100 feet platform made of steel and concrete*
6. How far under the sea do the platforms go? *100 feet*
7. How far above the surface do the towers rise? *700 feet*
8. What is the bridge suspended from? *cables*
9. How many lengths of wire does each of these cables contain? *26,108 lengths of*
10. Is the bridge very strong or not?
11. Is it simple and elegant or not? *Yes, it is*

Vocabulary

Give another word or phrase to replace the following words as they are used in the passage: agreeable situation (l. 4); midst (l. 5); considered (l. 7); remain immortal (l. 9); span (l. 14); taken into account (ll. 16-17); support (l. 17).

44 *extension*

consideration

center

great

timeless
deathless

18 Electric Currents in Modern Art

Modern sculpture rarely surprises us any more. The idea that modern art can only be seen in museums is mistaken. Even people who take no interest in art cannot have failed to notice examples of modern sculpture on display in public places. Strange forms stand in gardens, and outside buildings and shops. We have got quite used to them. Some so-called 'modern' pieces have been on display for nearly fifty years.

In spite of this, some people—including myself—were surprised by a recent exhibition of modern sculpture. The first thing I saw when I entered the art gallery was a notice which said: 'Do not touch the exhibits. Some of them are dangerous!' The objects on display were pieces of moving sculpture. Oddly shaped forms that are suspended from the ceiling and move in response to a gust of wind are quite familiar to everybody. These objects, however, were different. Lined up against the wall, there were long thin wires attached to metal spheres. The spheres had been magnetized and attracted or repelled each other all the time. In the centre of the hall, there were a number of tall structures which contained coloured lights. These lights flickered continuously like traffic lights which have gone mad. Sparks were emitted from small black boxes and red lamps flashed on and off angrily. It was rather like an exhibition of prehistoric electronic equipment. These peculiar forms not only seemed designed to shock people emotionally, but to give them electric shocks as well!



Comprehension and Précis

In not more than 80 words describe what the writer saw from the moment he entered the art gallery. Do not include anything that is not in the last paragraph.

Answer these questions in note form to get your points:

1. What did the writer see when he entered the art gallery?
2. Why did it forbid people to touch the exhibits?
3. What did the exhibition consist of?
4. What did the writer see against the wall?
5. What did the spheres do?
6. What did the tall structures in the centre of the hall contain?
7. What did the coloured lights do?
8. What was emitted from black boxes?
9. Did red lamps go on and off or not?

Vocabulary

Give another word or phrase to replace the following words as they are used in the passage: on display (l. 6); oddly (l. 18); suspended (l. 18); response (l. 19); familiar (l. 19); attached (l. 21); flickered continuously (l. 24).

19 A Very Dear Cat

Kidnappers are rarely interested in animals, but they recently took considerable interest in Mrs Eleanor Ramsay's cat. Mrs Eleanor Ramsay, a very wealthy old lady, has shared a flat with her cat, Rastus, for a great many years. Rastus leads an orderly life. He usually takes a short walk in the evenings and is always home by seven o'clock. One evening, however, he failed to arrive. Mrs Ramsay got very worried. She looked everywhere for him but could not find him.

Three days after Rastus' disappearance, Mrs Ramsay received an anonymous letter. The writer stated that Rastus was in safe hands and would be returned immediately if Mrs Ramsay paid a ransom of £1000. Mrs Ramsay was instructed to place the money in a cardboard box and to leave it outside her door. At first, she decided to go to the police, but fearing that she would never see Rastus again—the letter had made that quite clear—she changed her mind. She drew £1000 from her bank and followed the kidnapper's instructions. The next morning, the box had disappeared but Mrs Ramsay was sure that the kidnapper would keep his word. Sure enough, Rastus arrived punctually at seven o'clock that evening. He looked very well, though he was rather thirsty, for he drank half a bottle of milk. The police were astounded when Mrs Ramsay told them what she had done. She explained that Rastus was very dear to her. Considering the amount she paid, he was dear in more ways than one!



Rastus was in safe hands

Comprehension and Précis

In not more than 80 words describe how Mrs Ramsay's cat, Rastus, was returned to her. Do not include anything that is not in the last paragraph.

Answer these questions in note form to get your points:

1. When did Mrs Ramsay receive an anonymous letter?
2. How much money did the kidnapper demand for the return of the cat?
3. What would happen if she went to the police?
4. Where did she have to put the money?
5. Where did she have to put the box?
6. How much did she draw from the bank?
7. Did she act on the kidnapper's instructions or not?
8. Had the money disappeared the following morning or not?
9. When did Rastus return to Mrs Ramsay?

Vocabulary

Give another word or phrase to replace the following words as they are used in the passage: rarely (l. 1); considerable (ll. 2-3); wealthy (l. 4); worried (l. 11); stated (l. 15); changed her mind (l. 20); word (l. 23).

20 Pioneer Pilots

In 1908 Lord Northcliffe offered a prize of £1000 to the first man who would fly across the English Channel. Over a year passed before the first attempt was made.

- 5 On July 19th, 1909, in the early morning, Hubert Latham took off from the French coast in his plane the 'Antoinette IV'. He had travelled only seven miles across the Channel when his engine failed and he
10 was forced to land on the sea. The 'Antoinette' floated on the water until Latham was picked up by a ship.

- Two days later, Louis Bleriot arrived near Calais with a plane called 'No. XI'.
15 Bleriot had been making planes since 1905 and this was his latest model. A week before, he had completed a successful overland flight during which he

- covered twenty-six miles. Latham, however, did not give up easily. He, too, arrived near Calais on the same day with a new 'Antoinette'. It looked as if
20 there would be an exciting race across the Channel. Both planes were going to take off on July 25th, but Latham failed to get up early enough. After making a short test flight at 4.15 a.m., Bleriot set off half an hour later. His great flight lasted thirty seven minutes. When he landed near Dover, the first person to greet him was a local policeman. Latham made another attempt a week later
25 and got within half a mile of Dover, but he was unlucky again. His engine failed and he landed on the sea for the second time.



Comprehension and Précis

In not more than 80 words describe the attempts made by Bleriot and Latham to fly across the Channel from the time when they both arrived at Calais. Do not include anything that is not in the last paragraph.

Answer these questions in note form to get your points:

1. On what date did Bleriot and Latham arrive at Calais?]
2. Did it look as if there would be a race or not?]
3. When would it take place?]
4. Why did Latham not take part in the race?]
5. Did Bleriot make a short test flight before setting out or not?]
6. How long did it take him to fly across the Channel?]
7. Who greeted him when he arrived at Dover?]
8. How near to Dover did Latham fly the following week?]
9. Why did he have to land on the sea for the second time?]

Vocabulary

Give another word or phrase to replace the following words as they are used in the passage: forced to land (l. 10); picked up (l. 12); completed (l. 17); covered (l. 18); test (l. 22); set off (l. 22); failed (l. 26).

stopped to work

finished

Appendix (10) : Validity of Behavioural Objectives

Ministry of Higher Education and Scientific Research

Babylon University

College of Basic Education

Higher Studies Department

General Teaching Methods

A Letter to the Respectful Jury Members

Dear Sir, Mrs, Miss:

The researcher is conducting an experimental study entitled " *The Effectiveness of a Proposed Instructional Program Based on Augmented Reality Technology on Academic Achievement and Developing Visual Intelligence Skills for College of Basic Education Students* ".

Since the current study requires building the behavioural objectives to be achieved in the light of the topics to the students of the College of Basic Education, which represents the content of reading comprehension subject, the researcher derived those objectives from the content of the study material. You are kindly requested to express your opinions and comments in judging their validity, safety of construction and coverage of the content by marking each objective as valid or invalid or in need of modification.

Any comments and modifications will be taken into consideration and highly appreciated.

With my heartfelt thanks and gratitude.

The researcher

Ahmed Ali Alwan

Topics	Behavioral Objectives	Bloom's Taxonomy Cognitive Levels
1	Use their imagination to portray and describe thoughts (ideas) when reading the story.	Remembering
	Elicit specific information from the text (to get information about what you know and don't know).	Analyzing
	Sequence the events into the order in which they happened.	Applying
	Use their senses to connect the characters, events, and ideas to clarify the picture in their mind.	Analyzing
	Relate text content to particular social issues, concerns or dispositions in life.	Applying
	Present – with appropriate introduction, development, and conclusion – the ideas of the given story in an effective order.	Understanding + Creating
	Interpret the visual images used and manipulate information presented in this story.	Understanding
	Make a judgment on the written story by using your imagination to visualize thoughts when reading .	Evaluating
2	Find information from the text that might be clues to the answers and use these with your background knowledge for possible answers.	Analyzing
	Determine the relevance and the truthfulness of the ideas presented in the material reviewed.	Evaluating
	Use the context to help guess the meanings of unfamiliar words.	Understanding + Analyzing
	Say your point of view towards the text by reformulation of ideas in a new way.	Remembering + Understanding
	Link what you read or hear to your own experiences.	Applying
	Begin to draw inferences from the text or the illustrations.	Applying + Understanding

	Write phrases from memory, and adapt these to create new sentences, to express ideas clearly.	Remembering + Creating
	Picture the words as images in your mind.	Creating + Remembering
3	Write brief notes, symbols, and abbreviations to point out important ideas in the story.	Understanding
	Use prior knowledge to understand the story.	Understanding + Analyzing
	Draw inferences such as inferring characters' feelings, thoughts and motives from their actions.	Understanding
	Write phrases from memory, and adapt these to create new sentences, to express ideas clearly.	Remembering + Creating
	Describe people, places, things and actions of the story orally and in writing.	Understanding
	Write creatively to express your own ideas and opinions, and translate the difficult sentences accurately into Arabic language.	Creating
	Take part in a short conversation, asking and answering questions, and exchanging opinions.	Understanding
4	Generate new ideas or ways of viewing things in the given story.	Creating
	Make connections based on the events of the story.	Analyzing
	Identify the overall message, key points, details and opinions in written passage, involving some more complex language, and recognizing the relationship between past, present and future events.	Analyzing + Remembering
	Demonstrate understanding by being able to scan for particular information in the story.	Evaluating + Understanding
	Use the context to help guess the meanings of unfamiliar words.	Analyzing + Understanding
	Say what you like or dislike about the story.	Remembering
	Read a story on the same topic to find and compare information.	Analyzing
5	Use clues in the story to figure out the meaning of a new words.	Understanding

	Convey information and narrate events coherently and confidently, using and adapting language for new purposes.	Remembering + Creating
	Identify the overall message, key points, details and opinions in the story, involving some more complex language, recognizing the relationship between past, present and future events.	Analyzing + Remembering
	Explain the main purpose of the story and summarize it succinctly.	Understanding
	Explain the author's viewpoint in the story and present an alternative point of view.	Understanding + Analyzing
	Participate in discussions, listen attentively and respond to others' points of view, drawing on evidence and explaining.	Understanding + Analyzing
	Use written and visual clues from the story as well as your own personal experiences to make predictions about what might happen before, during and after reading.	Understanding + Applying
6	Recognize the correct and factual information from the story.	Analyzing + Understanding
	Communicate and interact effectively in speech for a variety of purposes across the range of specified contexts.	Remembering
	Sequence the events into the order in which they happened.	Creating
	Use the clues from the story to create a picture in your head by using all the senses and imagination to create your mental image.	Understanding + Creating
	Ask pertinent questions - before, during and after reading - to develop and extend ideas stated in the story.	Understanding + Creating
	Articulate ideas and opinions, using evidence and explanation to support.	Remembering + Analyzing
	Explain the main purpose of the story and summarize it succinctly.	Understanding
7	Distinguish between statements of fact and opinion.	Understanding + Analyzing
	Use pictures as a context clue to predict what the story will be about.	Analyzing

	• Make connections between information viewed and personal experiences.	Applying
	• Analyze the discussions and opinions presented by others.	Analyzing
	• Add new ideas or modify the ideas presented by the writer.	Creating
	• Make a judgment on the written story by using your imagination to visualize thoughts when reading .	Evaluating
	• Accept with respect the opinions and ideas offered by others.	Evaluating
	• Use emotional facial expressions, hand gestures, and body language to convey ideas to others.	Applying + Creating

Appendix (11): Names of Jury Members

The Jury Members Arranged According to Their Scientific Title and Then Alphabetically

No.	Title	Name	Field/specification	Place of work/institution
1	Prof. (PhD)	Abdul-Salam Jawdat Jassim	Educational Psychology	University of Babylon, College of Basic Education.
2	Prof. (PhD)	Emad Hussein AL-Murshidi	Educational Psychology	University of Babylon, College of Basic Education.
3	Prof. (PhD)	Fatima Abdel Rahim Hussein	TEFL	University of Misan, College of Basic Education
4	Prof. (PhD)	Haider Hatem AL-Ejresh	Methods of Teaching	University of Babylon, College of Basic Education.
5	Prof. (PhD)	Iman Mingher	Linguistics	University of Babylon, College of Education for Human Sciences.
6	Prof. (PhD)	Jaseb Ghanouh Abbas	TEFL	Ministry of Education, Open Educational College / Al-Qadisiyah
7	Prof. (PhD)	Manal Mohammed Farouq	TEFL	University of Helwan, College of Education , Egypt.
8	Prof. (PhD)	Salam Hamid AL-Temimi	TEFL	University of Baghdad, College of Education Ibn Rushd for Human Sciences.
9	Prof. (PhD)	Salih Mahdi Adday	Linguistics	University of Babylon, College of Education for Human Sciences.
10	Prof. (PhD)	Sohair Mohammed Saliem	TEFL	University of Helwan, College of Education , Egypt.
11	Prof.	Weam Majeed AL-Dulaimi	TEFL	AL-Qassim Green University, College of Agriculture.
13	Asst. Prof. (PhD)	Dhea Mizher Khouribet	TEFL	University of Baghdad, College of Education Ibn Rushd for Human Sciences.

12	Asst. Prof. (PhD)	Elaf Riyadh Khalil	TEFL	University of Baghdad, College of Education Ibn Rushd for Human Sciences.
14	Asst. Prof. (PhD)	Firas Abdual-Mun'm Jawad	TEFL	University of Babylon, College of Education for Human Sciences.
19	Asst. Prof. (PhD)	Haider Tariq Kadhimi	Psychology	University of Babylon, College of Basic Education.
20	Asst. Prof. (PhD)	Hassan Kadhimi	TEFL	Dhi Qar University, College of Education for Human Sciences
15	Asst. Prof.	Muneer Ali khudhayer	TEFL	University of Babylon, College of Education for Human Sciences.
16	Asst. Prof. (PhD)	Nadia Majeed Hussein	TEFL	Middle Technical University.
18	Asst. Prof. (PhD)	Ramy Abu Saelek	TEFL	Ministry of Education, Jordan.
17	Asst. Prof.	Sabeeha Hamza Dehham	TEFL	University of Babylon, College of Basic Education.
21	Asst. Prof. (PhD)	Surra Abbas Obaid	TEFL	University of Babylon, College of Nursing.

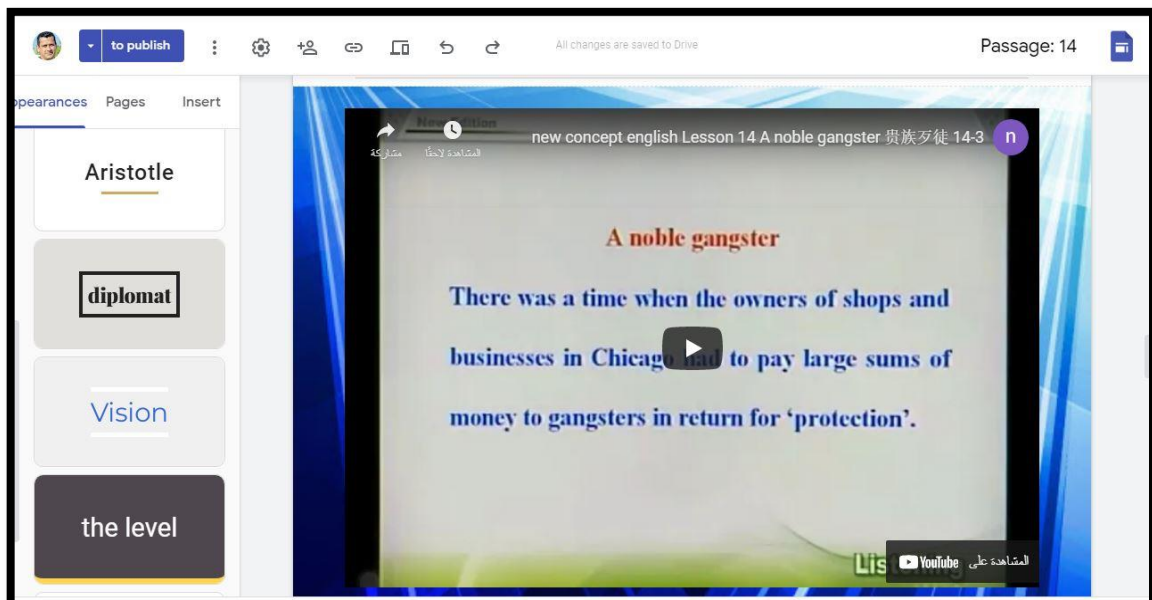
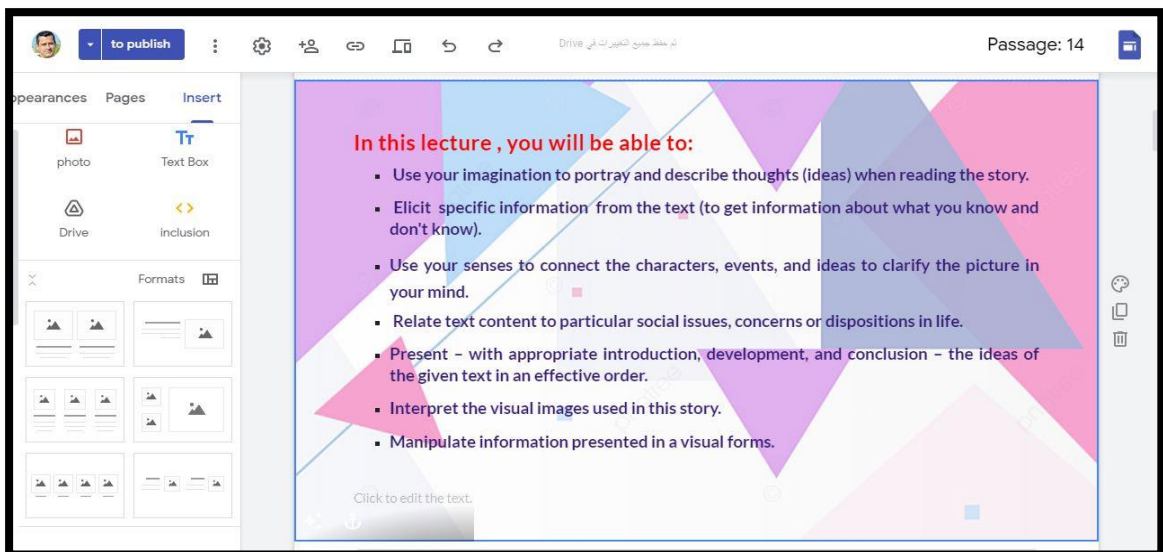
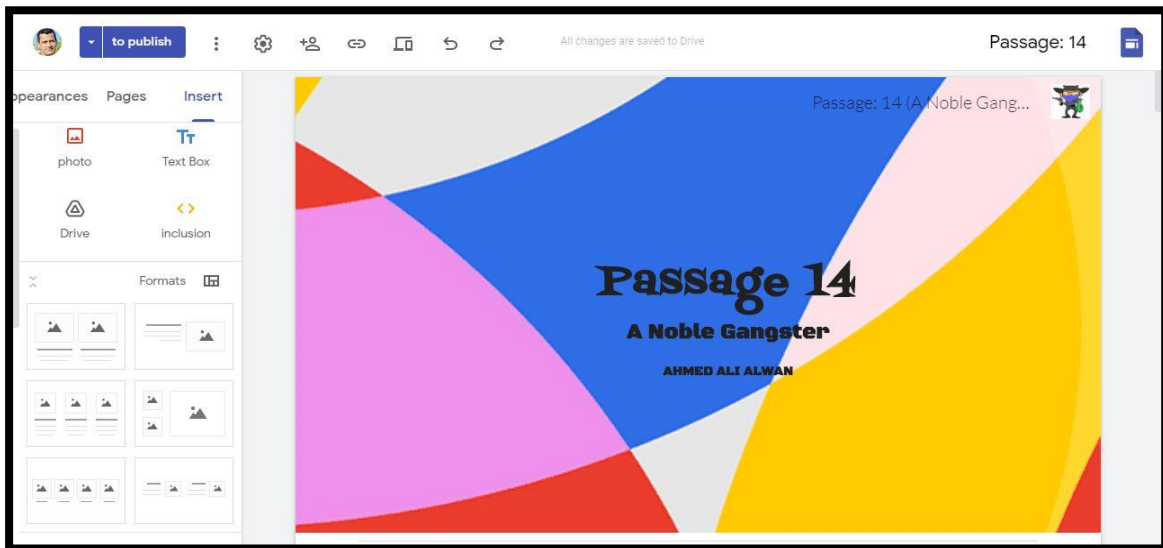
Names of Experts in the Field of Information Technology

No.	Title	Name	Field/specification	Place of work/institution
1	Asst. Prof. (PhD)	Ahmed Mahdi Saleh	IT	University of Babylon, College of Information Technology.
2	Asst. Prof. (PhD)	Mahdi Saleh Neama	IT	University of Babylon, College of Information Technology.
3	Asst. Prof. (PhD)	Souad Abdul Ilah	IT	University of Babylon, College of Information Technology.

Appendix (12):

Samples of the digital Content of reading comprehension course on Google Sites

1- PASSAGE (14)



2. PASSAGE (15)

Passage 15 (Sixpence Worth of Tr...

Passage 15

Sixpence Worth of Trouble

AHMED ALI ALWAN

You are welcome for the reading comprehension online lectures, and I hope you get full benefit of them as well as our lectures in the classroom. Each lesson consists of a passage taken from your textbook, explanation of the meanings of a number of words as they are used in the passage, answering comprehension questions about the passage and linking the answers later on into a précis.

Look at the clues in the title of the story and the following pictures to help you understand what is going on in the story?

Can you tell what the story is going to be about?

What information do you get from these pictures?

Click to edit the text.

3. PASSAGE (16)

Passage 16 (Mary had a Little La...

PASSAGE 16

Mary Had a Little Lamb

AHMED ALI ALWAN

You are welcome for the reading comprehension online lectures, and I hope you get full benefit of them as well as our lectures in the classroom. Each lesson consists of a passage taken from your textbook, explanation of the meanings of a number of words as they are used in the passage, answering comprehension questions about the passage and linking the answers later on into a précis.

to publish

Passage 16 (

Appearances

Pages

Insert

Vision

font style

the level

IMPRESSION

In this lecture, you will be able to:

- 1- Write brief notes, symbols, and abbreviations to point out important ideas in the story.
- 2- Use prior knowledge to understand the story.
- 3- Draw inferences such as inferring characters' feelings, thoughts and motives from their actions.
- 4- Write phrases from memory, and adapt these to create new sentences, to express ideas clearly.
- 5- Describe people, places, things and actions of the story orally and in writing.
- 6- Write creatively to express your own ideas and opinions, and translate the difficult sentences accurately into Arabic language.
- 7- Take part in a short conversation, asking and answering questions, and exchanging opinions.

to publish

Passage 16 (

Appearances

Pages

Insert

Vision

font style

the level

IMPRESSION

WHAT CAN YOU SEE IN THESE PHOTOGRAPHS? CAN YOU DESCRIBE THEM?



Photo #1



Photo #2



Photo #3

ACTIVITY:

Write the related words that you think will appear in the story? let's see how many words can you find?

4. PASSAGE (17)

17 (The Greatest Bridge in the W...

Passage 17

The Greatest Bridge in the World

AHMED ALI ALWAN

You are welcome for the reading comprehension online lectures, and I hope you get full benefit of them as well as our lectures in the classroom. Each lesson consists of a passage taken from your textbook, explanation of the meanings of a number of words as they are used in the passage, answering comprehension questions about the passage and linking the answers later on into a précis.

17 (The Greatest Bridge in the ...

Watch the following video below:

China Has Opened The World's Longest Sea Bridge

Now answer the following questions:

1. Talk with your classmates about what did you see?
2. In your mind, tell yourself what the current story is going to be about?

Write a description of 5 sentences about this video?

5. PASSAGE (18)



The screenshot shows a Google Slides interface. The top bar includes a profile icon, a 'to publish' button, and various editing tools. The title bar reads '18 Electric Currents in Modern ...'. The left sidebar shows the 'Insert' menu with options like button, divider, placeholder, YouTube, Calendar, the map, Documents, Presentations, Data tables, models, and Graphs. The main slide area displays a presentation slide with a colorful, abstract background. The slide title is '18 (Electric Currents in Modern ...'. The main content of the slide reads: 'Passage 18', 'Electric Currents in Modern', 'Art', and 'AHMED ALI ALWAN'. At the bottom of the slide, there is a text box with a red border containing the following text: 'You are welcome for the reading comprehension online lectures, and I hope you get full benefit of them as well as our lectures in the classroom. Each lesson consists of a passage taken from your textbook, explanation of the meanings of a number of words as they are used in the passage, answering comprehension questions about the passage and linking the answers later on into a précis.'

to publish

Drive

18 Electric Currents in Modern ...

appearances Pages Insert

basic

Aristotle

diplomat

Vision



What can you see in this photo?

Click to edit the text.



Take a minute to picture in your mind what the story is going to be about?

Write down a few key words/ sentences what do you think this story is about?

6. PASSAGE (19)

Passage 19 (A Very Dear Cat)

to publish

All changes are saved to Drive

Passage 19 (A Very Dear Cat)

Appearances Pages Insert

reducible group

table of contents

Shifting platform

button

divider

4- Write a description for the following images that related to the current story:

Picture #1

picture #2

picture #3

5- Rastus arrived punctually at 7 o'clock that morning. (T/F)

6- Number the following pictures and then write the story:

7. PASSAGE (20)

Passage 20 (Pioneer Pilots)

Passage 20

Pioneer Pilots

AHMED ALI ALWAN

You are welcome for the reading comprehension online lectures, and I hope you get full benefit of them as well as our lectures in the classroom. Each lesson consists of a passage taken from your textbook, explanation of the meanings of a number of words as they are used in the passage, answering comprehension questions about the passage and linking the answers later on into a précis.

Passage 20 (Pioneer Pilots)

1. What do you know about a pilot career?
2. Can an ordinary person land a plane? Why?
3. How many pilots are necessary for each flight?
4. Does the pilot eat the same food as the passengers? Why?
5. Can a commercial pilot fly all aircraft models?

Look at the following picture to help you predict what the story will be about.



to publish

All changes are saved to Drive

Passage 20 (Pioneer Pilots)

Appearances

Pages

Insert

Aristotle

diplomat

Vision

font style

...neer pilots 飞行员的先驱 20-3

Pioneer pilots

In 1908 Lord Northcliffe offered a prize of £1,000 to the first man who would fly across the English Channel.

Listening

After watching and reading the story, try to answer the following questions:

- Read each sentence. Determine if it is a fact or an opinion and write it on the line:**
 - Latham was landed on the sea because there was an engine failure.
 - Bleriot took off an hour after flying a long test at 4.15 am
- Is the setting effective or useful making you visualize the scenes? (C ite some lines that appeal to your senses).**
- As you read, take notes about how the story connects to each of the following:**

Appendix (13 a)
Academic Achievement Pre-Test in Reading Comprehension

Ministry of Higher Education and Scientific Research
Babylon University
College of Basic Education
Higher Studies Department
General Teaching Methods

Dear Sir / Mrs. / Miss:

The researcher is conducting an experimental study for a Ph.D. dissertation in Education (General Teaching Methods) entitled "***The Effectiveness of a Proposed Instructional Program Based on Augmented Reality Technology on Academic Achievement and Developing Visual Intelligence Skills for College of Basic Education Students***".

This study aims to find out the effectiveness of using a Proposed Instructional Program Based on Augmented Reality Technology on Academic Achievement and Developing Visual Intelligence Skills for 2nd stage English department Students, Basic Education College in Reading Comprehension subject. To achieve this aim, a pre and post academic achievement tests will be conducted for the control and experimental.

The pre-test prepared by the researcher to be used before experimentation. It will be administered to students before teaching the topics of Reading Comprehension using ART so as to identify their actual level after their learning the content with the proposed instructional program. As a specialist in the field, you are kindly requested to pass judgment on the validity and suitability of the study instruments.

Kindly read the following questions. Circle one of the following which expresses your opinion about each of the following criteria (Excellent = 5, very good = 4, good = 3, fair = 2, and poor = 1).

The criteria	5	4	3	2	1
The suitability of the test items to student's level.					
Timing suitability to the items of the test.					
Clarity and accuracy in all elements of question writing (such as distractions).					
The score assigned to each test item.					
The suitability of the test items for Bloom's cognitive levels.					

Any comments and modifications will be taken into consideration and highly appreciated.

Thank you for your efforts.

The researcher
Ahmed Ali Alwan

Full Name:

Stage:

Group:

General Instructions:

- **Read all the instructions carefully.**
- **You will have (90) minutes to answer the test.**
- **Use pen. Pencil is not allowed.**
- **Express your ideas and opinions clearly.**
- **Turn off your cellphones.**
- **If you have any doubts, please raise your hand. You can not speak during the test.**

Q1/ Read the following paragraphs and carefully determine what the main idea is for each. The best way to approach these questions is to first read the paragraph and then, in your own words, restate what you think the author is trying to say. From the four choices, select the one statement that best supports the author's point. (10.M)

Critical reading is a demanding process. To read critically, you must slow down your reading and, with pencil in hand, perform specific operations on the text. Mark up the text with your reactions, conclusions, and questions. When you read, become an active participant.

1- This paragraph best supports the statement that:

- a. critical reading is a slow, dull, but essential process.
- b. the best critical reading happens at critical times in a person's life.
- c. readers should get in the habit of questioning the truth of what they read.
- d. critical reading requires thoughtful and careful attention.

The best recipes for clam chowder all include onions and a bay leaf. The onions add a sharpness and zest to the blandness of the clams, and also help remove their slimy texture. The bay leaf complements the onion's strong flavour.

2- This paragraph best supports the statement that:

- a. onions and bay leaves go well with clams.
- b. onions were once thought to be poisonous.
- c. bay leaves are essential in many soups.
- d. clam chowder is very nutritious.

Mathematics allows us to expand our consciousness. Mathematics tells us about economic trends, patterns of disease, and the growth of populations. Math is good at exposing the truth, but it can also perpetuate misunderstandings and untruths. Figures have the power to mislead people.

3- This paragraph best supports the statement that:

- a. the study of mathematics is dangerous.
- b. figures are sometimes used to deceive people.

- c. words are more truthful than figures.
- d. the power of numbers is that they cannot lie.

Black-and-white camera film, in the old days of film photography, was very sensitive to blue light but not to red light. Blue skies would often show very little detail, because the film couldn't record all that it was seeing. To compensate, photographers would put a red filter on the lens, darkening the sky enough that the film could record its fluffy clouds.

4- This paragraph best supports the statement that:

- a. red filters were very popular in the old days of photography.
- b. infrared rays are invisible to the naked eye.
- c. red filters cut out some blue light on black and white film.
- d. black-and-white photography used to be very popular.

Reality TV shows will have an adverse effect on traditional dramas and comedies. As reality TV increases in popularity, network executives will begin cancelling more traditional programs and replacing them with the latest in reality TV. 109.

5- This paragraph best supports the statement that :

- a. reality TV is low quality.
- b. reality TV shows get the highest ratings.
- c. more and more people love to watch and participate in reality TV.
- d. as reality TV gets more popular, more traditional television shows may be threatened.

Q2/ Read the following passages. Then, answer the questions below by choosing the best item : (10.M)

1- When painting wood, the most important step is to thoroughly sand the wood to a smooth finish. All burrs and rough spots must be removed, and the surface should be silky smooth to the touch. After cleaning the wood, one should give it two coats of primer. This neutral coloured paint soaks into the grain and seals it. Once dried, the wood is ready for two more coats of the final colour.

What are the correct steps for painting wood, according to the passage?

- a. sand, prime, prime, paint, paint
 - b. sand, prime, prime, paint
 - c. sand, clean, prime, prime, paint, paint
 - d. sand, prime, paint
- 2- In the summer, the Northern Hemisphere is slanted toward the sun, making the days longer and warmer than in winter. The first day of summer, June 21st, is called summer solstice and is also the longest day of the year. However, June 21st marks the beginning of winter in the Southern Hemisphere, when that hemisphere is tilted away from the sun.

According to the passage, when it is summer in the Northern Hemisphere, it is _____ in the Southern Hemisphere.

- a. spring

- b. winter**
- c. summer
- d. autumn

3- Worldwide illiteracy rates have consistently declined in the last few decades. One of the major reasons for this decline is the sharp increase of literacy rates among young women, which is a result of specific campaigns designed to increase educational opportunities for girls. However, there are still an estimated 771 million illiterate adults in the world, about two-thirds of who are women.

Based on the passage, the author would tend to agree with which of the following statements?

- a. Males have a greater need for higher education than women.**
 - b. Men and women should have equal access to education.
 - c. Worldwide, women need medical care more than the ability to read.
 - d. It has been proven that women with increased education have fewer children.
- 4- Only certain people are qualified to handle hazardous waste. Hazardous waste is defined as any waste designated by the U.S. Environmental Protection Agency as hazardous. If you are unclear whether a particular item is hazardous, you should not handle the item but should instead notify a supervisor of the Sanitation.

Hazardous waste is defined as:

- a. waste picked up by special sanitation trucks.
 - b. anything so designated by the U.S. Environmental Protection Agency.
 - c. waste not allowed to be placed alongside regular residential garbage.
 - d. anything too dangerous to handle.**
- 5- In criminal cases, the availability of readable fingerprints is often critical in establishing evidence of a major crime. It is necessary, therefore, to follow proper procedures when taking fingerprints. In major cases, prints should be obtained from all persons who may have touched areas associated with a crime scene, for elimination purposes.

The paragraph best supports the statement that:

- a. all persons who have touched a crime-scene area should be fingerprinted.**
- b. no crimes can be solved without readable fingerprints.
- c. all persons who have touched an area in a crime scene are suspects.
- d. all fingerprints found at a crime scene are used in court as evidence.

Q3/ (A)Write one-paragraph summary of the following passage. Try to avoid copying from the original text. : (2.M)

Even though more and more women have started taking up full-time jobs outside the house, they still end up doing all the housework. In spite of a demanding career, a woman is expected to be an efficient housewife but most men still do not make good house-husbands. When it comes to helping with the housework many men feel totally helpless. When they decide to do a few jobs around the house they pick the ones they enjoy. Sometimes if they are in the mood they don't mind doing a bit of gardening or mending a few things but they refuse to do many boring jobs-like cleaning the house, washing and ironing the clothes,

looking after the children or cooking dinner. Most of these jobs have to be done immediately and regularly, while household repairs, the job that men enjoy doing most can always wait till a more **convenient** time or till one feels like doing them. According to survey done recently, the lady of the house does three quarters of the boring household chores even if she has a full-time job. But surprisingly, housewives don't seem to mind, for most women still they see their family role as the one that matters most. However, most women tend to use electrical appliances to make up for male laziness. Makers of household appliances and electrical gadgets are delighted, of course.

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(B)/ Answer the following questions: (4.M)

- 1- What does the word “convenient” mean?
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- 2- What message was the author trying to convey?
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Q4/ Read the following passage then answer the questions below: (10.M)

Each animal of the same species looks for the same sort food. Also there may be other animals of different species competing for the same food. Think of all the grazing animals on open grassland, for example, Zebras, antelopes and elands, all eating grass, or the competition between fish-eating birds and others. Sometimes a plant may provide a home for an animal: tree nesting birds can live only where there are trees. An animal may house another animal, as a dog does a parasite worm in its gut. Or an animal may alter the surroundings provide a home for another animal. Thus slits get caught up round the closely packed mussels in a mussel bet on the shore and in this slit we find worms which do not live elsewhere. All these factors- temperature, climate, competition act together to control living conditions. Plants and animals seldom find the ideal surroundings. They have to eke the best of their environment and live where the conditions are nearest to their needs.

- Questions:
1. What is the main idea of the passage?
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2. Why is there competition for food?
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3. How do different living things support others to live? Give examples from the passage.
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4. There is competition as well as cooperation among living things. Give evidence from the passage to support this view.
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5. Do you agree to the view that human beings are destroying living conditions today? Give reasons.
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Q5/ Read the following passage carefully, then try to answer the questions below: (14.M)

Celebrated architect, Zaha Mohammad Hadid, was born in 31 October 1950 in Baghdad, Iraq. Her interest in architecture began early during one of the many family visits to ancient Sumerian cities in southern Iraq. In the 1960s she received her formal education in Swiss and English boarding schools. Hadid began her post-secondary education studying at the American University of Beirut. However, in 1972, she moved to London to pursue her passion for architecture at the Architectural Association School of Architecture. After graduating, she worked at the Office of Metropolitan Architecture (OMA) in 1977.

Hadid opened her own practice in 1980 and soon created a lot of excitement in the architectural world with her innovative architectural paintings and paper sculptures. In 1988, her international reputation was firmly established when her visionary drawings were displayed at New York's Museum of Modern Art in the exhibit "Deconstruction in Architecture". In 1993 one of her architectural designs was finally built, the Vitra Fire Station in Weil Rhein, Germany. Until then, many believed her designs impossible to construct.

Everything changed for Zaha Hadid in 2005 with the completion of the Phaeno Science Center in Wolfsburg, Germany. This design created a significant change in our understanding of the possibilities of architecture. It was rounded and almost seemed to be moving. It was so different from everyday architecture that a new term, *Parametricism*, was created to describe this new architectural form. In the years that followed Hadid produced such works as the award-winning MAXXI Museum in 2010 and Beijing's Galaxy Soho in 2014.

However Hadid's passion was not for architecture alone. Throughout the later years of her career she designed unique interior items, such as chairs and tables, for a number of high-

profile firms and galleries and even high fashion for the Lacoste clothing company. Throughout her career Hadid held many professorships throughout the world and was frequently honoured for her distinctive designs. In 2005, she received the prestigious Pritzker Architecture Prize, and was doubly distinguished as being both the first female and the first Muslim recipient. On 31 March 2016, Zaha Hadid died suddenly from a heart attack resulting from acute bronchitis.

1- What was one possible reason it took so long for Zaha Hadid to have her designs realized?

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2- According to the text, what began her interest in architecture?

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3- What is the main idea of this passage?

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4- In the third paragraph, what does the word "distinctive" mean?

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5- What was the author's intention in writing this passage?

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6- What questions do you have about this passage?

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7- What prestigious award did she win? Why was this so noteworthy?

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Appendix (13 b)

Academic Achievement Post-Test in Reading Comprehension

Full Name:

Stage:

Group:

General Instructions:

- **Read all the instructions carefully.**
- **You will have (90) minutes to answer the test.**
- **Use pen. Pencil is not allowed.**
- **Express your ideas and opinions clearly.**
- **Turn off your cellphones.**
- **If you have any doubts, please raise your hand. You can not speak during the test.**

Q1/ Read the following passage then answer the questions below: (10.M)

The victory of the small Greek democracy of Athens over the mighty Persian empire in 490 B.C. is one of the most famous events in history. Darius, king of the Persian empire, was furious because Athens had interceded for the other Greek city-states in revolt against Persian domination. In anger the king sent an enormous army to defeat Athens. He thought it would take drastic steps to pacify the rebellious part of the empire. Persia was ruled by one man.

In Athens, however, all citizens helped to rule. Ennobled by this participation, Athenians were prepared to die for their city-state. Perhaps this was the secret of the remarkable victory at Marathon, which freed them from Persian rule. On their way to Marathon, the Persians tried to fool some Greek city-states by claiming to have come in peace. The frightened citizens of Delos refused to believe this. Not wanting to abet the conquest of Greece, they fled from their city and did not return until the Persians had left. They were wise, for the Persians next conquered the city of Etria and captured its people.

Tiny Athens stood alone against Persia. The Athenian people went to their sanctuaries. There they prayed for deliverance. They asked their gods to expedite their victory. The Athenians refurbished their weapons and moved to the plain of Marathon, where their little band would meet the Persians. At the last moment, soldiers from Plataea reinforced the Athenian troops. The Athenian army attacked, and Greek citizens fought bravely. The power of the mighty Persians was offset by the love that the Athenians had for their city. Athenians defeated the Persians in archery and hand combat. Greek soldiers seized Persian ships and

burned them, and the Persians fled in terror. Herodotus, a famous historian, reports that 6400 Persians died, compared with only 192 Athenians.

1- Athens had the other Greek city-states against the Persians.

- A. refused help to
- B. defeated
- C. given orders for all to fight
- D. **intervened on behalf of**

2- Darius took drastic steps to the rebellious Athenians.

- A. **calm**
- B. destroy
- C. weaken
- D. placate

3- Their participation to the Athenians.

- A. gave comfort
- B. **gave honor**
- C. gave strength
- D. gave fear

4- The people of Delos did not want to the conquest of Greece.

- A. end
- B. think about
- C. **encourage**
- D. daydream about

5- The Athenians were by some soldiers who arrived from Plataea.

- A. welcomed
- B. captured
- C. held
- D. **strengthened**

Q2/ Read the following passages. Then, answer the questions below by choosing the best item : (10.M)

1. Every Sunday, Mustafa wakes up early. After he eats and takes a bath, he prepares the materials for his modules. He really follows what is stated in the class schedule. He reads and understands the content of each lesson. What can you infer about Mustafa?

- A. He wants to accomplish his lessons as early as possible.
- B. He has many things to do.
- C. **He is organized and diligent in his studies.**
- D. He is an ambitious and intelligent student.

2. Since 1944, the County of Los Angeles Department of Parks and Recreation has been meeting the diverse needs of not only residents, but also visitors from around the world. With over 63,000 acres of parks, gardens, lakes, trails, natural areas, and the world's largest public golf course system, the Department of Parks and Recreation is committed to

providing the public with social, cultural, and recreational activities to enjoy the whole year round!

From the passage, it can be inferred that:

- A. The County has boasted the largest public golf course system since 1944.
- B. **The department offers a variety of activities that represent the needs of the community.**
- C. The natural areas of Los Angeles County are one of the biggest attractions for visitors.
- D. The Department of Parks and Recreation focuses its efforts entirely on recreational activities.

3. Because of the high cost of living today, Zaid is trying to save money to meet the basic needs of his family. One of his ways is to grow vegetables to meet their daily food supply. What can you infer about Zaid?

- A. **He is economical and frugal.**
- B. He is a stingy man.
- C. He is a nature-lover.
- D. He likes vegetables.

4. Fatima lost her job due to the impact of COVID-19 pandemic in the country. Despite this, she did not stop looking for a solution until she came up with an idea of selling Iraqi delicacies such as Dolma and Biryani by posting these on social media. Her product presentations were creative. Also, she tried other unique ideas to make it popular to customers. What can you infer about Fatima?

- A. She loves cooking and selling.
- B. She likes posting on social media.
- C. She is a risk-taker.
- D. **She is resourceful and creative.**

5. Amazon river dolphins are a species of dolphin that make their homes in rivers. They are friendly animals, and are known to approach humans and river boats. But, unlike the dolphins you might see in the ocean, these dolphins are often pink in color.

From the passage, it can be inferred that:

- A. **River dolphins live in freshwater, not saltwater.**
- B. River dolphins are an endangered species.
- C. River dolphins are very intelligent animals.
- D. River dolphins eat crabs, catfish, and small turtles.

Q3/ (A)Write one-paragraph summary of the following passage. Try to avoid copying from the original text. : (2.M)

Even though more and more women have started taking up full-time jobs outside the house, they still end up doing all the housework. In spite of a demanding career, a woman is expected to be an efficient housewife but most men still do not make good house-husbands. When it comes to helping with the housework many men feel totally helpless. When they decide to do a few jobs around the house they pick the ones they enjoy. Sometimes if they are in the mood they don't mind doing a bit of gardening or mending a few things but they

refuse to do many boring jobs-like cleaning the house, washing and ironing the clothes, looking after the children or cooking dinner. Most of these jobs have to be done immediately and regularly, while household repairs, the job that men enjoy doing most can always wait till a more convenient time or till one feels like doing them. According to survey done recently, the lady of the house does three quarters of the boring household chores even if she has a full-time job. But surprisingly, housewives don't seem to mind, for most women still they see their family role as the one that matters most. However, most women tend to use electrical appliances to make up for male laziness. Makers of household appliances and electrical gadgets are delighted, of course.

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(B)/ Answer the following questions: (4.M)

1- What does the word “convenient” mean?

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2- What message was the author trying to convey? How do you know?

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Q4/ Read the following passage then answer the questions below: (10.M)

Each animal of the same species looks for the same sort food. Also there may be other animals of different species competing for the same food. Think of all the grazing animals on open grassland, for example, Zebras, antelopes and elands, all eating grass, or the competition between fish-eating birds and others. Sometimes a plant may provide a home for an animal: tree nesting birds can live only where there are trees. An animal may house another animal, as a dog does a parasite worm in its gut. Or an animal may alter the surroundings provide a home for another animal. Thus slits get caught up round the closely packed mussels in a mussel bet on the shore and in this slit we find worms which do not live elsewhere. All these factors- temperature, climate, competition act together to control living conditions. Plants and animals seldom find the ideal surroundings. They have to eke the best of their environment and live where the conditions are nearest to their needs.

Questions:

1- What is the main idea of the passage?

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2- Why is there competition for food?

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3- How do different living things support others to live? Give examples from the passage.

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4- There is competition as well as cooperation among living things. Give evidence from the passage to support this view.

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.....
5- Do you agree to the view that human beings are destroying living conditions today? Give reasons.

.....
Q5/ Read the following passage carefully, then try to answer the questions below: (14.M)

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However Hadid's passion was not for architecture alone. Throughout the later years of her career she designed unique interior items, such as chairs and tables, for a number of high-profile firms and galleries and even high fashion for the Lacoste clothing company. Throughout her career Hadid held many professorships throughout the world and was frequently honoured for her distinctive designs. In 2005, she received the prestigious Pritzker

Architecture Prize, and was doubly distinguished as being both the first female and the first Muslim recipient. On 31 March 2016, Zaha Hadid died suddenly from a heart attack resulting from acute bronchitis.

1. What was one possible reason it took so long for Zaha Hadid to have her designs realized?

2. According to the text, what began her interest in architecture?

3. What is the main idea of this passage?

4. In the third paragraph, what does the word "distinctive" mean?

5. What was the author's intention in writing this passage?

• What questions do you have about this passage?

• What prestigious award did she win? Why was this so noteworthy?

Appendix (14)

Answer Time for the Pilot Sample Students in Achievement Test

No.	Time Taken	No.	Time Taken
1.	105	26.	101
2.	100	27.	109
3.	98	28.	110
4.	111	29.	111
5.	90	30.	88
6.	84	31.	80
7.	70	32.	73
8.	88	33.	87
9.	94	34.	92
10.	104	35.	105
11.	84	36.	80
12.	70	37.	73
13.	88	38.	87
14.	94	39.	92
15.	104	40.	105
16.	70	41.	73
17.	88	42.	87
18.	94	43.	92
19.	104	44.	105
20.	84	45.	80
21.	99	46.	84
22.	88	47.	89
23.	80	48.	88
24.	73	49.	84
25.	87	50.	77

Appendix (15 a): Difficulty value of achievement test items

Items	Difficulty Coefficient
1	0.42
2	0.36
3	0.63
4	0.33
5	0.48
6	0.62
7	0.63
8	0.61
9	0.48
10	0.56
11	0.29
12	0.60
13	0.56
14	0.33
15	0.39
16	0.48
17	0.36
18	0.35
19	0.54
20	0.60
21	0.28
22	0.62
23	0.63
24	0.36
25	0.63
Total Difficulty Coefficient = 0.48	

Appendix (15 b): Discriminative power of achievement test items

Items	Discrimination Coefficient
1	0.50
2	0.55
3	0.45
4	0.70
5	0.50
6	0.55
7	0.55
8	0.60
9	0.45
10	0.75
11	0.45
12	0.65
13	0.55
14	0.50
15	0.45
16	0.65
17	0.65
18	0.50
19	0.60
20	0.55
21	0.55
22	0.45
23	0.65
24	0.70
25	0.70
Total Discrimination Coefficient = 0.56	

Appendix (15 c) shows the effectiveness of wrong alternatives of achievement test.

The Effectiveness of Wrong Alternatives			
A	B	C	D
0.11-	0.19-	0.07-	-
-	0.19-	0.15-	0.11-
0.07-	-	0.15-	0.11-
0.15-	0.22-	-	0.15-
0.19-	0.07-	0.11-	-
0.11-	0.15-	-	0.15-
0.15-	-	0.15-	0.11-
-	0.19-	0.11-	0.15-
0.11-	0.15-	0.07-	-
-	0.19-	0.22-	0.15-

Appendix (15 d)

Difficulty Coefficient and Discrimination Coefficient of Achievement Test for The Pilot Sample

No.	Number of students in the upper group	Number of students in the lower group	Diff. C	Disc. C
1.	13	3	0.42	0.50
2.	15	4	0.36	0.55
3.	13	4	0.63	0.45
4.	20	6	0.33	0.70
5.	18	8	0.48	0.50
6.	17	6	0.62	0.55
7.	16	5	0.63	0.55
8.	15	3	0.61	0.60
9.	14	5	0.48	0.45
10.	19	4	0.56	0.75
11.	17	8	0.29	0.45
12.	19	6	0.60	0.65
13.	16	5	0.56	0.55
14.	16	6	0.33	0.50
15.	13	4	0.39	0.45
16.	19	6	0.48	0.65
17.	17	4	0.36	0.65
18.	16	6	0.35	0.50
19.	20	8	0.54	0.60
20.	17	6	0.60	0.55
21.	19	8	0.28	0.55
22.	13	4	0.62	0.45
23.	17	4	0.63	0.65
24.	19	5	0.36	0.70
25.	18	4	0.63	0.70

Appendix (16)

Students' Scores to Calculate the Reliability of the Achievement Test Using the Re-correction Method

No.	Corrector's Scores	Scores Over Time	Scores with Another Rater
1.	25	24	22
2.	10	11	12
3.	22	23	25
4.	28	26	24
5.	8	10	13
6.	35	33	33
7.	23	20	22
8.	29	25	25
9.	37	33	33
10.	26	25	25

Appendix (17 a)

The Visual Intelligence Skills Pre-Test in Reading Comprehension

Ministry of Higher Education and Scientific Research
Babylon University
College of Basic Education
Higher Studies Department
General Teaching Methods

Dear Sir / Mrs. / Miss:

The researcher is conducting an experimental study for a Ph.D. dissertation in Education (General Teaching Methods) entitled "*The Effectiveness of a Proposed Instructional Program Based on Augmented Reality Technology on Academic Achievement and Developing Visual Intelligence Skills For College of Basic Education Students*".

This study aims to find out the effectiveness of using a Proposed Instructional Program Based on Augmented Reality Technology on Academic Achievement and Developing Visual Intelligence Skills for 2nd stage English department Students, Basic Education College in Reading Comprehension subject. To achieve this aim, a pre and post visual intelligence test for the control and experimental groups will be adopted.

The pre-test prepared by the researcher to be used before experimentation. It will be administered to students before teaching the lessons so as to identify their actual level before receiving any instruction.

As a specialist in the field, you are kindly requested to pass judgment on the validity and suitability of the study instruments.

Kindly read the following questions. Circle one of the following which expresses your opinion about each of the following criteria (Excellent = 5, very good = 4, good = 3, fair = 2, and poor = 1).

The criteria	5	4	3	2	1
The suitability of the test vocabularies to student's level.					
The suitability of match between test items and skills.					
Timing suitability to the items of the test.					
Items sufficiency to cover the identified skills.					

Any comments and modifications will be taken into consideration and highly appreciated.

Thank you for your efforts.

The researcher

Ahmed Ali Alwan

Name:.....

Group:

Q1/ Read the following passage carefully:

Marie Curie was one of the most accomplished scientists in history. Together with her husband, Pierre, she discovered radium, an element widely used for treating cancer, and studied uranium and other radioactive substances. Pierre and Marie's amicable collaboration later helped to unlock the secrets of the atom.

Marie was born in 1867 in Warsaw, Poland, where her father was a professor of physics. At an early age, she displayed a brilliant mind and a blithe personality. Her great exuberance for learning prompted her to continue with her studies after high school. She became disgruntled, however, when she learned that the university in Warsaw was closed to women. Determined to receive a higher education, she defiantly left Poland and in 1891 entered the Sorbonne, a French university, where she earned her master's degree and doctorate in physics.



Marie was fortunate to have studied at the Sorbonne with some of the greatest scientists of her day, one of whom was Pierre Curie. Marie and Pierre were married in 1895 and spent many productive years working together in the physics laboratory. A short time after they discovered radium, Pierre was killed by a horse-drawn wagon in 1906. Marie was stunned by this horrible misfortune and endured heartbreaking anguish. Despondently she recalled their close relationship and the joy that they had shared in scientific research. The fact that she had two young daughters to raise by herself greatly increased her distress.

Curie's feeling of desolation finally began to fade when she was asked to succeed her husband as a physics professor at the Sorbonne. She was the first woman to be given a professorship at the world-famous university. In 1911 she received the Nobel Prize in chemistry for isolating radium. Although Marie Curie eventually suffered a fatal illness from her long exposure to radium, she never became disillusioned about her work. Regardless of the consequences, she had dedicated herself to science and to revealing the mysteries of the physical world.

Please circle the correct answer for each item:

(10.M)

1- The Curies' _____ collaboration helped to unlock the secrets of the atom.

- a) friendly
- b) competitive
- c) courteous
- d) industrious

2- Marie had a bright mind and a _____ personality.

- a) strong
- b) lighthearted
- c) humorous
- d) strange

3- When she learned that she could not attend the university in Warsaw, she felt _____.

- a) hopeless
- b) depressed
- c) worried
- d) annoyed

4- Marie _____ left Poland and travelled to France to enter the Sorbonne.

- a) showed intelligence
- b) behaved
- c) boldly
- d) was distressed

5- _____ she remembered their joy together.

- a) Dejectedly
- b) Worried
- c) Tearfully
- d) Happily

Q2/ Read the following passage. Determine what event is likely to occur next. Explain your answer using textual evidence. (10.m)

Valarie pulled into her mother's driveway on a lovely morning in the month of May. She got the kids out of the car and walked them up to the door. Grandma smiled brightly and welcomed them, "So nice to see you children. You too, Valarie, I hope that you have a wonderful vacation. We will see you in a couple weeks." The kids kissed their mother goodbye and went outside to play in the warm sun.

They were wearing shorts and t-shirts and had sunblock on their noses. As mom pulled out of the driveway, a storm cloud rolled across the sky. The temperature suddenly dropped. Grandma looked at



the weather report and saw a bunch of snowflake icons across the next few days. Then Grandma looked at the shivering children in their summer clothes. "Do you have anything warmer in your bags, kids?" The children shook their heads. Grandma replied, "Ok, well, hop in the car. We've got to go to the store." Tiny snowflakes began to fall.....

1.What event is most likely to occur next? (5.M)

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2. What evidence from the text supports your prediction? (5.M)

Q3/ Use the following pictures to produce meaningful sentences: (10.M)



1-

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2-

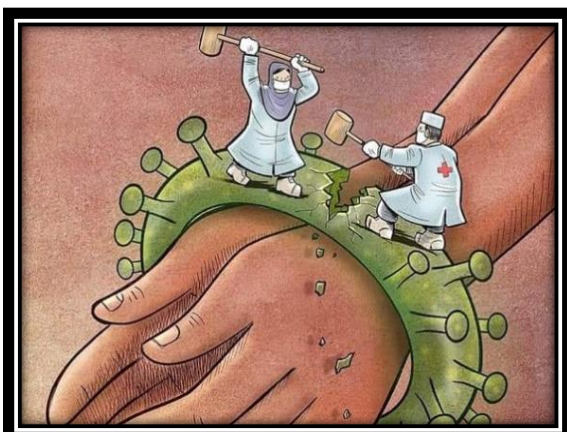


.....

3-



4-



5-



Q4/ Read the following passage carefully and summarize it with your own words. Do not write more than 80 words: (10.M)

When another old cave is discovered in the south of France, it is not usually news. Rather, it is an ordinary event. Such discoveries are so frequent these days that hardly anybody pays heed to them. However, when the Lascaux cave complex was discovered in 1940, the world was amazed. Painted directly on

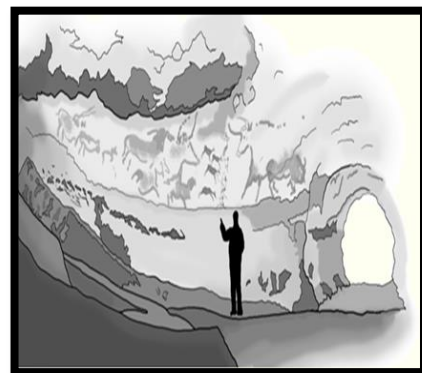


its walls were hundreds of scenes showing how people lived thousands of years ago. The scenes show people hunting animals, such as bison or wild cats. Other images depict birds and, most noticeably, horses, which appear in more than 300 wall images, by far outnumbering all other animals.



Early artists drawing these animals accomplished a monumental and difficult task. They did not limit themselves to the easily accessible walls but carried their painting materials to spaces that required climbing steep walls or crawling into narrow passages in the Lascaux complex. Unfortunately, the paintings have been exposed to the destructive action of water and temperature changes, which easily wear the images away. Because the Lascaux caves have many entrances, air movement has also damaged the images inside. Although they are not out in the open air, where natural light would have destroyed them long ago, many of the images have deteriorated and are barely recognizable. To prevent further damage, the site was closed to tourists in 1963, 23 years after it was discovered.

The answer:

This image shows a full page of primary-ruled paper. It features horizontal dashed lines for writing and vertical dotted lines on the left and right sides to define margins. The paper is otherwise blank, with no handwriting or other markings.

**Q5/ Write a story about these pictures in about 120 words and give a title to the story:
(10.M)**



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Q6/ Sequence the events into the order in which they happened: (20.M)

One Saturday morning, Mr. Miller was planning to sleep in. He was not planning to have a puppy jumping up and down on him at 7 a.m.! But there was George, running up and down the bed, wagging his tail and licking his face, and Mr. Miller knew that sleeping in was out of the question. That puppy needed some exercise!

Mr. Miller packed a knapsack full of the essentials: a water bowl and dog biscuits for George and a canteen and lunch for himself. Then he put George's collar and leash on, and they headed out the door. They walked to the end of the street, crossed the street, and headed into the park. Mr. Miller walked as fast as he could walk, and still he felt like George was pulling him. After about an hour they stopped and sat on a bench. Mr. Miller closed his eyes to rest, but suddenly George let out a yelp and leapt after a tiny white poodle that was nearby. The leash slipped through Mr. Miller's hands, and George was gone!



Mr. Miller walked around for hours calling George's name. Where was George? He asked a woman with Collie if she had seen George. Then he asked a man with a Doberman if he has seen George. Mr. Miller didn't like the look of the Doberman. He looked like he might have eaten George for a snack! Finally, Mr. Miller asked a girl with a tiny white poodle if she had seen George. At the sound of his name, George popped out from behind a nearby tree. "George! I am so glad to see you!" Mr. Miller said. But he wasn't taking any chances. He carried George all the way home.

- Mr. Miller puts on George's collar and leash.
- Mr. Miller sits on a bench to rest.
- Mr. Miller asks a woman with a white poodle if she has seen George.
- George jumps up and down on Mr. Miller.
- George runs after a white poodle.
- Mr. Miller packs his knapsack.
- Mr. Miller asks a woman with a Collie if she has seen George.
- Mr. Miller asks a man with a Doberman if he has seen George.
- Mr. Miller and George walk to the park.
- Mr. Miller finds George.

Q7/ Read the following short story and try to answer the questions below: (10.M)

There were 200 people attending a seminar on mental and physical health. At one point, the speaker told the group they were going to do an activity. He gave each attendee one balloon and told them to write their name on it. Then, the balloons were collected and moved into a very small room.



The participants were then asked to go into the other room and were given 2 minutes to find their balloon. It was chaos. People were searching frantically for their balloon, pushing each other

The speaker then told the group, “This is what it’s like when people are frantically searching for their own happiness in life. People push others aside to get the things that they want that they believe will bring them happiness.

a. What is the purpose of the third paragraph in the story?

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b. In second paragraph, can you predict what is going to happen next? Why did you make that prediction? Can you point to something in the story that helped you make that prediction? OR What do you already know that helped you make that prediction?

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c. In what ways does the author make you feel as if you were there?

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d. What are the critical points in the plot? How does the story unfold? Try to make a story map.

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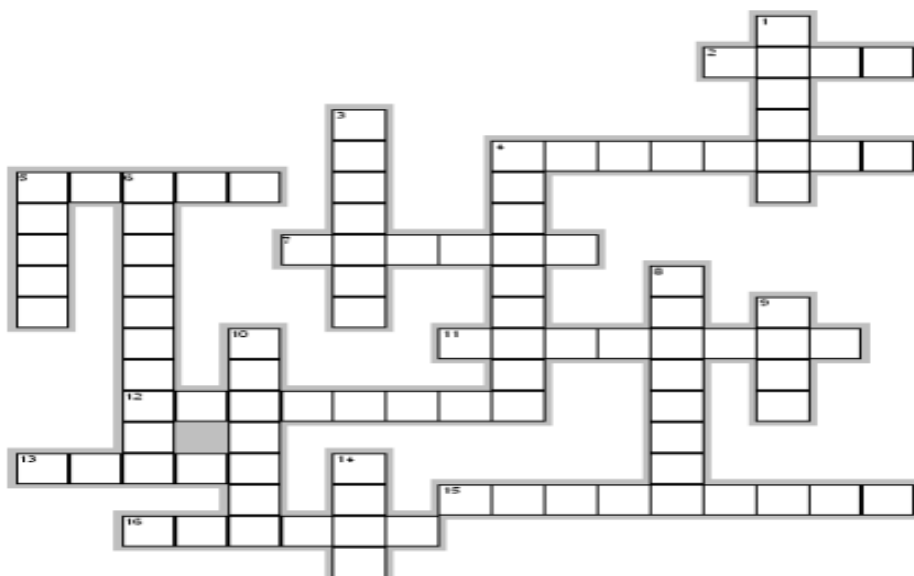
e. What is the moral of the story?

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Q8/ Solve the following crossword puzzle about "the internet". Do (10) only. (20.m)



Across

2. Junk e-mail sent to many people at once, usually involving advertising or offering services. (4)
4. Pieces of equipment, such as the computer, keyboard, webcam etc. (8)
5. When your computer suddenly stops working. (5)
7. A computer expert who can break through security to damage computers with viruses or steal data. (6)
11. A program which protects your computer from damage by other users. (8)
12. A way of marking an internet website so that you can find it easily. (8)
13. A piece of software that is on your computer without your permission and runs against your wishes. (5)
15. A permanent high-speed internet connection. (9)
16. This thing on your screen can indicate two things: 1) where your mouse pointer is, or 2) where the next character typed will be entered in a line of text. (6)

Down

1. To move a file from your computer onto the internet. (6)
3. To replace something with a newer version. (7)
4. A word, phrase, or image that you can click on to move to a new document or a new section within the current document. (9)
5. To push one of the buttons on the mouse. (5)
6. The area where you type the address of the web site you want to view. (7,3)
8. To move a file from the internet to your computer. (8)
9. An online personal diary with thoughts and opinions as well as links to other websites. (4)
10. A program you use to view websites. (7)
14. A small picture on the screen that shows the type of file or programme. (4)

Appendix (17 b)

Visual Intelligence Skills Post Test in Reading Comprehension

Ministry of Higher Education and Scientific Research

Babylon University

College of Basic Education

Higher Studies Department

General Teaching Methods

Dear Sir / Mrs. / Miss:

The researcher is conducting an experimental study for a Ph.D. dissertation in Education (General Teaching Methods) entitled "*The Effectiveness of a Proposed Instructional Program Based on Augmented Reality Technology on Academic Achievement and Developing Visual Intelligence Skills For College of Basic Education Students*".

This study aims to find out the effectiveness of using a Proposed Instructional Program Based on Augmented Reality Technology on Academic Achievement and Developing Visual Intelligence Skills for 2nd stage English department Students, Basic Education College in Reading Comprehension subject. To achieve this aim, a pre and post visual intelligence test for the control and experimental groups will be adopted.

The post-test prepared by the researcher to be used after experimentation. It will be administered to students after teaching the topics of Reading Comprehension using ART so as to identify their actual level after their learning the content with the proposed instructional program.

As a specialist in the field, you are kindly requested to pass judgment on the validity and suitability of the study instruments.

Kindly read the following questions. Circle one of the following which expresses your opinion about each of the following criteria (Excellent = 5, very good = 4, good = 3, fair = 2, and poor = 1).

The criteria	5	4	3	2	1
The suitability of the test vocabularies to student's level.					
The suitability of match between test items and skills.					
Timing suitability to the items of the test.					
Items sufficiency to cover the identified skills.					

Any comments and modifications will be taken into consideration and highly appreciated.

Thank you for your efforts.

The researcher
Ahmed Ali Alwan

Full Name:

Stage:

Group:

General Instructions:

- **Read all the instructions carefully.**
- **You will have (180) minutes to answer the test.**
- **Use pen. Pencil is not allowed.**
- **Express your ideas and opinions clearly.**
- **Turn off your cellphones.**
- **If you have any doubts, please raise your hand. You can not speak during the test.**

Q1/Look at the picture on the right. A man is using a snowshoe to dig the airplane out of the snow. Write a short story describing what is happening in the picture. You may use any point of view (10.M)

Note: This question measures skill number (10).

The answer:

[illegible]

Q2/ (A): Read the following story then summarize it by creating story map template: (5.M)

Note: This question measures skill number (1,8).

Children always appreciate small gifts of money. Father, of course, provides a regular supply of pocket-money, but uncles and aunts are always a source of extra income. With some children, small sums go a long way. If sixpences are not exchanged for sweets, they rattle for months inside money boxes. Only very thrifty children manage to fill up a money-box. For most of them, sixpence is a small price to pay for a satisfying bar of chocolate. My nephew, George, has a money-box but it is always empty. Very few of the sixpences I have given him have found their way there. I gave him sixpence yesterday and advised him to save it. Instead, he bought himself sixpence worth of trouble. On his way to the sweet shop, he dropped his sixpence and it rolled along the pavement and then disappeared down a drain.



George took off his jacket, rolled up his sleeves and pushed his right arm through the drain cover. He could not find his sixpence anywhere, and what is more, he could not get his arm out. A crowd of people gathered round him and a lady rubbed his arm with soap and butter, but George was firmly stuck. The fire-brigade was called and two firemen freed George using a special type of grease. George was not too upset by his experience because the lady who owns the sweet shop heard about his troubles and rewarded him with a large box of chocolates.

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(B) Determine what event is likely to occur next. Explain your answer using textual evidence then draw a picture about what you think is going to happen? (5. M)

Note: This question measures skill number (7) .

Tom Jonson waved to the crowd one more time before he put on his motorcycle helmet. The crowd cheered uproariously. Tom looked down the ramp and across the 15 school busses that he was about to attempt to jump. It was a difficult trick and everything would need to go right for him to nail it. His cape blew in the wind. As Tom hopped on his motorcycle and started down the ramp, he noticed something that he had not seen before. There was large oil slick at the end of the ramp. He attempted to stop the bike, but it was too late. He had already built up too much momentum..... .



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Q3/ Read the cartoon below and then answer the questions which follow: (10.M)

Note: This question measures skill number (3).



1- Describe what is happening in frame 1 ?

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2- How does the cartoonist show us the dog is thinking?

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3- How does the cartoonist show us the woman is speaking?

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4- What theme do you notice emerging?

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5- How do the images of the cartoon above influence your thinking?

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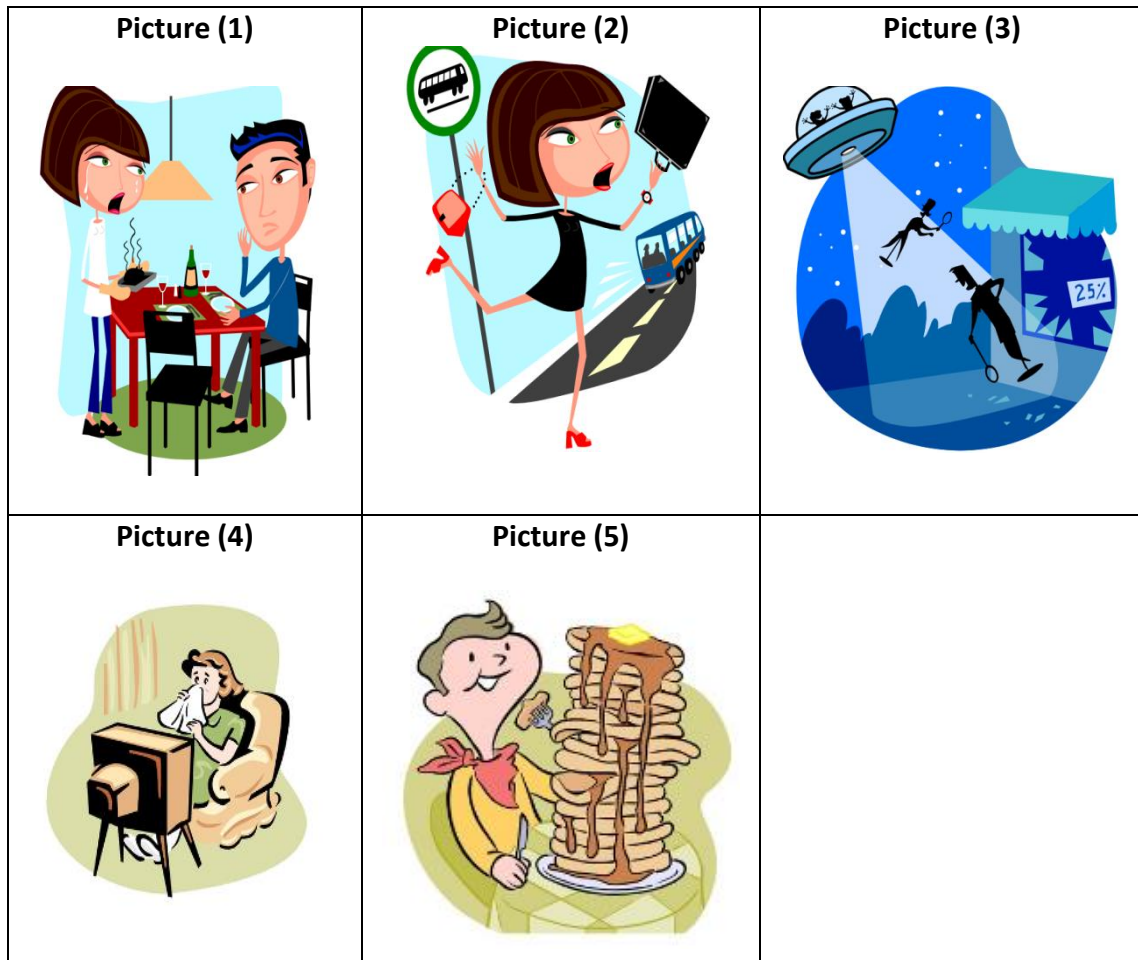
Q5/ Look at the pictures on the left. Then, draw a picture and write about what you predict will happen next: (10.M)

Note: This question measures skill number (5, 14)

**Q6/ Examine each picture carefully to make an inference about the situation.
(10.M)**

Note: This question measures skill number (4).



picture 1

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-
-

picture2

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-
-

picture 3

-
-
-

picture 4

-
-
-

picture 5

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-
-

Q7/ Read the following article then answer the questions and create connection maker below to explain general contained ideas of the article.: (10.M)

Note: This question measures skill number (9).

Charlize Theranos, 21 , is an online shopping assistant at a supermarket branch in Wales. Her day begins with a 3:00 a.m. wake-up call, six times a week, for the 4 a.m. start. She jumps in her car and drives 5 minutes to her workplace. She works six days a week, from 4 a. m. to midday, and comes into contact with dozens of people every day.

When Theranos first started working at her local supermarket in January, 2020, she was a cashier. But soon she was asked to switch to online shopping. Her duties include picking up items from supermarket shelves for delivery. At work, she picks up an iPad listing all the customer orders placed that day, and starts walking up and down the aisles, scanning the products she needs. Then she places them in a box that will be packed up and delivered to someone's front door.



When the supermarket opens at 8:30 a.m., shoppers start coming in. Theranos needs to try to avoid them as much as possible as she continues wandering up and down the aisles, scanning products, and occasionally answering questions.

She doesn't wear any protective equipment, though — only cashiers are given face masks. "Since I come into contact with more than 200 people every day, I can't only think of myself," she told Business Guru. "I have to think about the walk-in customers and their family members as well."



The eight-hour shifts are sometimes quite stressful. Sometimes people rush in to panic-buy food and supplies, causing arguments and upsetting staff. However, most people are polite and respectable. Consequently, Charlize enjoys her job. She has gained more skills, and in recent times, her line of work has become an essential service.

(A)/ Answer the following questions:

1- What problems does Charlize encounter in her work?

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2- Would you like to do this job? Explain.

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(B) Try to make connection with the following figure:

Text to self



Text to text



Text to real world



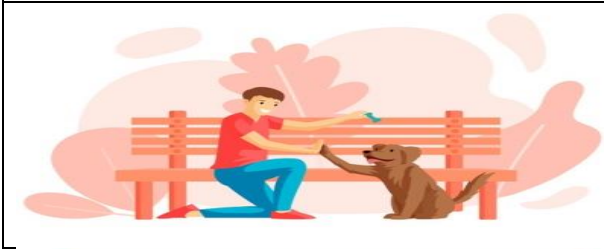
Q8/ Read the story below, then number the illustrations in the order in which they took place in the story: (10.M)

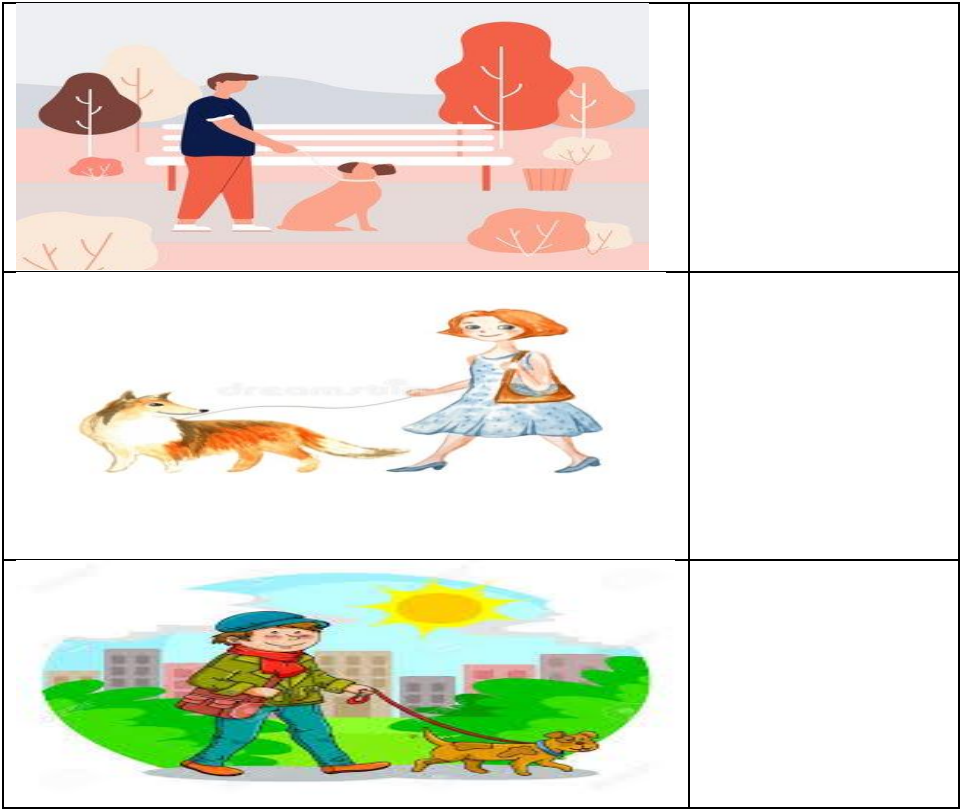
Note: This question measures skill number (13).

One Saturday morning, Mr. Miller was planning to sleep in. He was not planning to have a puppy jumping up and down on him at 7 a.m.! But there was George, running up and down the bed, wagging his tail and licking his face, and Mr. Miller knew that sleeping in was out of the question. That puppy needed some exercise!

Mr. Miller packed a knapsack full of the essentials: a water bowl and do biscuits for George and a canteen and lunch for himself. Then he put George's collar and leash on, and they headed out the door. They walked to the end of the street, crossed the street, and headed into the park. Mr. Miller walked as fast as he could walk, and still he felt like George was pulling him. After about an hour they stopped and sat on a bench. Mr. Miller closed his eyes to rest, but suddenly George let out a yelp and leapt after a tiny white poodle that was nearby. The leash slipped through Mr. Miller's hands, and George was gone!

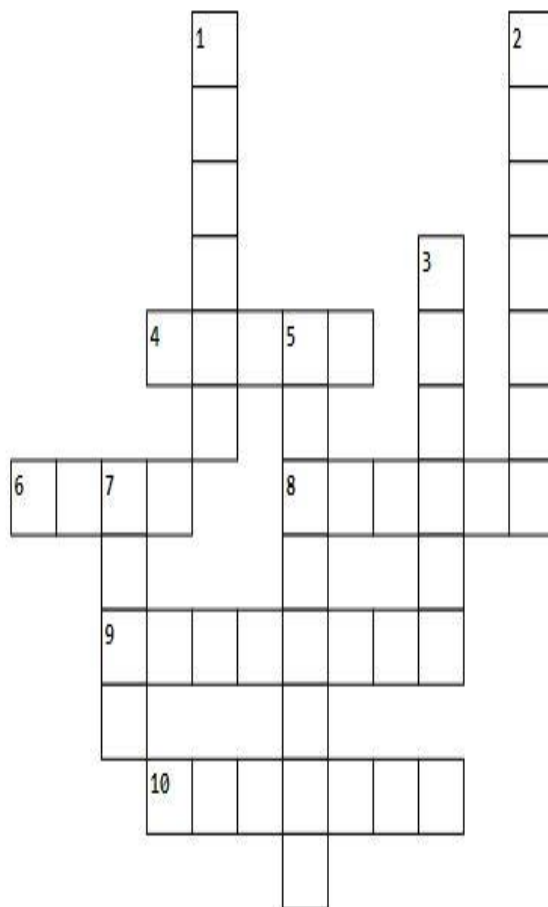
Mr. Miller walked around for hours calling George's name. Where was George? He asked a woman with Collie if she had seen George. Then he asked a man with a Doberman if he has seen George. Mr. Miller didn't like the look of the Doberman. He looked like he might have eaten George for a snack! Finally, Mr. Miller asked a girl with a tiny white poodle if she had seen George. At the sound of his name, George popped out from behind a nearby tree. "George! I am so glad to see you!" Mr. Miller said. But he wasn't taking any chances. He carried George all the way home.



Q9/ Solve the following crossword puzzle. Do (5 only). (10.M)

Note: This question measures skill number (2).



Across

- 4. a person who flies an aircraft
- 6. a title of a man who has a specially high social rank, or the person himself
- 8. with no difficulty or effort
- 9. to make whole or perfect
- 10. a person who is one of the first people to do something

Down

- 1. inside or not further than an area or period of time
- 2. not lucky
- 3. a machine that uses the energy from liquid fuel or steam to produce movement
- 5. across the land, and not by sea or air
- 7. a competition in which all the competitors try to be the fastest and to finish first

Q10/ Look at the following picture-story and answer the questions below:(10.M)



1- Based on what you observe above, What can you tell about the people from looking at the pictures? What can you infer or guess about the pictures? How does the opening of the story compare with the closing of the story? **Note: This question measures skill number (11).**

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2- What message or theme have you communicated? Make classification of common messages and themes of the story above.

Note: This question measures skill number (12)

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Appendix (18 a):

The First Form of Visual Intelligence Skills Checklist

Ministry of Higher Education and Scientific Research
Babylon University
College of Basic Education
Higher Studies Department
General Teaching Methods

Dear Professor,

The researcher is conducting an experimental study for a Ph.D. dissertation in Education (General Teaching Methods) entitled " *The Effectiveness of a Proposed Instructional Program Based on Augmented Reality Technology on Academic Achievement and Developing Visual Intelligence Skills for College of Basic Education Students* ".

This study mainly aims at developing visual intelligence skills for 2nd stage English department students , College of Basic Education by training them using a proposed instructional program based on the augmented reality technology. It is very important to identify the visual intelligence skills appropriate for this stage. This study also aims to test the change that is expected to occur for students' achievement in comprehension subject as a result of applying the proposed framework.

Augmented Reality Technology (ART): 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. At times ART will be referred to both as medium and a technology (McMahon, 2014: 4).

Visual Intelligence Skills(VIS): It is the ability of a 2nd stage English department students to understand and visualize the scientific content, transform it into an intelligible visual language, give it a verbal or written meaning, and remove ambiguity about it, *i.e.* it is every mental activity that the 2nd stage English department students tries to use when presenting and recognizing the visual form, trying to understand and analyze it, then express it in a readable or written form after deducing the meaning from it. It is measured by the degree obtains by the students of the research sample when subjecting them to the visual intelligence test.

The following checklist includes a list of visual intelligence skills that are considered important for 2nd stage English department students. These skills also will be used in order to develop a pre-post visual intelligence test for the study.

The researcher has determined these skills according to literature review and related studies . He prepared a preliminary form of these skills, so please read them and choose the appropriate ones or modify them as you see from the objective scientific viewpoint for this age of students. You are kindly requested to identify the importance of each skill. Please give your opinion of each skill by ticking (√) in front of each skill in the suitable table on (1-3) scale, where: 3 = Valid, 2= Not valid, 1 = Valid but needs modification.

I would be grateful if you give your connects and suggestions, if any. Thank you for your cooperation.

Name:

Date:

Scientific Title:

Time:

Specialization:

NO	Required Visual – Spatial Intelligence Skills for 2 nd Stage Students	Valid	Not valid	Valid but needs modification
1-	Using concept maps and mind maps to write down the notes and the information, and organize the ideas.			
2-	Solving visual puzzles and practicing visual – spatial games.			
3-	Merging virtual objects with real – world image to realize the physical and virtual immersion.			
4-	Visual perception and spatial awareness.			
5-	Spatial visualization based on receiving and thinking about images and recognizing shapes (transferring visual spatial ideas from memory and using them to build meanings).			
6-	Transforming the visual language carried by the visual form into a verbal or spoken language.			
7-	Interpreting visual information in the text.			
8-	Analyzing visual information in the text.			
9-	Inferring the meaning in the text.			
10-	Translating thoughts and feelings into visual expressive drawings and diagrams to perceive visual depth of the text.			
11-	Determining the main points of the text by using graphic organizers.			
12-	Determining the author's purpose by designing a book cover for the story/the text.			
13-	Summarizing the picture of story/ text with student's own words.			
14-	Realizing the visual relationship between the pictures and the written text to describe general contained ideas in the texts.			
15-	Employing the illustrations in different visual contexts :it is the process of translating, analyzing, and interpreting information and linking it to reach useful scientific			

	conclusions.			
16-	Visual description: It means the student's ability to reformulate or translate the elements and components of the picture or illustration from visual language into the equivalent verbal language.			
17-	Visual Comparison: It means the student's ability to identify similarities and differences between expressed things, events, or relationships in one or more pictures or illustrations, in light of certain criteria such as size, color, length, shape, type, function, use, components, or other criteria.			
18-	Visual classification: It refers to the student's ability to gather expressed objects, events, phenomena, or processes with illustrations in two or more groups on the basis of one or more criteria, or characteristics.			
19-	Visual arrangement: It refers to the student's ability to arrange the components or elements of an illustration or a group of illustrations according to a relationship (law - principle - rule - characteristic etc.) to express an idea, concept, process, event, or phenomenon by employing his information.			
20-	Visual Prediction: It means the student's ability to anticipate the situation in which an event, phenomenon, process, or thing. It will be expressed in an illustration with a mention of the reasons upon which student's prediction is based.			

The researcher
Ahmed Ali Alwan

Appendix (18 b)

The Final Form of Visual Intelligence Skills Checklist

Ministry of Higher Education and Scientific Research
Babylon University
College of Basic Education
Higher Studies Department
General Teaching Methods

Dear Professor,

The researcher is conducting an experimental study for a Ph.D. dissertation in Education (General Teaching Methods) entitled " ***The Effectiveness of a Proposed Instructional Program Based on Augmented Reality Technology on Academic Achievement and Developing Visual Intelligence Skills For College of Basic Education Students*** ".

This study mainly aims at developing Visual Intelligence Skills (VIS) for 2nd stage English department students , College of Basic Education by training them using a proposed instructional program based on Augmented Reality Technology (ART). It is very important to identify the VIS appropriate for this stage. This study also aims to test the change that is expected to occur for students' achievement in Reading Comprehension subject as a result of applying the proposed program.

Augmented Reality Technology (ART): 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. At times ART will be referred to both as medium and a technology (McMahon, 2014: 4).

Visual Intelligence Skills (VIS): It is the ability of a 2nd stage English department students to understand and visualize the scientific content, transform it into an intelligible visual language, give it a verbal or written meaning, and remove ambiguity about it, *i.e.* it is every mental activity that the 2nd stage English department students tries to use when presenting and recognizing the visual form, trying to understand and analyze it, then express it in a readable or written form after deducing the meaning from it. It is measured by the degree obtains by the students of the research sample when subjecting them to the visual intelligence test.

The following checklist includes a list of visual intelligence skills that are considered important for 2nd stage English department students. These skills also will be used in order to develop a pre-post visual intelligence test for the study.

The researcher has determined these skills according to literature review and related studies . He prepared a preliminary form of these skills, so please read them and choose the appropriate ones or modify them as you see from the objective scientific viewpoint for this age of students. You are kindly requested to identify the importance of each skill. Please give your opinion of each skill by ticking (√) in front of each skill in the suitable table on (1-3) scale, where: 3 = valid, 2= Not valid, 1 = Valid but needs modification.

I would be grateful if you give your connects and suggestions, if any. Thank you for your cooperation.

Name:

Date:

Scientific Title:

Time:

Specialization:

NO	Required Visual – Spatial Intelligence Skills for 2 nd Stage Students	Valid	Not valid	Valid but needs modification
1	Using story map or mind map to write down and organize the events and the main ideas of the story.			
2	Solving visual puzzles (crossword puzzles) and practicing visual–spatial games.			
3	Mental visualization: It is the ability to receive images and think about them, as well as the ability to transfer visual and spatial ideas from memory to construct meaning; in other words, students can construct mental images when reading a text by using prior knowledge and background experiences.			
4	Analyzing and interpreting the visual form presented, to make an inference about a situation or an event in the story .			
5	Translating thoughts and feelings presented in the story/text into visual expressive drawings and diagrams to understand the visual depth of the text.			
6	Determining the main points of the story or text by using the graphic organizers.			
7	Determining the author's purpose by drawing some events from the story or text.			
8	Using the images or illustrations of the story to summarize the events of the story in the student's own words.			
9	Perceiving spatial relations: the ability of the learner to link the visual stimulus in the story to the reality surrounding this stimulus, and to know the relationship between			

	them.			
10	Visual description: It is the ability to reformulate the elements and components of a visual form (picture or illustration) from a visual language to an equivalent spoken or written language.			
11	Visual comparison: It is the ability to identify similarities and differences in the events of two stories or texts, expressed in pictures or illustrations, in light of certain criteria such as main idea, conflict, viewpoint, plot, theme, writer's purpose, etc.			
12	Visual classification: It refers to the learner's ability to classify two objects or events related to the visual form given.			
13	Visual arrangement: It refers to a learner's ability to use his/her visual background knowledge to sequence the events or components of an illustration, image, chart, or map in order to represent or express an idea or concept.			
14	Visual Prediction: It is the learner's ability to anticipate a certain situation or event based on a picture or illustration, as well as a statement of reasons for the learner's prediction.			

The researcher
Ahmed Ali Alwan

Appendix (19)

Answer Time for the Pilot Sample Students in Visual Intelligence Skills Test

No.	Time Taken	No.	Time Taken
1.	193	26.	189
2.	188	27.	197
3.	186	28.	198
4.	199	29.	199
5.	178	30.	176
6.	172	31.	168
7.	158	32.	161
8.	176	33.	175
9.	182	34.	180
10.	192	35.	193
11.	172	36.	168
12.	158	37.	161
13.	176	38.	175
14.	182	39.	180
15.	192	40.	193
16.	158	41.	161
17.	176	42.	175
18.	182	43.	180
19.	192	44.	193
20.	172	45.	168
21.	187	46.	172
22.	176	47.	177
23.	168	48.	176
24.	161	49.	172
25.	175	50.	165

**Appendix (20 a): Difficulty coefficients for each test item in
visual intelligence skills test**

Items	Difficulty Coefficient
1	0.62
2	0.63
3	0.61
4	0.48
5	0.42
6	0.36
7	0.56
8	0.29
9	0.60
10	0.56
11	0.33
12	0.48
13	0.63
14	0.48
15	0.36
16	0.33
17	0.39
18	0.35
19	0.54
20	0.60
21	0.28
22	0.33
23	0.48
24	0.62
25	0.63
26	0.61
27	0.60

28	0.59
29	0.55
30	0.50
31	0.68
32	0.41
33	0.59
34	0.41
35	0.41
36	0.55
37	0.59
38	0.55
39	0.50
40	0.68
41	0.50
Overall difficulty coefficient = 0.51	

**Appendix (20 b): Discrimination Coefficient for each test item
in visual intelligence skills test**

Items	Discrimination Coefficient of test Items
1	0.55
2	0.55
3	0.60
4	0.45
5	0.50
6	0.80
7	0.75
8	0.45
9	0.65
10	0.55
11	0.70
12	0.50
13	0.45
14	0.75
15	0.65
16	0.55
17	0.45
18	0.50
19	0.60
20	0.55
21	0.55
22	0.65
23	0.60
24	0.70
25	0.65
26	0.45
27	0.60
28	0.65

29	0.60
30	0.55
31	0.75
32	0.45
33	0.65
34	0.45
35	0.45
36	0.60
37	0.65
38	0.60
39	0.55
40	0.75
41	0.55
Overall Discrimination Coefficient = 0.59	

Appendix (20 c)

Difficulty Coefficient and Discrimination Coefficient of Visual Intelligence Skills Test for the Pilot Sample

No.	Number of students in the upper group	Number of students in the lower group	Diff. C	Disc. C
1.	16	5	0.62	0.55
2.	16	5	0.63	0.55
3.	17	5	0.61	0.6
4.	15	6	0.48	0.45
5.	13	3	0.42	0.5
6.	19	3	0.36	0.8
7.	20	5	0.56	0.75
8.	15	6	0.29	0.45
9.	17	4	0.60	0.65
10.	16	5	0.56	0.55
11.	19	5	0.33	0.7
12.	13	3	0.48	0.5
13.	15	6	0.63	0.45
14.	18	3	0.48	0.75
15.	17	4	0.36	0.65
16.	18	7	0.33	0.55
17.	15	6	0.39	0.45
18.	13	3	0.35	0.5
19.	17	5	0.54	0.6
20.	16	5	0.60	0.55
21.	16	5	0.28	0.55
22.	17	4	0.33	0.65
23.	17	5	0.48	0.6
24.	18	4	0.62	0.7
25.	17	4	0.63	0.65
26.	16	7	0.61	0.45
27.	16	4	0.60	0.6
28.	16	3	0.59	0.65
29.	16	4	0.55	0.6
30.	20	9	0.50	0.55
31.	19	4	0.68	0.75
32.	15	6	0.41	0.45
33.	18	5	0.59	0.65
34.	15	6	0.41	0.45

35.	13	4	0.41	0.45
36.	18	6	0.55	0.6
37.	20	7	0.59	0.65
38.	21	9	0.55	0.6
39.	14	3	0.50	0.55
40.	19	4	0.68	0.75
41.	15	4	0.50	0.55

Appendix (21)

Students' Scores to Calculate the Reliability of Visual Intelligence Skills Test Using the Re-correction Method

No.	Corrector's Scores	Scores Over Time	Scores with Another Rater
1.	52	48	44
2.	34	36	30
3.	60	58	56
4.	64	64	60
5.	46	44	50
6.	70	72	66
7.	46	48	40
8.	58	56	50
9.	74	74	66
10.	52	50	44

Appendix (22)

The Scores of the Two Research Groups Students in Achievement Post-Test

Experimental Group		Control Group	
No.	Scores	No.	Scores
1.	36	1.	27
2.	33	2.	26
3.	27	3.	31
4.	40	4.	15
5.	40	5.	17
6.	41	6.	35
7.	26	7.	17
8.	31	8.	18
9.	30	9.	24
10.	42	10.	31
11.	35	11.	22
12.	23	12.	22
13.	29	13.	23
14.	37	14.	20
15.	26	15.	15
16.	34	16.	33
17.	31	17.	26
18.	41	18.	21
19.	33	19.	31
20.	28	20.	33
21.	32	21.	21
22.	35	22.	23
23.	36	23.	38
24.	38	24.	13
25.	30	25.	20
26.	28	26.	18
27.	43	27.	15
28.	42	28.	32
29.	39	29.	26
30.	29	30.	39

31.	26	31.	23
32.	37	32.	16
33.	35	33.	21
34.	39	34.	23
35.	33	35.	25
36.	24	36.	20
37.	33	37.	15
38.	28	38.	34
39.	43	39.	28
40.	40	40.	24
41.	33	41.	11
42.	40	42.	39
43.	38	43.	18
44.	27	44.	29
45.	41	45.	38
46.	40		

Appendix (23)

Comparison of the Achievement Pre-test and the Post-test scores for the Experimental Group

Pre-Test		Post-Test	
No.	Scores	No.	Scores
1.	32	1.	36
2.	29	2.	33
3.	17	3.	27
4.	33	4.	40
5.	36	5.	40
6.	34	6.	41
7.	10	7.	26
8.	18	8.	31
9.	19	9.	30
10.	35	10.	42
11.	25	11.	35
12.	10	12.	23
13.	22	13.	29
14.	28	14.	37
15.	8	15.	26
16.	23	16.	34
17.	23	17.	31
18.	34	18.	41
19.	24	19.	33
20.	14	20.	28
21.	17	21.	32
22.	24	22.	35
23.	22	23.	36
24.	28	24.	38
25.	26	25.	30
26.	20	26.	28
27.	38	27.	43
28.	30	28.	42
29.	32	29.	39
30.	15	30.	29

31.	21	31.	26
32.	23	32.	37
33.	19	33.	35
34.	23	34.	39
35.	27	35.	33
36.	19	36.	24
37.	23	37.	33
38.	26	38.	28
39.	35	39.	43
40.	25	40.	40
41.	17	41.	33
42.	31	42.	40
43.	22	43.	38
44.	15	44.	27
45.	37	45.	41
46.	34	46.	40

Appendix (24)

Comparison of the Achievement Pre-test and the Post-test scores for the Control Group

Pre-Test		Post-Test	
No.	Scores	No.	Scores
1.	28	1.	27
2.	24	2.	26
3.	32	3.	31
4.	17	4.	15
5.	16	5.	17
6.	36	6.	32
7.	14	7.	18
8.	10	8.	18
9.	20	9.	24
10.	31	10.	31
11.	23	11.	22
12.	24	12.	22
13.	23	13.	25
14.	18	14.	20
15.	19	15.	15
16.	30	16.	33
17.	29	17.	26
18.	18	18.	21
19.	33	19.	31
20.	35	20.	33
21.	23	21.	21
22.	21	22.	23
23.	35	23.	38
24.	17	24.	15
25.	17	25.	20
26.	10	26.	18
27.	17	27.	15
28.	35	28.	32
29.	28	29.	26
30.	40	30.	39

31.	20	31.	23
32.	19	32.	18
33.	20	33.	21
34.	23	34.	23
35.	24	35.	25
36.	17	36.	20
37.	13	37.	15
38.	33	38.	34
39.	28	39.	28
40.	20	40.	24
41.	9	41.	11
42.	35	42.	39
43.	20	43.	18
44.	29	44.	27
45.	38	45.	36

Appendix (25)

The Scores of the Two Research Groups Students in Visual Intelligence Skills Post-Test

Experimental Group		Control Group	
No.	Scores	No.	Scores
1.	79	1.	47
2.	66	2.	48
3.	52	3.	38
4.	81	4.	40
5.	70	5.	44
6.	80	6.	59
7.	61	7.	46
8.	58	8.	41
9.	65	9.	35
10.	85	10.	51
11.	55	11.	35
12.	69	12.	68
13.	72	13.	48
14.	81	14.	45
15.	64	15.	24
16.	73	16.	78
17.	69	17.	58
18.	85	18.	43
19.	70	19.	53
20.	52	20.	66
21.	67	21.	44
22.	77	22.	29
23.	62	23.	65
24.	58	24.	58
25.	78	25.	45
26.	56	26.	47
27.	84	27.	50
28.	80	28.	72
29.	75	29.	59
30.	59	30.	82

31.	48	31.	41
32.	59	32.	33
33.	55	33.	52
34.	39	34.	39
35.	60	35.	30
36.	66	36.	45
37.	68	37.	39
38.	41	38.	60
39.	78	39.	50
40.	63	40.	45
41.	51	41.	50
42.	74	42.	60
43.	63	43.	40
44.	59	44.	62
45.	80	45.	77
46.	86		

Appendix (26)

Comparison of the Visual intelligence skills Pre-test and the Post-test scores for the Experimental Group

Pre-Test		Post-Test	
No.	Scores	No.	Scores
1.	55	1.	79
2.	48	2.	66
3.	41	3.	52
4.	60	4.	81
5.	57	5.	70
6.	63	6.	80
7.	25	7.	61
8.	44	8.	58
9.	36	9.	65
10.	68	10.	85
11.	39	11.	55
12.	34	12.	69
13.	46	13.	72
14.	53	14.	81
15.	45	15.	64
16.	55	16.	73
17.	48	17.	69
18.	62	18.	85
19.	45	19.	70
20.	29	20.	52
21.	40	21.	67
22.	54	22.	77
23.	49	23.	62
24.	44	24.	58
25.	50	25.	78
26.	36	26.	56
27.	72	27.	84
28.	58	28.	80
29.	55	29.	75
30.	32	30.	59

31.	21	31.	48
32.	28	32.	59
33.	49	33.	55
34.	18	34.	39
35.	37	35.	60
36.	38	36.	66
37.	43	37.	68
38.	10	38.	41
39.	57	39.	78
40.	36	40.	63
41.	24	41.	51
42.	56	42.	74
43.	39	43.	63
44.	25	44.	59
45.	65	45.	80
46.	70	46.	86

Appendix (27)

Comparison of the Visual intelligence skills Pre-test and the Post-test scores for the Control Group

Pre-Test		Post-Test	
No.	Scores	No.	Scores
1.	44	1.	47
2.	35	2.	48
3.	42	3.	38
4.	25	4.	40
5.	46	5.	44
6.	64	6.	59
7.	33	7.	46
8.	48	8.	41
9.	41	9.	35
10.	53	10.	51
11.	39	11.	35
12.	65	12.	63
13.	45	13.	48
14.	46	14.	45
15.	19	15.	24
16.	71	16.	78
17.	60	17.	58
18.	40	18.	43
19.	58	19.	53
20.	74	20.	66
21.	27	21.	44
22.	17	22.	29
23.	55	23.	65
24.	51	24.	58
25.	50	25.	45
26.	40	26.	47
27.	53	27.	50
28.	77	28.	73
29.	61	29.	59
30.	80	30.	82

31.	45	31.	42
32.	27	32.	33
33.	59	33.	52
34.	44	34.	39
35.	33	35.	31
36.	37	36.	45
37.	30	37.	39
38.	67	38.	61
39.	46	39.	50
40.	20	40.	45
41.	55	41.	51
42.	58	42.	60
43.	46	43.	40
44.	60	44.	62
45.	81	45.	77

Appendix (28)

An open questionnaire to identify the needs of students in reading comprehension course from the point of view of the students

Dear Students,

The researcher is conducting an experimental study entitled " *The Effectiveness of a Proposed Instructional Program Based on Augmented Reality Technology on Academic Achievement and Developing Visual Intelligence Skills for College of Basic Education Students*". Due to the importance of your opinion in determining these needs, please answer the following question of the open questionnaire.

With my heartfelt thanks and gratitude.

The researcher

Ahmed Ali Alwan

Question: What are the basic needs of the second-stage university students/Department of English language/College of Basic Education in the reading comprehension course, from your point of view?

Stage:

College :

University :

Answer:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

Appendix (29)

An open questionnaire to identify the needs of students in reading comprehension course from the point of view of the instructors

A Letter to the Respectful Jury Members

Dear Sir, Mrs, Miss:

The researcher is conducting an experimental study entitled " *The Effectiveness of a Proposed Instructional Program Based on Augmented Reality Technology on Academic Achievement and Developing Visual Intelligence Skills for College of Basic Education Students* ". One of the requirements for building the instructional program is to determine the basic teaching needs of students in reading comprehension course. Because of your experience and scientific knowledge in this field, you are kindly requested to express your opinions and comments in answering the following question of the open questionnaire:

With my heartfelt thanks and gratitude.

The researcher

Ahmed Ali Alwan

Question: What are the basic teaching needs of the second stage university students /Department of English Language/College of Basic Education in the reading comprehension course from the instructors' point of view?

First: Educational Goals

- 1.
- 2.
- 3.
- 4.
- 5.

Second: Instructional Content

- 1.
- 2.
- 3.
- 4.
- 5.

Third: Teaching Methods and Techniques

- 1.
- 2.
- 3.
- 4.
- 5.

Fourth: Instructional Activities and Resources

- 1.
- 2.
- 3.
- 4.
- 5.

Appendix (30)

The Basic Educational Needs of Reading Comprehension Course from the students' point of view

1. The topics of the reading comprehension course should be related to the students' inclinations, abilities and intellectual scientific capabilities.
2. The scientific material of the Reading Comprehension Course should teach the students how to read, write, and speak sentences that other people can understand quickly and easily.
3. There is no variety of assessment methods in the reading comprehension course.
4. Most of the topics in reading comprehension course are not up to date with the modernity and development taking place in the educational process.
5. Using modern teaching terms that develop students' linguistic, visual, and auditory abilities.
6. The use of modern technologies is important because technology has many capabilities that provide learners with life and mental experiences that are not provided by traditional educational tools, and thus the learner can face any obstacle or problem.
7. Focusing on the use of classroom activities and extra-curricular activities that help link the learners' previous experiences with the new experiences they will learn, which leads to the continuity of the learning process.
8. The use of modern educational means that help diversify the learner's experiences as they provide the opportunity to watch, listen, practice, and think.

Appendix (31)

The Basic Educational Needs of Reading Comprehension Course from the instructors' point of view

1. The content of the curriculum should be presented in a variety of ways. Diversity is the locomotive through which learners access the information, skills, and concepts to be learned. The key to teaching diversity is the teachers' flexible use of teaching/learning activities, and of ways to organize lessons. Therefore, the content of reading comprehension must include various topics in an attempt to confront the individual differences between these learners as much as possible so that each learner can find in these topics what suits his needs, preparations, and abilities.
2. Selecting content for reading comprehension should be based on identifying the learners' needs, problems, knowledge, and skills they need in their lives and work. Accordingly, the content that meets the needs of the learners is selected.
3. In the process of selecting the content of reading comprehension course, the main topics of reading comprehension should be related and appropriate to the objectives. Moreover, the size of these topics and the dimensions they contain should be appropriate for the time allotted for them in the educational process.
4. The instructors do not assign the students to do educational activities and extra-curricular exercises such as short reports in reading comprehension course.
5. The instructors can urge the students to do free reading and get acquainted with various sources of knowledge from books, magazines, and so on.
6. In the process of explaining and presenting any of the reading comprehension stories, the teacher must raise a set of questions that can allow for discussion between him and the learners in order to arrive at the fact that motivates the learners to participate and enjoy the lesson.
7. Progressive patterns should be practised throughout the duration of the course by means of oral comprehension questions on each passage. The students should be asked a few mixed questions designed to elicit short or long answers.
8. Changing the traditional educational activities used in teaching reading comprehension and replacing them with fun and attractive activities that are flexible and lively to cover different levels of knowledge. In order for these activities to achieve their objectives, the following should be taken into account when constructing them:
 - Educational activities are related to the behavioural objectives of the subject of the lesson. Every class activity achieves a behavioural objective.
 - Educational activities are related to teaching methods, as diversification of classroom activities leads to enriching learning methods and taking into account individual differences among learners.
 - Preparing the necessary educational tools and aids to facilitate the methods of activities implementation.

Appendix (32) General Instructional Goals of the Proposed Program Based on ART:

The general objective of the proposed program is to develop academic achievement and visual intelligence skills for second-stage students, Department of English in the subject of comprehension, which leads to further academic progress. This general objective is divided into a set of sub-objectives:

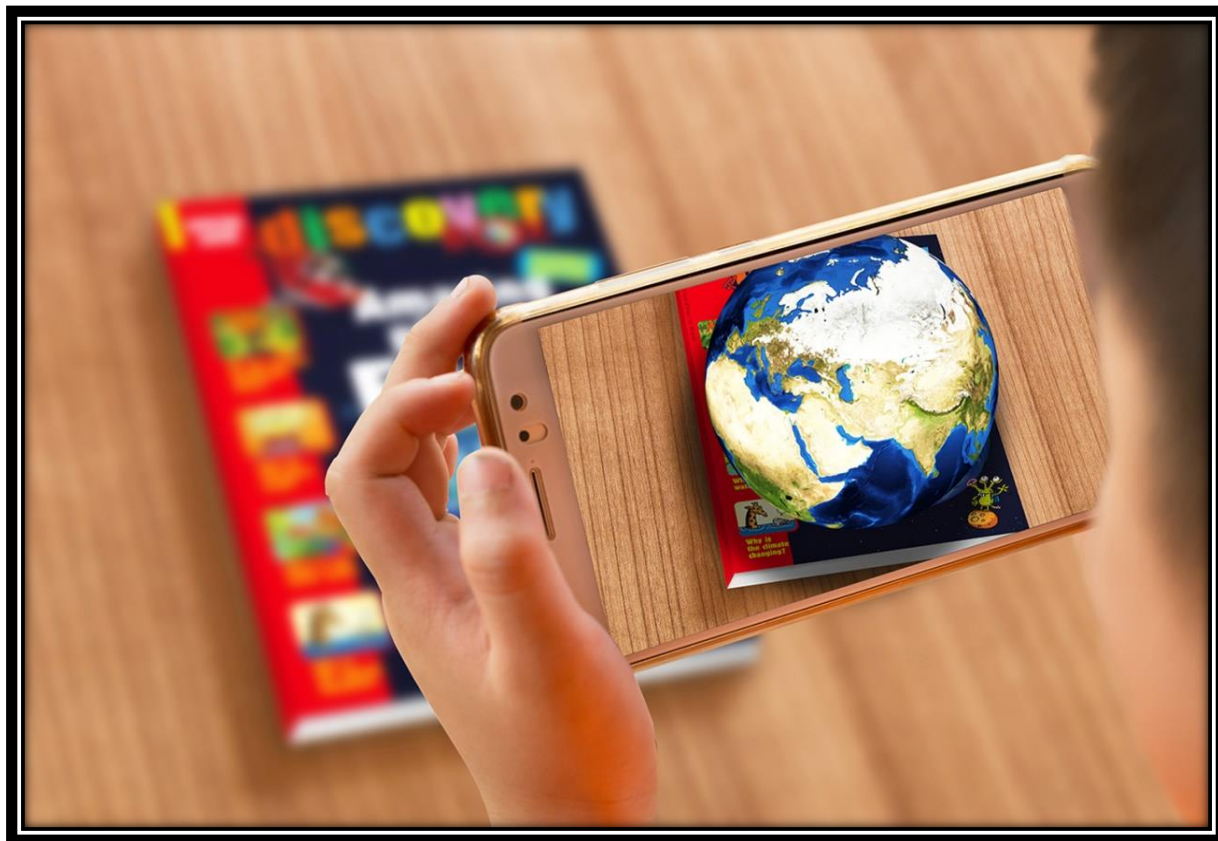
- Developing the ability to imagine, visualize and guess, and to reach thinking beyond reality.
- Developing the student's ability to produce the largest number of ideas.
- Converting the reading comprehension textbook from a static to a lively book supported by video, audio and 3D images.
- Participating in the student's intellectual, personal, and professional growth.
- Helping the student to acquire the following skills of language: listening, speaking, reading and writing
- Developing higher reading comprehension levels.
- Interpreting texts about different genres and performing critical tasks.
- Educating the student about the importance of studying reading comprehension subject as a means of communication.
- Analyzing and discussing the topics with diverse communicative intentions, found in the stories.
- Analyzing and applying comprehension strategies to construct meaning and understand texts.
- Discussing words and phrases that capture the interest and imagination in the stories presented.
- Understanding what is read independently by asking questions about the text.
- Socializing with peers about texts insights, points of view and proposing solutions to problems.
- Developing the student's positive attitude towards learning comprehension subject.
- Helping the student to acquire the necessary language competence required in different life situations.
- Developing the student's linguistic competence, which enables him to present and explain the topics and ideas needed in life situations.
- Enhancing the idea of cooperation between the students, to develop a spirit of understanding and respect of opinions between them.
- Providing the student with the technological basis that enables him to participate in conveying of scientific and digital progress in the education process, thus enhancing his progress in the future.
- Encouraging the situational learning, which is one of the important entrances to facilitate the learning process, by presenting meaningful situations based on ART, and linking teaching with real-life experiences.
- Reasonable Communication: Communicating clearly, accurately and appropriately, and giving arguments and reasons of students' beliefs.
- Active Understanding: Summarizing material, identifying text, and making some inferences from it.

- Active Generalization: Identifying good resources and procedures within the subject area and understanding the generalizations that support this evaluation.
- Refining the skill of critical thinking as it is a useful tool while reading English texts and stories.
- Employing the skills of planning, designing, using and evaluating the technology based teaching- learning process.
- Focusing on the students becoming digital citizens.
- Using technology to increase the process of communication and interaction between learners (students) and between students and teachers.
- Using Augmented Reality Learning Experience (ARLE) to diagnose learning gaps of the students in either self-diagnosis, peer or teacher evaluation.
- Working together in physical or virtual groupings utilizing the ARLE to be engaged in activities requiring convergent or divergent knowledge expression of comprehension.

Appendix (33)

Student's Guide

A Proposed Program Based on Augmented Reality Technology for second stage students, Department of English Language



Name:

Group:

Introduction

Dear students,

Welcome to a series of activities, assignments, and questions for you to do. This is a series of educational program lessons, which include topics of reading comprehension for second stage students , Department of English Language, based on Augmented Reality Technology (ART), prepared and designed to develop your visual intelligence skills and achievement in Reading Comprehension Subject.

Education has always been one of the most prominent and developed fields over the past years. As education pioneers see a bright future for Augmented Reality Technology (ART), today there are clear steps for this technology in the field of education. The educational environment is a fertile environment for the application of ART, as it can be used to transform paper textbooks into interactive display platforms via smart devices. ART has several advantages that have led to the emergence of its importance and justified the need for it in educational institutions, and it can be identified as these advantages in the following points:

1. Arousing the motivation and enthusiasm of learners, as the scientific material of the reading comprehension course is presented in an attractive and interesting manner that is compatible with the technology generation.
2. The ability to provide educational experiences through three-dimensional models, in which the learner can view and analyse reading comprehension topics from various perspectives, allows for a deeper understanding of these topics by providing a correct and comprehensive mental picture of educational experiences.
3. ART does not need a specific learning environment as it can be applied in the classroom.
4. Promoting cooperative learning and social interaction among learners in the same educational environment through the active participation of students helps solve problems.
5. Providing interactive educational content that helps students remember topics of reading comprehension for a longer amount of time than what they learn through traditional methods.
6. Learning becomes more enjoyable using ART, which tests the learner's creativity.
7. ART compensates for the lack of resources in education, reduces the cost, and creates an exciting learning environment.

In order to be able to understand the proposed program, a set of visual ART activities has been built that can contribute to the realization of this direction. At the end of each lesson, an activity or a group of enrichment activities (homework) is allocated, and it is

hoped that you will benefit from them in developing your achievement and visual intelligence skills.

Instructions for Using the Student's Guide:

Dear student,

In order to achieve the desired benefit of the student's guide, you must do the following:

- Dealing with this guide individually or collectively according to what is required of you.
- Practicing the activities mentioned in each lecture and answering them in the space designated for that.
- Pay attention to what is asked of you in each lecture, and implement it with perfection and motivation.

How does EyeJack Creator work?

EyeJack AR Creator helps you bring images of your reading comprehension textbook to life with animation and sound in easy steps:

1. Download EyeJack AR Creator from Google Store or Play Store (Google Play or Apple store.).
2. Add your image or illustration of the story presented in your textbook. This is the image that will trigger your animation. Simply upload your story image as either a JPG or PNG.
3. Add your animation: Choose a video file, GIF or PNG sequence that you want to play over your story image.
4. Preview your AR art:: Watch your augmented story image come to life by previewing it with the EyeJack app

14 A Noble Gangster

There was a time when the owners of shops and businesses in Chicago had to pay large sums of money to gangsters in return for 'protection'. If the money was not paid promptly, the gangsters would quickly put a man out of business by destroying his shop. Obtaining 'protection money' is not a modern crime. As long ago as the fourteenth century, an Englishman, Sir John Hawkwood, made the remarkable discovery that people would rather pay large sums of money than have their life work destroyed by



Six hundred years ago, Sir John Hawkwood arrived in Italy with a band of soldiers and settled near Florence. He soon made a name for himself and came to be known as the Italian city-states' 'mercenary'. Whenever the Italian city-states were at war, Hawkwood used to hire his soldiers to princes who would march into a city-state and, after destroying it, go away if protection money was not paid. In times of peace, when business was good, the princes would pay him money to stay in the city. In spite of this, Hawkwood was not a gangster. When he died at the age of eighty, the Florentines gave him a state funeral and had a picture painted which showed him as the most valiant soldier and most notable

of Sir John Hawkwood's career from the following points:
 1. What was his career like in the last paragraph?
 2. What was his career like in the last paragraph?
 3. What was his career like in the last paragraph?

Use the following words as they are used in the text:
 (1. 7); remarkable (1. 12); seemed (1. 12);

14 A Noble Gangster

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Comprehension and Process

1. Write an account of Sir John Hawkwood's career from the time he arrived in Italy. Do not include anything that is not in the last paragraph.
2. Where did Sir John Hawkwood settle to get his money?
3. What was his career like in the last paragraph?
4. Would he be hired to destroy a city-state in times of war?
5. What would he do if a city-state was in times of peace?
6. Did Sir Hawkwood ever die?
7. How old was he when he died?
8. What gave him a state funeral when he died?
9. What was the picture painted when he died?

A photograph of a young girl with brown hair in a ponytail, wearing black-rimmed glasses and a pink polka-dot shirt. She is resting her chin on her hand and looking upwards thoughtfully. A large, white, jagged starburst shape is overlaid on the left side of the image, containing the text 'Who are the highly-developed visual intelligence learners?'. A thought bubble is also visible behind her head.

Who are the highly-developed visual intelligence learners?

They are able to:

- tend to think and process information in the form of images.
- understand maps and charts well.
- use a wide and unbridled imagination to create strange new ideas and unique solutions for the problems.(The ability of visually perceiving and taking advantage of mental image to solve problems).
- think of things in three dimensions, even though having limited information about them. This also includes the ability to draw a clear general idea based on specific information.
- mix reality with fiction, and describe the images they construct it in their minds.
- accurately comprehend the visual world, and reconfigure it visually and spatially in mind or on paper.
- create stories from fiction.



Dear students,

By the end of the lesson, you will be able to:

- Use your imagination to portray and describe thoughts (ideas) when reading the story.
- Use barcodes to describe the events of the story.
- Elicit specific information from the text (to get information about what you know and don't know).
- Use your senses to connect the characters, events, and ideas to clarify the picture in their mind.
- Relate text content to particular social issues, concerns or dispositions in life.
- Present – with appropriate introduction, development, and conclusion – the ideas of the assigned story in an effective order.
- Interpret the visual images used and manipulate information presented in this story.

ACTIVITY (1)

By using a graphic organizer try to Scan and analyse the story on page 38 by identifying and summarizing required information, such as similarities and differences, problem and solution, and causes and effects.

YOUR ANSWER:

ACTIVITY (2)

By using your QR Code Reader Application, scan the following QR Code then try to describe the image that will display?



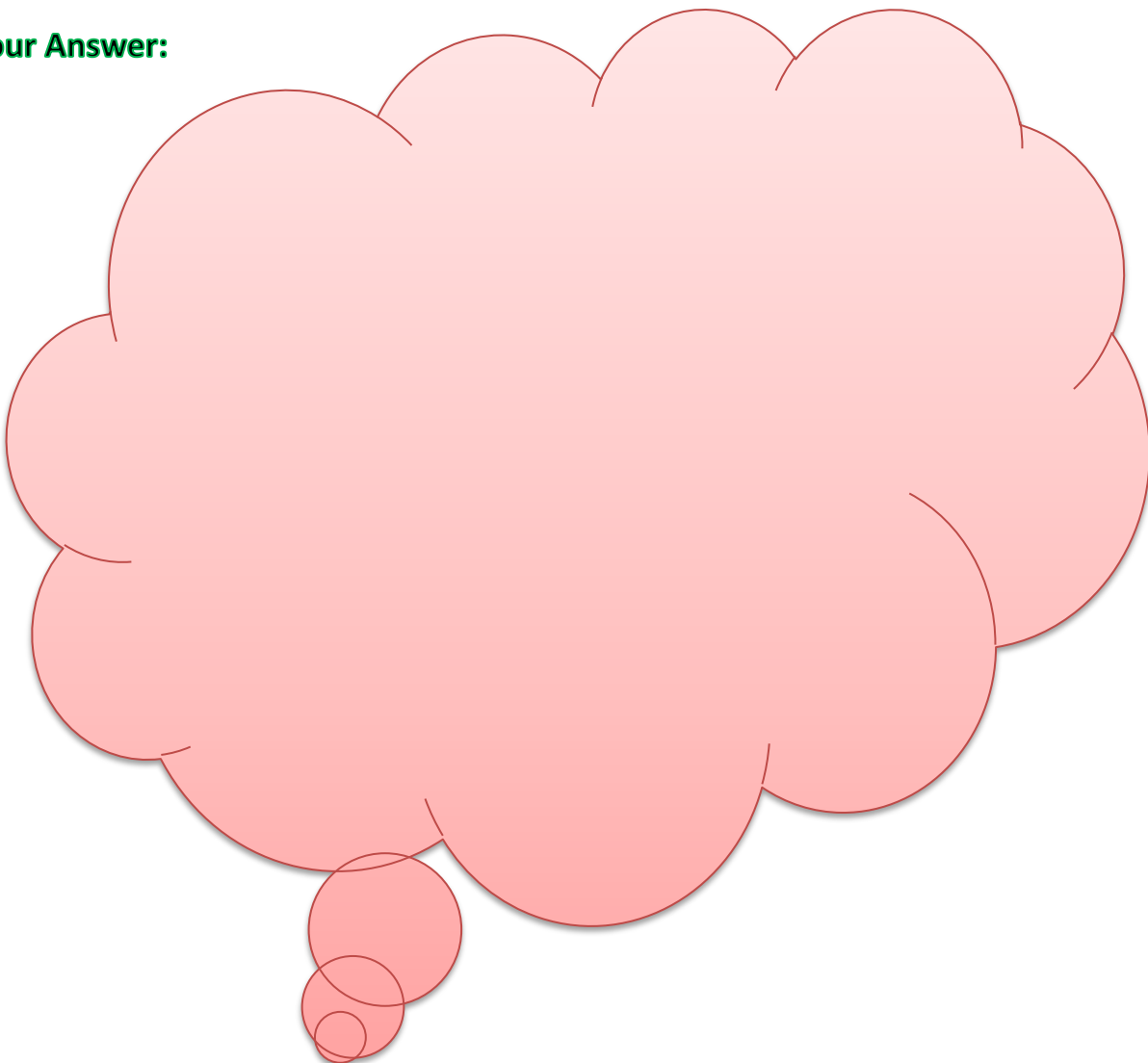
YOUR ANSWER:

ACTIVITY (3)

Imagine yourself living the life of a main character of the story, “What do you see around you?” Try to write 5 lines.



Your Answer:



ACTIVITY (4):

What a message or theme have you communicated in this story? Write the theme (message) of the story in the scroll at the top of the page below. Then write three examples that demonstrate the theme:

The diagram consists of a scroll at the top with the text "Your message" inside it. Three arrows point downwards from the bottom of the scroll to three empty ovals arranged horizontally below. The entire graphic is set against an orange background.

ACTIVITY (5)

Who is the gangster? Try to use the different definitions through the following code:



Your Answer:



Dear students,

By the end of the lesson, you will be able to:

- Find information from the text that might be clues to the answers and use these with your background knowledge for possible answers.
- Determine the relevance and the truthfulness of the ideas presented in the material reviewed.
- Use barcodes to describe the events of the story.
- Use the context to help guess the meanings of unfamiliar words.
- Say your point of view towards the text by reformulation of ideas in a new way.
- Link what you read or hear to your own experiences.
- Begin to draw inferences from the text or the illustrations.
- Write phrases from memory, and adapt these to create new sentences, to express ideas and events of the story clearly.
- Picture the words as images in your mind.

Activity (1)

As you read, take notes about how the story connects to each of the following: Text-to-Text, Text-to-Self, Text-to-World.

TEXT CONNECTIONS

Name: _____
Date: _____

«« TEXT TO SELF »»

THOUGHTS
EXPERIENCES
TRAVELS
FAMILY
FRIENDS
SCHOOL

reminds me of _____

because _____

«« TEXT TO TEXT »»

OTHER BOOKS
CHARACTERS
POEMS
ARTICLES
WEBSITES
BLOGS

_____ is similar to _____

because _____

«« TEXT TO WORLD »»

TELEVISION
MOVIES
CURRENT EVENTS
GAMES
NEWS
POP-CULTURE

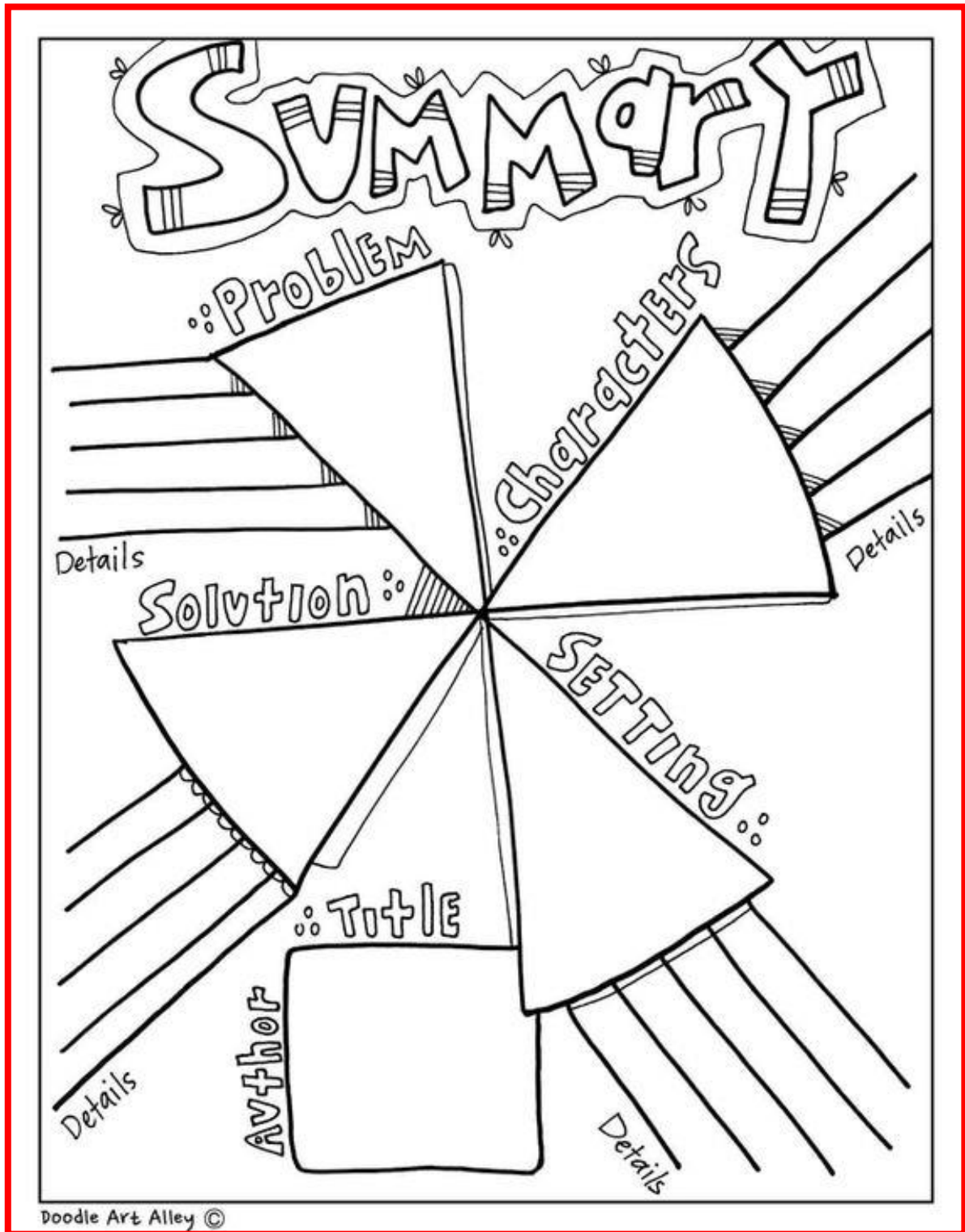
_____ makes me think of _____

because _____

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ACTIVITY (2)

With your own words, write a summary of the story. Restate the important events or facts. The following diagram will help you:



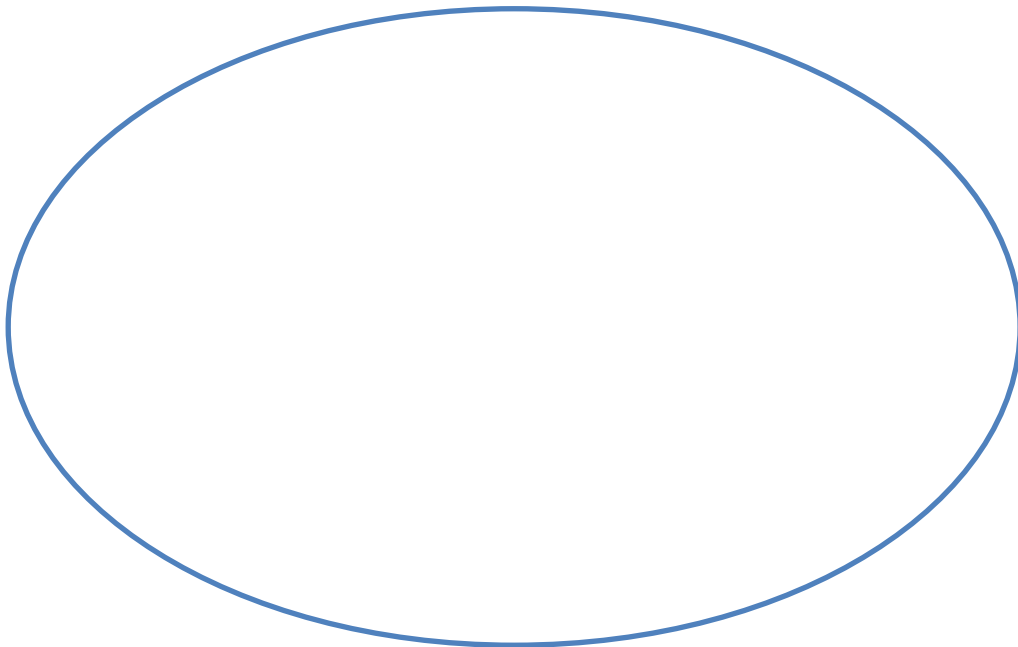
ACTIVITY (3)

Dear student,

By using the EyeJack Creator Application on your device, point the camera at the image below and deduce from the short video that will appear on your smartphone screen “What is the topic about which the events of this story revolve?”



YOUR ANSWER:



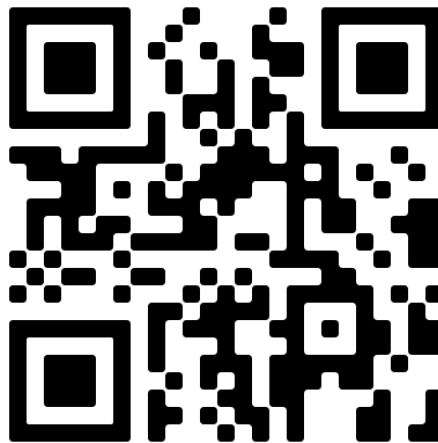
ACTIVITY (4)

After reading the story, reorder the events of the story making use of the following images:



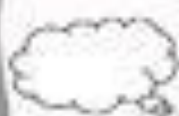
ACTIVITY (5)

By using the following code, try to make a prediction about what will happen next? Why do you think that?



The following worksheet can help you make predictions:

Name: _____



Predictions



Draw a picture of what you predict will happen next.

Why do you think this will happen next?

.....

.....

.....

.....

.....



Dear Students,

By the end of the lesson, you will be able to:

- Write brief notes, symbols, and abbreviations to point out important ideas in the story.
- Use prior knowledge to understand the story.
- Draw inferences such as inferring characters' feelings, thoughts and motives from their actions.
- Write phrases from memory, and adapt these to create new sentences, to express ideas clearly.
- Describe people, places, things and actions of the story orally and in writing.
- Write creatively to express their own ideas and opinions, and translate the difficult sentences accurately into Arabic language.
- Take part in a short conversation, asking and answering questions, and exchanging opinions.

ACTIVITY (1)

According to the following image:

What do you think the topic is about?

- a- The most beautiful little lamb contest.
- b- The dead lamb.
- c- The stolen lamb.
- d- The happy man.



ACTIVITY (2)

By using the following code, try to activate your background knowledge (draw on background knowledge and prior experience to understand the text will display by QR Code). The following chart can help you.



<i>K</i>	<i>W</i>	<i>L</i>
What I know	What I want to know	What I've learned

ACTIVITY (3)

Through what was mentioned, try to answer this activity by placing a circle around the correct answer:

1- One of the following is not relevant to the current story:

- a. Aleko had suddenly acquired a new lamb.
- b. One of Mary's prize possessions was a little white bird.
- c. Dimitri's neighbor was Aleko.
- d. Dimitri had found his lost animal.

2- Dimitri stayed in Aleko's house for:

- a. 120 minutes.
- b. 60 minutes .
- c. 30 minutes .
- d. 35 minutes.

3- One of the following is the main idea of the story:

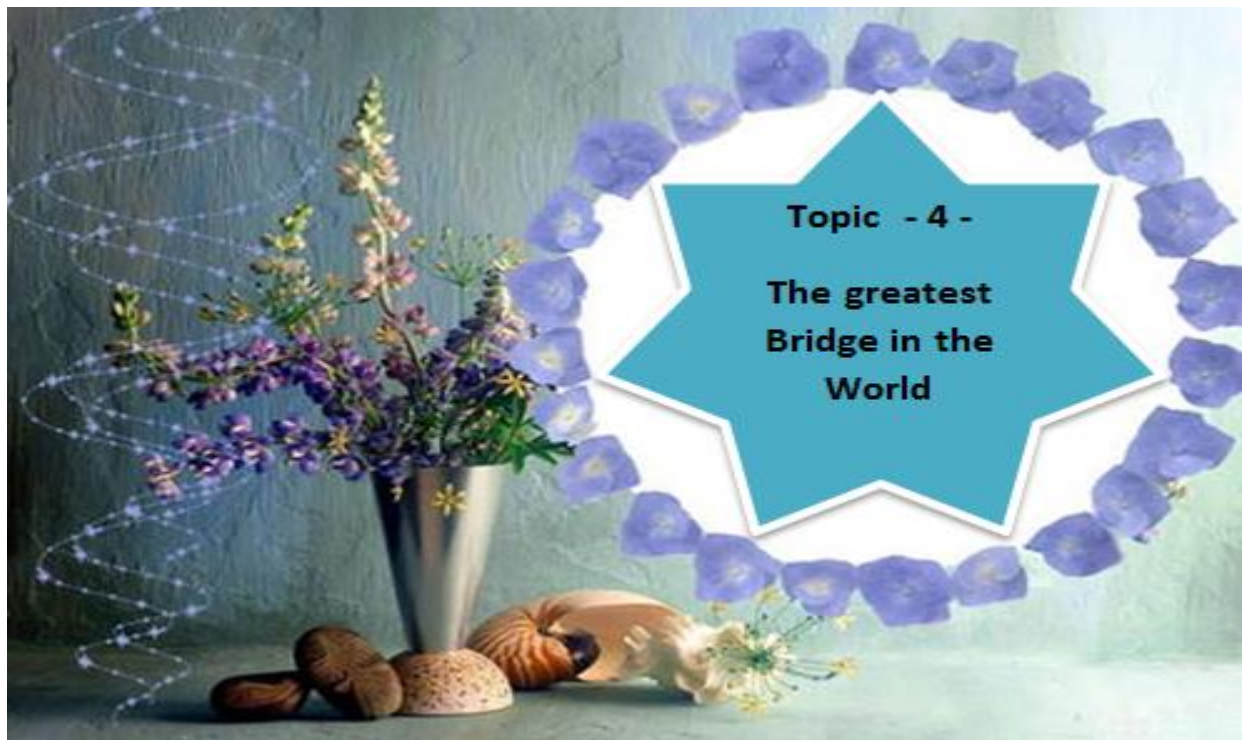
- a. The lamb was missing.
- b. The theft was ashamed.
- c. Aleko bought a new lamb.
- d. The lamb was Dimitri's wife prize.

ACTIVITY (4)

Scan the following image with EyeJack Creator Application, then try to summarize what will display on the screen of the your device?



Your Answer:



Dear students,

By the end of the lesson, you will be able to:

- Generate new ideas or ways of viewing things in the given story.
- Make connections based on the events of the story.
- Identify the overall message, key points, details and opinions in the passage, involving some more complex language, and recognizing the relationship between past, present and future events.
- Demonstrate understanding by being able to scan for particular information in the story.
- Use the context to help guess the meanings of unfamiliar words.
- Say what you like or dislike about the story.
- Read a story on the same topic to find and compare information.

ACTIVITY (1)

Use the context clues in the sentence to find the meaning of the following unknown red words:

- I don't wish to **impede** your progress, I was merely trying to make sure you understand the instructions.
a. Slow b. Improve c. Exaggerate
- She showed great **prowess** in the engineering competition and won first prize.

a. Anxiety b. Patience c. Skill

- The coach **admonished** her for picking daisies when she should have been defending the goal.

a. Criticized b. Praised c. Listened

ACTIVITY (2)

Does this story remind you of something else you have read? Is it similar to something else happening in the world right now? How does it relate to your life? Use text connection diagram below to answer this question?

Making Connections	
 My Text to Self Connections	I can connect to the book because...
 My Text to Text Connections	It reminds me of the book _____, because...
 My Text to World Connections	It makes me think of _____, because...

ACTIVITY (3)

Mention things that you really liked or disliked in the story:

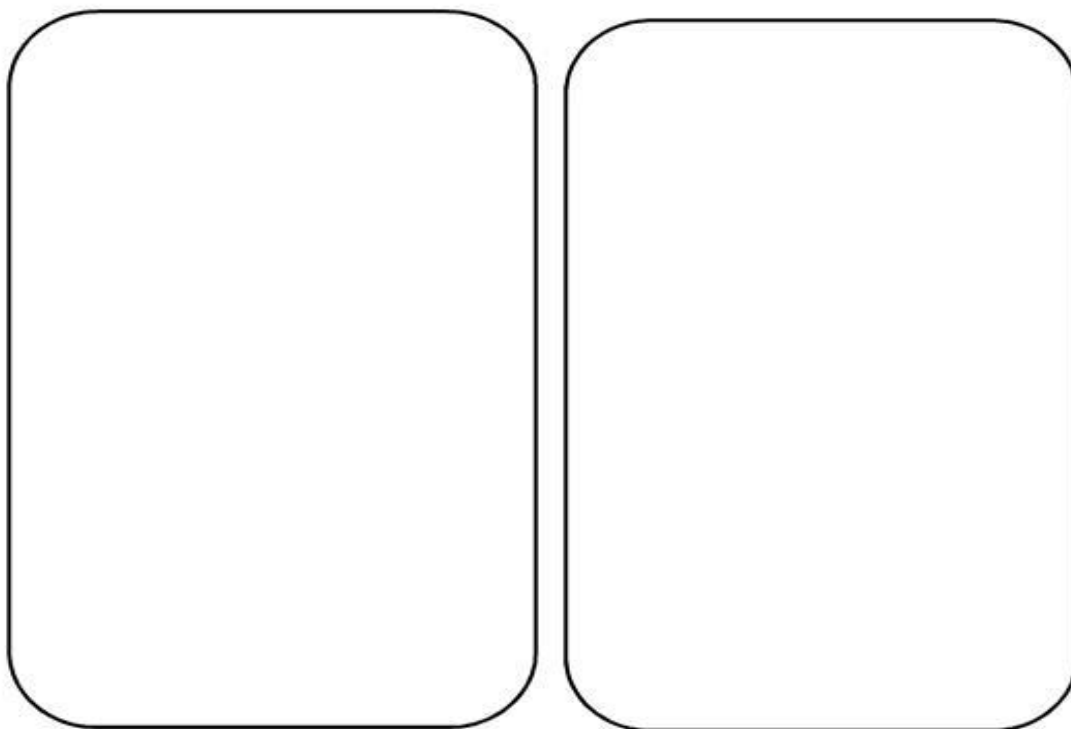
LIKE – DON'T LIKE

NAME: _____

A. Draw and name in English

10 Things I like

10 Things I don't like

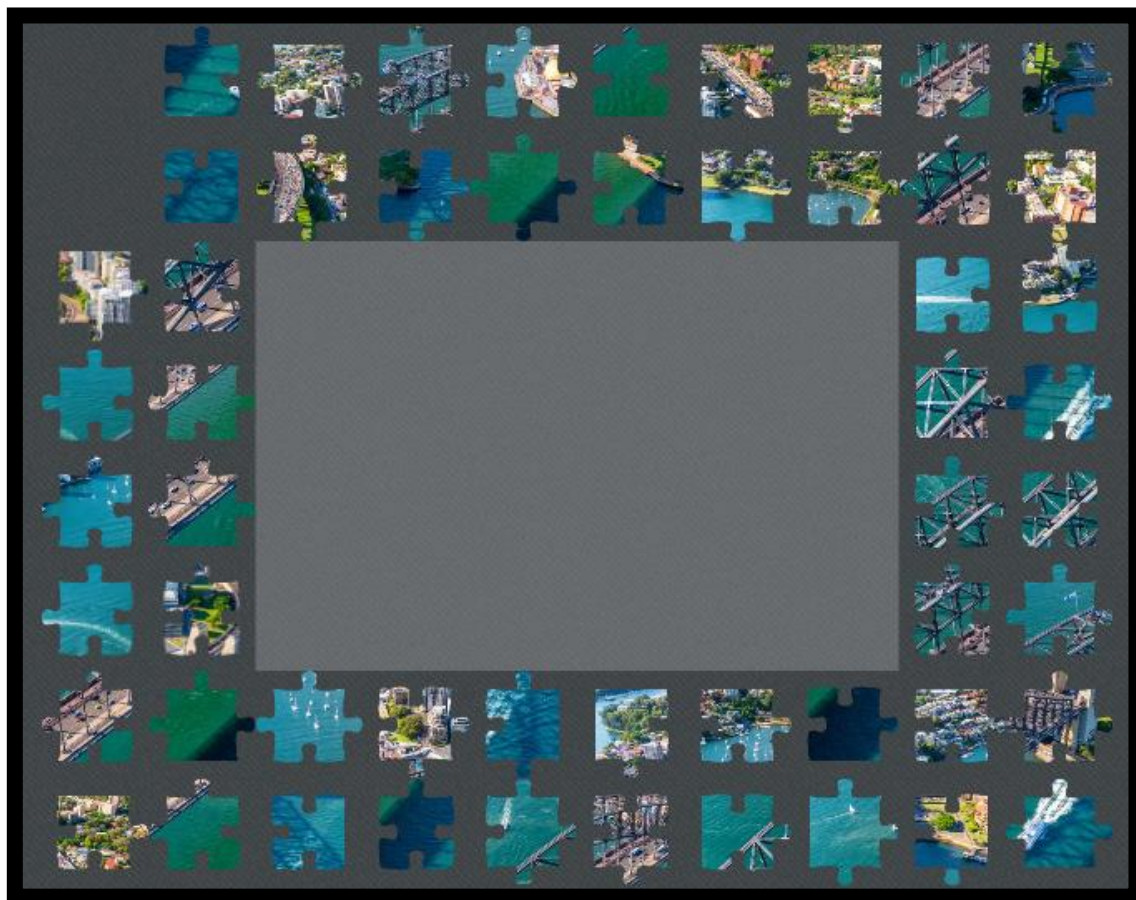
The form consists of two large, side-by-side rounded rectangular boxes. The left box is intended for drawing and naming 10 things the student likes, and the right box is for drawing and naming 10 things the student doesn't like. Both boxes are currently empty.

B. Share your drawings with your classmates and talk about why you like them or dislike them

ACTIVITY (4)

Click on the following link then try to solve Sydney jigsaw puzzle below:

<https://puzzlegarage.com/puzzle/998/>



The original picture



ACTIVITY (6):

Spot the differences between the two pictures :





Dear students,

By the end of the lesson, you will be able to:

- Use visual context clues to figure out the meaning of unfamiliar or new words .
- Explain the main purpose of the story and summarize it succinctly.
- Explain the author’s viewpoint in the story and present an alternative point of view.
- Use written and visual clues from the story as well as your own personal experiences to make predictions about what might happen before, during and after reading.

ACTIVITY (1)

Using pictures clues is a great way to help you build a mental image of the different multiple meaning words or homonyms. Try to figure out the meaning of each underlined word by looking at the picture and thinking about what is happening.

Name: _____

Using Picture Clues

Directions: Read the passages below. Try to figure out the meaning of each underlined word by listening to clues, looking at the picture, and thinking about what is happening.

When the caterpillar is ready to become a butterfly it makes a chrysalis.



What do you think a chrysalis is?

.....

.....

.....



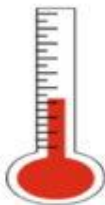
Five days after I planted my seed, it began to sprout.

What do you think the word sprout means?

.....

.....

.....



It was hot out so I checked the thermometer to see how hot.

What do you think a thermometer is?

.....

.....

.....

Last night we had a rain storm and bright lightning struck.



What do you think the word struck means?

.....

.....

.....

ACTIVITY (2)

To summarize is to briefly retell the important ideas from the story in your own words.
Write a summary of main points of the story making use of the following pictures:



Summary:

What I learnt:

ACTIVITY (3)

By looking at following pictorial story, try to make predictions that engage you in thinking about what has occurred and what will happen next.

Picture Predictions

What do you see on the front cover?
What do you think this story is about?



What do you see on the first page?



What do you think is happening?



What do you think will happen next?



How do you think the story will end? Why do you think that?



YOUR ANSWER:

ACTIVITY (4)

Recognize the author's viewpoint about the topic, then pick out the text evidence that supports the author's point of view.

Name _____

Date _____

The Author's Viewpoint vs. My Viewpoint

Point of view or viewpoint is the way we feel about the topic or events in a piece of text.

- **Opinions, beliefs, and reasons** are clues in the text that help us recognize the author's personal attitude or feelings on the subject.

Example	Author's Viewpoint	Text Evidence
Watching too much television is connected to poor eating habits.	Too much television is not good for you.	The text says that poor eating habits can happen because of watching too much television.

Directions: Read the passages below and complete the chart.

Passage	Author's Viewpoint What does the author think about the topic?	Text Evidence What clues tell you about the author's viewpoint?	My Viewpoint What do you think about the topic?
It is hard for scientists to know how many West Indian manatees there are. They estimate between 2,000 to 5,000. The West Indian manatee has been listed as an endangered species. This means that the population is so low that the West Indian manatee is in danger of becoming extinct. Many die because of accidents with ships or other human causes, such as pollution. Federal and state laws protect the manatee. Scientists are working to find ways to help the manatee survive.			



Dear Students,

By the end of the lesson, you will be able to:

- Recognize visually the correct and factual information of the story.
- Sequence the events into the order in which they happened.
- Use the visual clues of the story to create a picture in your head by using all the senses and imagination to create your mental image.
- Ask pertinent questions - before, during and after reading - to develop and extend ideas stated in the story.
- Articulate ideas and opinions, using evidence and explanation to support.
- Explain the main purpose of the story and summarize it succinctly.

ACTIVITY (1)

By using the following QR code, try to read the short story of “Adventures in Spanglish”
By Gerald R Gioglio, then say if there is any factual
information.



Name _____


Facts

Write 3 facts you have learned. Draw a picture to go with each fact.

1. _____

2. _____

3. _____

ACTIVITY (2)

Use a sequence of the following pictures to make a story:



ACTIVITY (3)

Look at the pictures and answer the questions by articulating your ideas and opinions, using evidence and explanation to support.



1 Do you acknowledge your mistakes?

Yes/no. For example _____



3 Are you good at negotiating?

Yes/no. For example _____



5 Are you capable of doing many things at one time?

Yes/no. For example _____



7 Do you make choices quickly?

Yes/no. For example _____



2 Can you keep a clear perspective in difficult situations?

Yes/no. For example _____



4 Do you show favoritism to special people?

Yes/no. For example _____



6 Do you ever cross boundaries?

Yes/no. For example _____



8 Do you think you have the ability to see the potential in an opportunity?

Yes/no. For example _____

In conclusion, I believe I would/ wouldn't make a good leader because

ACTIVITY (4)

By using the following QR code, try to draw a scene from the story that you will visualize in your head as read it. Write a sentence or two explaining your answer.



Visualizing



Your sentences:

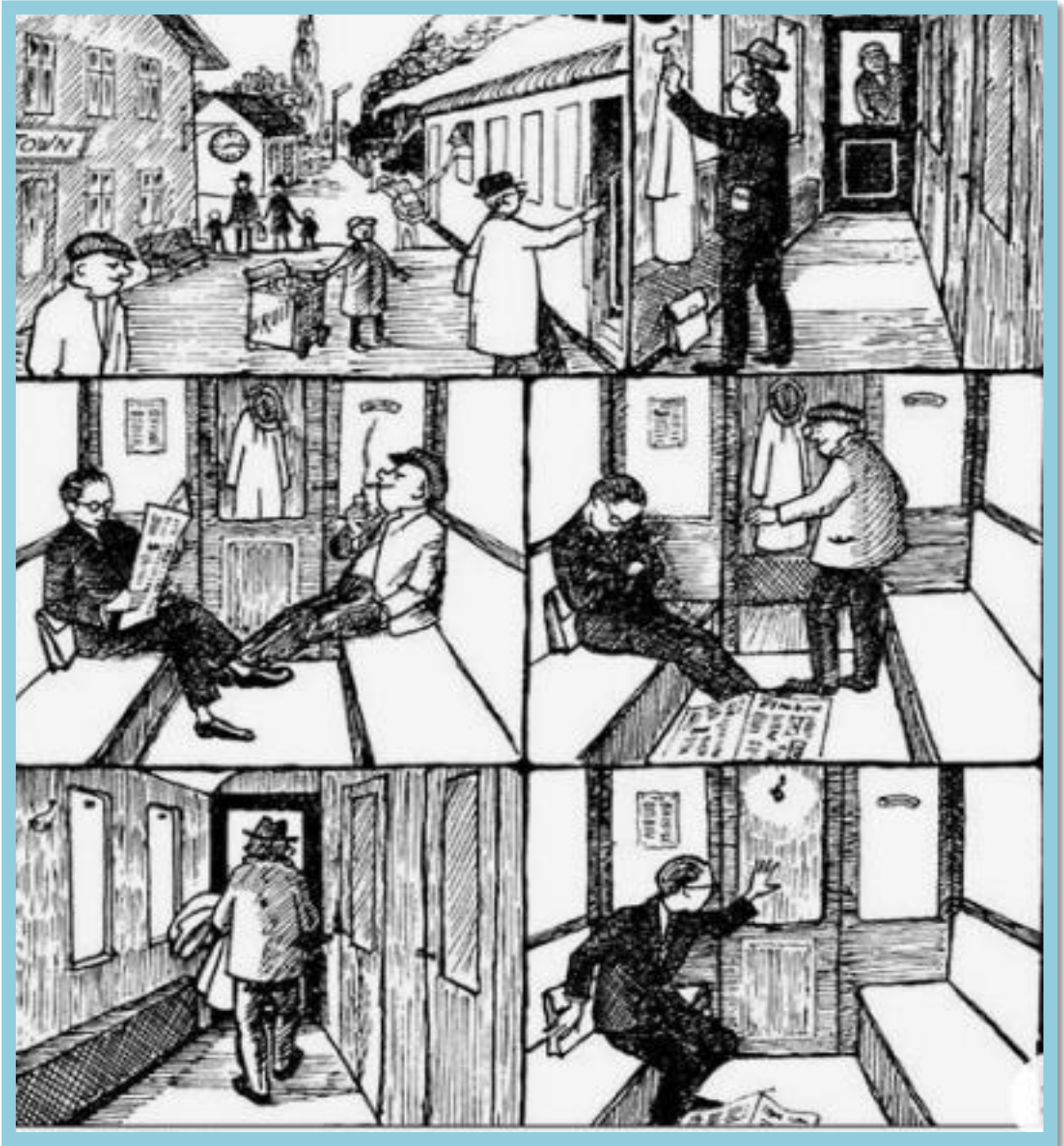
.....

.....

ACTIVITY (5)

In pair work try to:

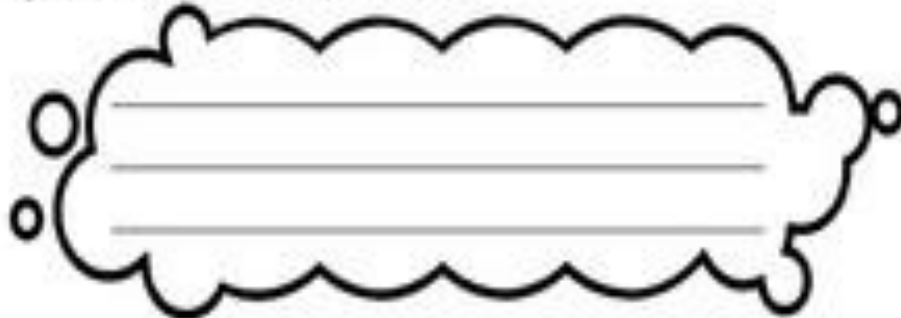
- Look at each picture and describe what you can see to your partner.
- Where does the story below take place.
- Suggest and ask pertinent questions - before, during and after reading - to develop and extend ideas stated in the story.
- Write a story about these pictures with your partner.



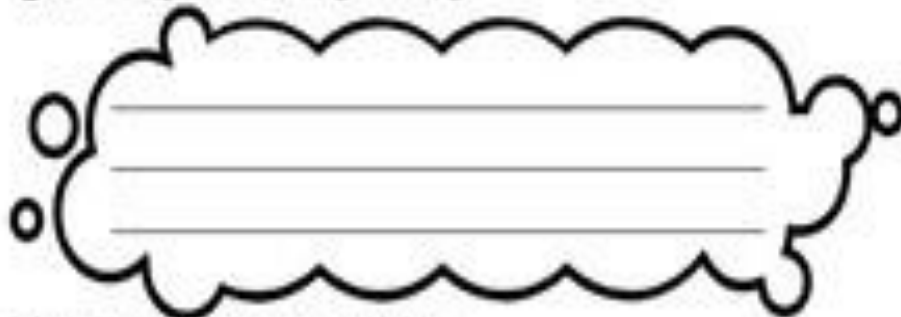
Name: _____

Questions Before During & After Reading

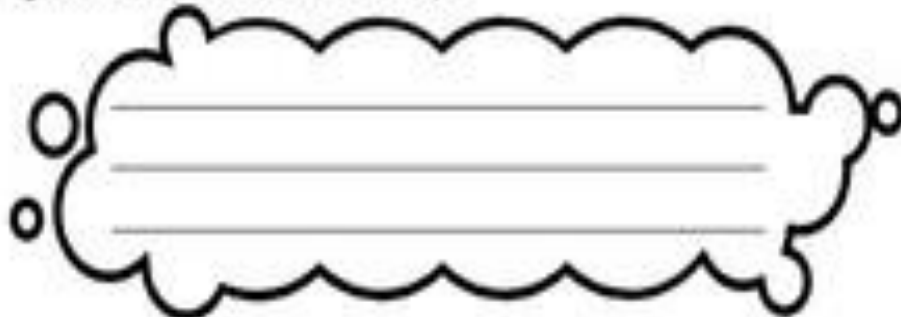
Questions I have before reading:



Questions I have during reading:



Questions I have after reading:



ACTIVITY (6)

Scan the following image with EyeJack Creator Application, then try to summarize the picture story that will display on the screen of the your device?

This image shows a full page of primary-ruled notebook paper. It features multiple sets of horizontal lines designed to help young learners write neatly. Each set consists of three lines: a solid top line, a dashed middle line, and a dotted bottom line. These sets are repeated down the entire page, providing ample space for handwriting practice. The paper is otherwise blank, with no text or other markings.



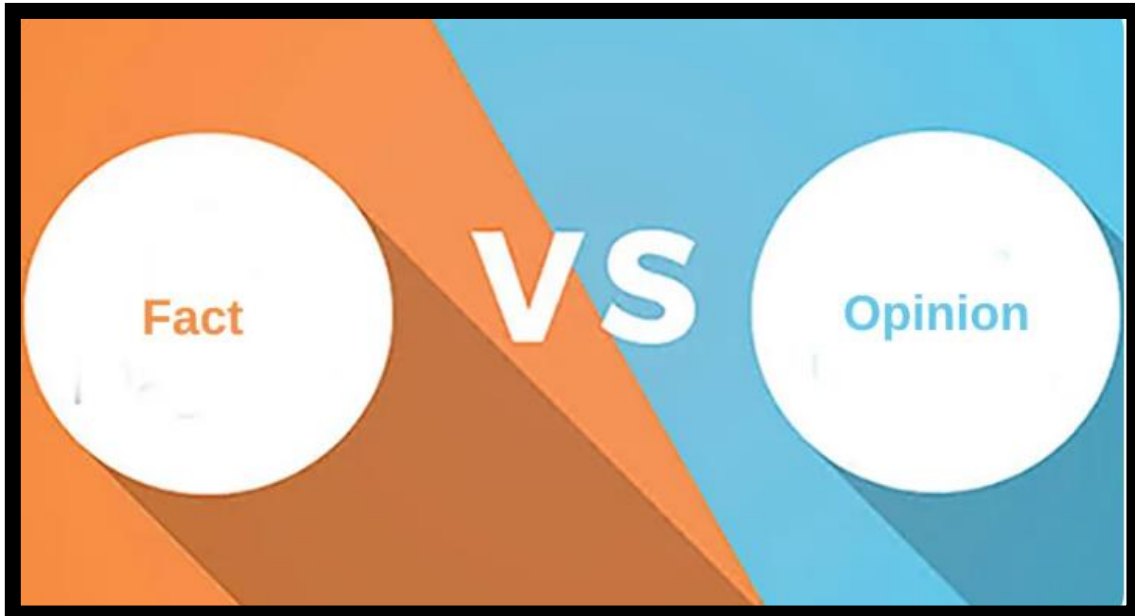
Dear students,

By the end of the lesson, you will be able to:

- Distinguish between statements of fact and opinion. Make comparison between fact and opinion using comparison table maker.
- Use pictures as a context clue to predict what the story will be about.
- Make connections between information viewed and personal experiences by using connection maker.
- Add new ideas or modify the ideas presented by the writer depending on the image of the story presented.
- Make a judgment on the written story by using your imagination to visualize thoughts when reading .

ACTIVITY (1)

Scan the following image with EyeJack Creator Application, then try to make comparison between fact and opinion of the story that will display on the screen of the your device?

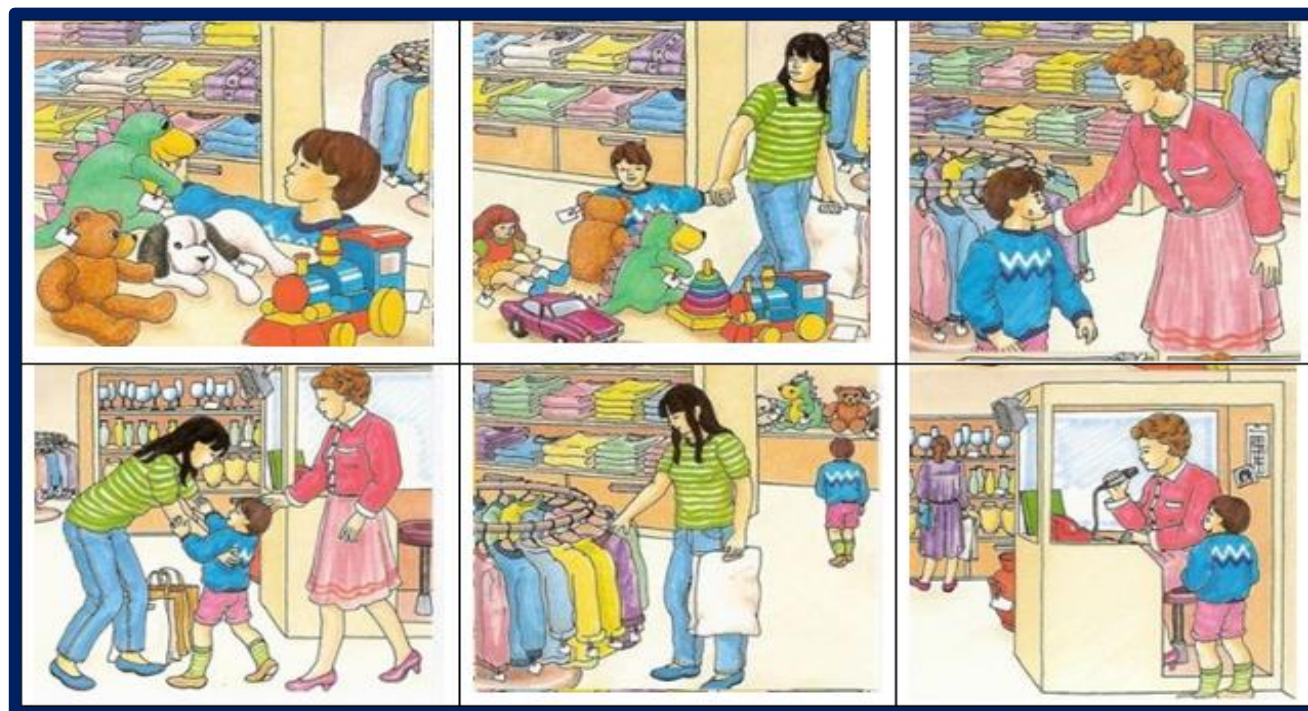


Fact or Opinion?	
Fact	Opinion
1	1
2	2
3	3
4	4
5	5



ACTIVITY (2)

Sequence and tell the story by using the following pictures as a context clue to predict what the story will be about.



YOUR ANSWER:

ACTIVITY (3)

After telling the story of activity (2), make connections between information viewed and personal experiences by using the following connection maker.

 Text to Text	 Text to Self	 Text to World
In the text I read this...	and it reminded me of...	and that helps me understand...

ACTIVITY (4)

In the following image, a grandmother tries to teach Sally to knit You are requested to add new ideas or modify the idea presented by the writer .

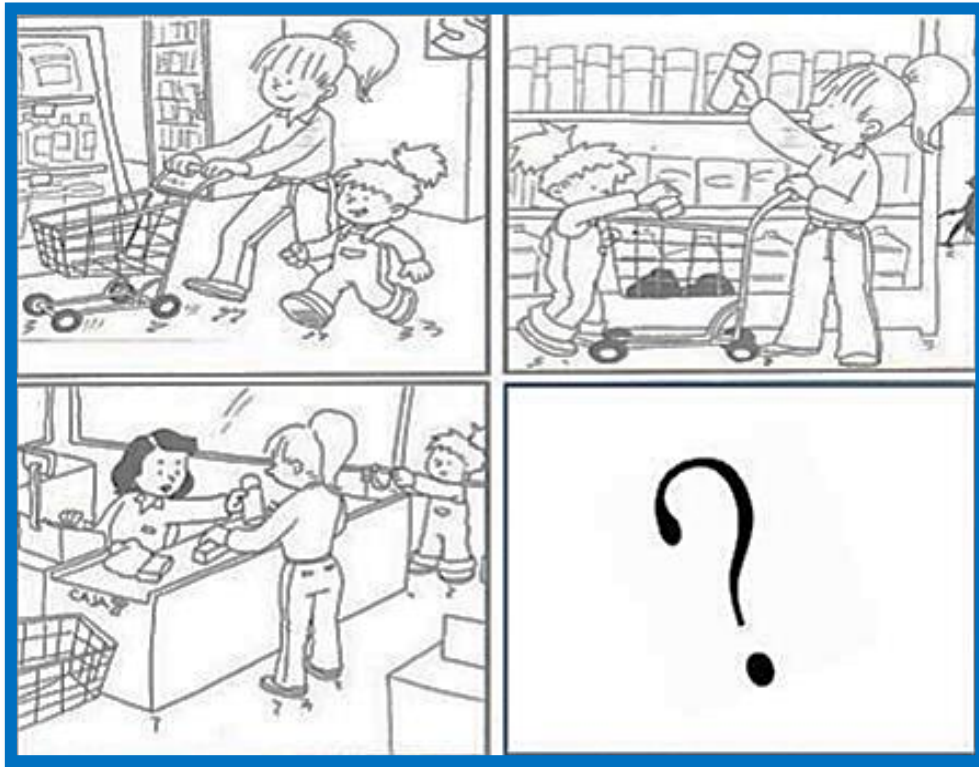


YOUR ANSWER:

ACTIVITY (5)

Use the suggested words in the box and your own thoughts and creativity to create a movie in your mind of what will happen next in the story.

Carry shopping list take cashier money trolley carton fruit
cheerful supermarket



YOUR ANSWER:

Best Wishes!

Appendix (34)

The opinion questionnaire of the experimental group students' views about using the proposed ART- based instructional program and its benefit in developing academic achievement and visual intelligence skills

Dear student,

Please kindly answer the following opinion questionnaire regarding your benefit from learning with ART in the reading comprehension course.

Note: The questionnaire consists of (38) questions:

1. Is ART an effective tool to present scientific information visually?
☐ Yes. ☐ No.
2. Were you satisfied with the materials that were created with ART applications?
☐ Yes. ☐ No.
3. Do you believe that employing ART as an active learning method will have a significant influence on the teaching of the remaining courses in the second stage?
☐ Yes. ☐ No.
4. Did ART applications (audio, video, and image) affect your academic achievement in reading comprehension course?
☐ Yes. ☐ No.
5. Does learning with ART give the educational situation a lot of dynamism and activity?
Yes. ☐ No.
6. Do you believe the ART-created reading comprehension topics make it easier to understand the topics?
☐ Yes. ☐ No.
7. Do you think the materials presented with ART were effective in improving your academic achievement and developing your visual intelligence skills while studying?
☐ Yes. ☐ No.
8. Did the use of ART help provide enough time to do your homework and carry out the required tasks?
☐ Yes. ☐ No.
9. Were the AR-based learning contexts appropriate for your needs to learn reading comprehension topics by displaying clear texts, images, videos or audio files?
☐ Yes. ☐ No.
10. Did the use of ART increase your motivation towards the learning process?
☐ Yes. ☐ No.
11. Was the information provided by ART in teaching reading comprehension topics comprehensive?
☐ Yes. ☐ No.

- 12.** Was the information provided by ART in teaching reading comprehension topics clear ?
- ☐ Yes. ☐ No.
- 13.** Did learning with ART help you accomplish your activities faster than the traditional method?
- ☐ Yes. ☐ No.
- 14.** Was the digital content available on Google Sites up to date and accurate?
- ☐ Yes. ☐ No.
- 15.** Did the content available on ART applications suit your needs and abilities in learning the prescribed reading comprehension topics?
- ☐ Yes. ☐ No.
- 16.** Was the digital content-based ART presented in a simple and attractive way?
- ☐ Yes. ☐ No.
- 17.** Was the digital content offered through ART applications easily accessible?
- ☐ Yes. ☐ No.
- 18.** Was the content-based ART applicable?
- ☐ Yes. ☐ No.
- 19.** Were the ART-based educational activities appropriate for your level of mental abilities and aptitudes?
- ☐ Yes. ☐ No.
- 20.** Did the visual instructional activities contribute to the acquisition of new knowledge and skills?
- ☐ Yes. ☐ No.
- 21.** Did the ART-based instructional activities contribute to the development of your scientific level of reading comprehension?
- ☐ Yes. ☐ No.
- 22.** Does learning with ART support independence in education and give self-confidence?
- ☐ Yes. ☐ No.
- 23.** Do you think that learning reading comprehension with ART is more flexible than traditional learning?
- ☐ Yes. ☐ No.
- 24.** Did the instructor interact with you sufficiently, positively, and constructively while learning with ART?
- ☐ Yes. ☐ No.
- 25.** Have you been given sufficient instructions on how to use electronic applications based on ART that are necessary to study the course?
- ☐ Yes. ☐ No.
- 26.** Were the teaching methods and teaching aids used in the proposed instructional program multifarious?

- ☐ Yes. ☐ No.
- 27.** Did the ART-based educational program help you improve your interpersonal skills in visual intelligence, problem solving, self-learning, and effective communication.
- ☐ Yes. ☐ No.
- 28.** Was the interaction between you and your colleagues appropriate and effective when using digital content?
- ☐ Yes. ☐ No.
- 29.** Were the assessment tools used in the instructional program easy to understand and appropriate for the nature of learning with ART?
- ☐ Yes. ☐ No.
- 30.** Have you received feedback on your performance while learning with the proposed instructional program in a timely manner?
- ☐ Yes. ☐ No.
- 31.** Were the resources and instructional materials provided in the ART-based instructional program distinguished (characterized) by diversity and modernity?
- ☐ Yes. ☐ No.
- 32.** Did you find enjoyment in browsing the instructional digital content of Reading Comprehension Course and navigating between its parts?
- ☐ Yes. ☐ No.
- 33.** Are you satisfied in general with the level of quality, design, and construction of the ART-based instructional program?
- ☐ Yes. ☐ No.
- 34.** Does learning with ART provide educational content that is characterized by modernity and reliability?
- ☐ Yes. ☐ No.
- 35.** Does using ART in the classroom help to strengthen the teacher's role in explaining the material?
- ☐ Yes. ☐ No.

Open-ended questions

- 36.** What are the most important practises and aspects of this proposed ART-based educational program that you liked?

37.What difficulties did you encounter in the learning process with ART?

38.What are the most important suggestions you have to improve the process of learning a reading comprehension course using ART?

Appendix (35)

The results of the opinion questionnaire of the experimental group students' views about using the proposed ART- based instructional program and its benefit in developing their visual intelligence skills after ending the experiment

No. of items	Selected Answer			
	Yes (Agree)		No (Not Agree)	
	Frequency	Percentage	Frequency	Percentage
1	35	76%	11	24%
2	36	78%	10	22%
3	33	72%	13	28%
4	42	91%	4	9%
5	41	89%	5	11%
6	44	96%	2	4%
7	37	80%	9	20%
8	39	85%	7	15%
9	33	72%	13	28%
10	40	87%	6	13%
11	41	89%	5	11%
12	44	96%	2	4%
13	45	98%	1	2%
14	44	96%	2	4%
15	33	72%	13	28%
16	32	70%	14	30%
17	30	65%	16	35%
18	31	67%	15	33%
19	33	72%	13	28%
20	41	89%	5	11%
21	40	87%	6	13%
22	39	85%	7	15%
23	38	83%	8	17%
24	35	76%	11	24%
25	36	78%	10	22%
26	38	83%	8	17%
27	29	63%	17	37%

28	35	76%	11	24%
29	37	80%	9	20%
30	40	87%	6	13%
31	43	93%	3	7%
32	42	91%	4	9%
33	44	96%	2	4%
34	39	85%	7	15%
35	38	83%	8	17%
Arithmetic mean	37.9	82%	8.1	18%

Some of students' answers of open-ended questions

36. What are the most important practises and aspects of this proposed ART-based educational program that you liked?

1. Arousing the motivation and enthusiasm of learners as the scientific material (texts, videos, static and animated images, and audio recordings) of the reading comprehension course is presented in an attractive and interesting way.
2. The possibility of understanding the scientific material in an easy and effective way by presenting the reading comprehension topics in a simple and clear manner within the educational situation plan.
3. Learning with ART has given the educational situation a lot of dynamism and activity.

37. What difficulties did you encounter in the learning process with ART?

The result of this question indicated some weak obstacles that impede the use of the instructional program based on ART, including:

1. This result is attributed to the absence of pre-approved technology-based educational programmes at the university, which would have made the students progress in theoretical aspects, while they found difficulty in how to learn using augmented reality applications (practical aspects).
2. This result is also due to the fact that the internet speed is weak and inappropriate in some areas, which creates disparities in the reception and exchange of information, in addition to the occurrence of power outages.
3. This result is due to the fact that learning with ART in Iraq is an

educational innovation, and every innovation (newcomer) faces difficulties and challenges at the beginning, but with experience comes the ability to overcome many of these difficulties and adapt this technology to the requirements of the Iraqi learning environment.

38. What are the most important suggestions you have to improve the process of learning a reading comprehension course using ART?

1. Offering training courses to students on how to use ART in the learning process.
2. The interest of ART and its applications lies in building multiple instructional environments that are rich in digital media such as audio, image, presentation, shape, and video, whether these media are two-dimensional or three-dimensional, to integrate educational events and situations with reality or the real world, which in turn leads to meaningful learning (characterized by suspense, fun, and attractiveness).