



عنوان البحث: The Effectiveness of a Program
Based On Educational Infographics in Developing Reading Comprehension Inferential Skills For EFL Secondary Stage Students

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The Effectiveness of a Program Based on Educational Infographics in Developing EFL Inferential Reading Comprehension Skills For EFL Secondary Stage Students

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ABSTRACT

The Effectiveness of a Program Based On Educational Infographics in Developing EFL Inferential Reading Comprehension Skills For EFL Secondary Stage Students

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The current study aimed at investigating the effectiveness of a program based on educational infographics in developing Inferential reading comprehension skills for EFL secondary stage students. The participants of the study were 64 students. They were divided into two groups: an experimental group (N=32) and a control one (N=32). The experimental group was taught using educational infographics, while the control group received regular instruction. This study adopted the quasi-experimental design. The study instruments were EFL reading comprehension test with a rating scale. They were administrated to the study participants before and after the treatment. The treatment was implemented during the second semester of the academic year 2022-2023. The data obtained were statistically analyzed, The results revealed that using educational infographics was effective in developing EFL inferential reading comprehension skills for second-year secondary stage students. Thus, it is recommended that teachers and curriculum designers pay attention to educational infographics and its effective role in developing EFL inferential reading comprehension skills for secondary school students.

Keywords: Educational Infographic, EFL Inferential Reading Comprehension Skills

المخلص

عنوان البحث: فاعلية برنامج قائم على الانفوجرافيك التعليمي في تنمية مهارات الفهم القرائي الاستنتاجي في اللغة الانجليزية كلغة أجنبية لدى طلاب المرحلة الثانوية

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هدفت الدراسة الحالية إلى التعرف على أثر استخدام الانفوجرافيك التعليمي في تنمية مهارات الفهم القرائي الاستنتاجي في اللغة الإنجليزية كلغة أجنبية لدى طلاب المرحلة الثانوية بمدرسة البنات الجديدة بمدينة السادات ، محافظة المنوفية بلغ عدد الطلاب المشاركين في الدراسة ٦٤ طالبا. تم تقسيمهم إلى مجموعتين: مجموعة تجريبية (عدد = ٣٢) ومجموعة ضابطة (عدد = ٣٢). كانت أدوات ومواد الدراسة تشمل قائمة لمهارات الفهم القرائي الاستنتاجي في اللغة الإنجليزية كلغة أجنبية ، واختبار الفهم القرائي الاستنتاجي في اللغة الإنجليزية كلغة أجنبية باستخدام مقياس التقييم ، بالإضافة الى برنامج مبنى على الانفوجرافيك التعليمي. تم التدريس الطلاب في المجموعة التجريبية باستخدام الانفوجرافيك التعليمي في حين تلقى الطلاب في المجموعة الضابطة تدريسا باستخدام الطرق التقليدية. وتم تنفيذ التجربة خلال الفصل الدراسي الثاني من العام الدراسي ٢٠٢٢-٢٠٢٣. تم تحليل البيانات إحصائياً ، وأظهرت النتائج أن استخدام الانفوجرافيك التعليمي كان فعالاً في تطوير مهارات الفهم القرائي الاستنتاجي باللغة الإنجليزية كلغة أجنبية بين طلاب الصف الثاني الثانوي في مدرسة البنات الثانوية الجديدة بمدينة السادات ، محافظة المنوفية

الكلمات المفتاحية: الانفوجرافيك التعليمي - مهارات الفهم القرائي الاستنتاجي

1.1. Introduction

English is a very essential language. It is the means that helps students to communicate with native and non-native speakers around the world. It is used to gain knowledge and personal insight that helps to develop language skills, build greater interaction, comprehend, and respect others. English is necessary for students because it broadens their horizons, develops their emotional skills and improves their quality of life. Moreover, the use of English as an international language has increased over time as English is one of the effective means of communication in many countries. EFL learners should have language skills that enable them to communicate and use English. There are four skills that students can use in their daily lives. For learning purposes, these language skills are classified into two types. Oral (listening, speaking) and written (reading, writing).

Reading is one of the most important language skills. It is considered a very essential skill for learners because it provides access to even more languages and opens a window to formal means of continuing one's personal education. Students can improve their language, experience, information and ideas they need through reading activities. In addition, they can learn things they did not know before (Saputri & Rizal, 2021). Furthermore, Sinagaat et.al. (2020) stated that reading helps students interpret language more easily. It also helps them find the message in the text and finally develops thinking skills.

Additionally, it is considered as a good means to learn new ideas, facts and experiences. One of the most difficult tasks of a language teacher in the context of teaching English as a foreign language is that aims to reinforce students' attitudes towards reading (Dolba et al., 2022; Firman et al., 2021). This is caused by limited time and other obstacles faced in the teaching and learning process.

Dorkchandra (2010) pointed out that reading skill is essential and important for those who learn English as a foreign language and for professional development. In addition, Sari (2017) stated that reading skill is essential to master because it is important to get knowledge and information. English language teachers must use suitable and modern methods and strategies for teaching reading because it is very important for students.

Reading comprehension is defined as the complex process of extracting meaning from texts (Castles et al., 2018), it is one of the key elements for successful learning in school and societal participation (Wijekumar et al., 2020). Consequently, guiding students toward effective reading comprehension is essential. Developing reading comprehension skills becomes increasingly crucial in the educational process. (Ritchey et al., 2017).

According to Smith & Robinson (2010: 205), "Reading comprehension means the understanding, evaluating, and utilizing of information and ideas gained through the interaction between the readers and the author." It is an active thinking process in recognizing vocabulary, organizing ideas and understanding the text. Reading comprehension is the brain's ability to grasp the meaning of large issues, enabling individuals to understand and explore social phenomena within reading texts. Ahmadi (2013:12) stated that "reading comprehension is a process of understanding a text, exploring the meaning, purpose, and message conveyed in a text.". For good reading comprehension, it is important for readers to be able to critically analyze and evaluate what they read. So to fully understand what we read, we must use a combi-

nation of text and readers. Therefore, reading comprehension is an activity of understanding the content of reading material.

Moreover, Rassaei (2015) stated that reading comprehension is the process of extracting and constructing meaning from written language through participation and engagement with it. According to Olviyanti, Marbun, and Arifin (2015), there are five characteristics of reading comprehension that help students comprehend a text effectively: main ideas, detailed information, vocabulary in context, references, and conclusions.

Salah (2018) asserted that secondary stage students often lack essential reading comprehension skills. For instance, they may struggle with identifying the main idea of a text, understanding the author's purpose or organizational pattern, determining the most suitable title for a passage, summarizing the text, recognizing the meanings of unfamiliar words, and identifying details, information, and referents. These challenges may arise due to the use of traditional teaching methods by teachers.

To develop reading comprehension, there are various methods and strategies, one of them is infographics. This is the interest of the current study. Infographics technology has emerged in a variety of designs in an attempt to provide new visual formats for presenting information with attractive images and for transmitting data to students. Infographic design is important because "it changes the way we think about the complex data and information changes that infographic technology supports." (Shaltout, 2014, 47).

The role of technology in the field of education is classified into four roles: it is concluded as a part of the curriculum, as an educational system, as a means of aiding education and as a tool to enhance the overall learning process. Thanks to technology; education has evolved from passive and reactive to interactive and creative. Technology makes our work much easier and less time consuming. The effect of technology can be felt in all possible fields. Infographics are now widely used in various fields. The use of this visual form has increased significantly in professional communication and social networks such as Pinterest, Facebook and Twitter (Toth, 2013).

In scientific communication, infographics are used to describe experiments, explore datasets, communicate results and share knowledge in more summarized and visually attractive ways (Saunders et al., 2017; Scott et al., 2017). So, in education, infographics can be used to promote active learning and involve learners in creating a wider variety of learning artefacts

and also ease the learning process through interaction and creativity. Infographics is a technical term for turning complex information and data into pictures. It has many names such as: Graphic information, visualization, data visualization, information design, information architecture, (Smiciklas, 2012 & Polman, Gebre, 2015).

Al-Haddad (2018) showed different types of infographics: “Static Infographics” that includes a print version, and three types of digital versions. Some of these types include animation as GIF format. The other type “Motion Infographics” or “Motion Infographic Videos”, abbreviated (MI), it includes moving visuals and graphics. The motion of the content helps simplify complex information, making it faster and easier understanding by the viewer. This kind of infographics is characterized by features including sound effects. The information presented in MI flows in a logical sequence of events similar to storytelling.

1.2. Context of the problem

As a teacher of English for ten years, it was observed that there was a lack in EFL reading comprehension skills for secondary school students. Furthermore, reviewing previous studies related to EFL reading comprehension skills, confirmed that there are serious problems in EFL reading comprehension skills. Examples of these studies are the studies of Ali (2011), Abdeldayem (2016), Algazar (2016), Khaleel (2016), Abu El fadle (2017), Salah (2018). El-behery (2019), Nageeb (2019), Seif (2019), Eissa (2020), Hammad (2020).

To document the study problem, a pilot study was conducted to discover the difficulties which secondary school students face in EFL reading comprehension skills. It consisted of an English reading comprehension test. The researcher administrated the test to a group of second year, secondary school students to measure some of their reading comprehension inferential skills' level at Secondary School in Sadat City, Menofia Governorate. The results of the pilot study provided additional evidence that the students have a problem with their reading comprehension skills (Literal, Inferential, critical and Evaluative skills) in general and Inferential reading comprehension skills (Drawing inferences and conclusions, Interpreting the figurative language, Rearranging ideas discussed in the text, Predicting, Summarizing, Guessing meaning from context and Meaning mapping) in particular. This could be due to a lack of opportunities to learn those skills in the classrooms.

1.3. Statement of the problem

The problem of the current study was demonstrated in the weakness of secondary school students in their EFL Inferential reading comprehension skills. The researcher found that stu-

dents had some inferential reading comprehension problems. That is why the current research attempted to investigate educational infographics program and its effect on developing second year secondary stage students ' inferential reading comprehension skills.

1.4. Questions

The present study was an attempt to answer the following questions:-

1. What are the EFL inferential reading comprehension skills required for secondary stage students ?
2. To what extent do second year, secondary stage students master such skills ?
3. What is the effectiveness of a program based on educational infographics in developing EFL inferential reading comprehension skills for secondary school students ?

1.5. Research Hypothesis

The researcher benefited a lot from the previous studies in forming the study hypotheses. They were as follows:

1. There is a statistically significant difference at the (0.01) level between the mean scores of control and the experimental groups on overall EFL reading comprehension skills post-test in favor of the experimental group.
2. There is a statistically significant difference at the (0.01) level between the mean scores of control and the experimental groups on each of EFL inferential reading comprehension skills in favor of the experimental group.

1.6. Significance of the Study

The current study is useful for the students, teachers, curriculum designers and researchers as follows:

1.6.1. For EFL Students

The study could enhance students' :

1. EFL inferential reading comprehension skills.
2. Interaction by using effective learning methods which depend on visual figures and motion infographics.

1.6.2. For EFL Teachers

It provides them with a new effective method in teaching inferential reading comprehension skills, namely educational infographic that enables them to develop and enhance their students' inferential reading comprehension skills.

1.6.3. For EFL Curriculum Designers

It could draw their attention to the importance of using educational infographics in learning and teaching EFL skills in general and EFL inferential reading comprehension skills in particular.

1.6.4. For Researchers

The results of this study can be used as a starting point for the researchers to gain insight and make use of infographics in their future research to develop students' skills.

1.7. Procedures of study:

To conduct the present study, the following steps were taken:

1. Reviewing the literature and previous studies related to EFL inferential comprehension skills.
2. Preparing the tools and materials of the study. The tools included a pre- post test to measure students' EFL inferential comprehension skills.
3. Submitting the pre- post test to a jury
4. Modifying the pre- post test validity and reliability according to the jury's opinion.
5. Selecting the participants of the study at random and putting them in one group (a study group).
6. Conducting the experiment where the study group students were taught using a program based on educational infographics.
7. Treating data statistically and interpreting the result.
8. Providing recommendations for further research.

1.8. Delimitations of the study

The present study was delimited to:-

- A group of sixty-four second year secondary school students New girls' secondary school.
- Some EFL reading comprehension skills namely (Inferential comprehension skills).
- The second semester of the academic year (2022-2023).

1.9. Study Variables

- The independent variable: A program based on educational infographics.
- The dependent variable: The EFL reading comprehension inferential skills.

1.10. Instruments and materials of the study

In order to fulfill the aim of the present study, the researcher prepared and used the following instruments:

- 1- An EFL inferential reading comprehension skills checklist.
- 2- An EFL inferential reading comprehension skills test.
- 3- A teacher's guide based program.

1.11. Definitions of Terms

1.11.1. EFL Inferential Comprehension Skills:

Inferential comprehension is the ability to process written information and understand the underlying meaning of the text. This information is then used to infer or determine deeper meaning that is not explicitly stated. Inferential comprehension requires readers (Duggan, 2009; Sheng, 2000; El-Hadad, 2012).

Delgado et al. (2018) and Smith et al. (2021) defined reading comprehension as a process in which the reader has to decide on linguistic symbols and reconstruct them up to a meaningful whole intended by the writer. Additionally, Reading comprehension is a term referring to reading skills the important thing is not the pronouncing or load reading, but it is the understanding taken into consideration.

1.11.2. Infographics:

Smiciklas (2012:14) pointed out that the term “infographic” is derived from the words ‘information graphic,’ which refers to pictures that merge graphic design with a collection of data to convey messages to the audience in brevity and establish good communication with them.

Babu (2015:16) defined infographics as "a provider of information in a desirable way as well as to introduce tremendous amount of information with effectively and efficiency and this happen by reducing the contents of whole information or data". The main aspect that distinguishes infographics from other visual media, such as photographs, is the specific practical manner that employs maps, symbols, videos, and technical documents to deliver information in a clear and simple manner.

Yıldırım (2016) stated that infographics is the ability to attach multimedia sources with visualized information such as related audios and videos and it can reflect the flexibility to modify visualized information in alternative forms.

Review of Literature

2.1.1 Nature of reading

Reading, writing, listening, and speaking are the four fundamental skills of English, just like any other language. One of the four basic skills of the English language, reading, has emerged as the most crucial skill in the learning process because it reveals the students' ability to comprehend a text or material. Mortini (2021) asserted that Students will not be able to master the other language skills without reading. Reading is the only way to gain new information and improve their knowledge. The most important object in reading is text and it is one of the important skills in learning English besides speaking, listening, and writing..

Reading is the process to gain knowledge by which individuals are taught to derive meaning from text. Reading has an important role in language skill mastery (Jang et al.2015; Palacios & Kibler, 2016). Also, Keyser (2015) confirmed that reading is an important skill that qualifies people to acquire the knowledge and experiences of others. It is a means of language acquisition, communication, and sharing information and ideas. It helps people to develop their characters, activate their minds, enrich their thoughts and widen their vision.

It is also the process to comprehend and obtain knowledge. Reading is an active process that requires an excellent idea of practice and skill. In reading, there is an interaction between the reader and the text. In this process, the meanings are conveyed by the writer and the readers are not still the same, which may be different from the other reader reading in the exact text (Tompkins, 2011).

In addition, reading helps students read different printed materials, such as periodicals, newspapers, fiction, or nonfiction books that can provide us with knowledge, pleasure, and

solutions to problems. Along with listening, speaking, and writing, reading was an important method in students learning and teaching English because reading can help students learn and understand the material better when learning English (Seidenberg (2017).

Reading skills is essential to understanding a text. Comprehension is the main object of reading. Comprehension is simply defined as the ability to understand certain information. Student need to comprehend the text that they read in order to get the meaning of the text. Students can not get the information of the message of the text without comprehending the text properly. Comprehension is the process of simultaneously extracting and constructing meaning through interaction and involvement with written language (Castles et al., 2018; Brevik et al., 2019). Extracting and constructing emphasizes both the importance and the insufficiency of the text as a determinant of reading comprehension.

Reading cannot be separated from comprehension. Comprehension in reading means understanding what is being read. In order to understand the messages of the author, readers should have the ability to read with comprehension. Both of students and teachers value reading comprehension greatly as it increases the process of language acquisition and helps students to read for different purposes. The most successful readers are those who use cognitive strategies to comprehend the text better. Reading comprehension is the process in which the reader has to decide on linguistic symbols and reconstruct them up to a meaningful whole intended by the writer (Delgado et al., 2018; Smith et al., 2021).

Students' reading comprehension and their ability to draw conclusions from both academic and non-academic sources must be improved if they are to be given the tools they need to have goals and take actions. In order to measure and improve students' reading comprehension, educators and instructors constantly try to do so. Academics are researching the various aspects of and methods for enhancing reading comprehension because it is an internal and thus invisible activity (Mulyaningtyas and Setyawan, 2021).

Reading comprehension is the outcome of effective reading (Pourhosein Gilakjani & Sabouri, 2016). Through reading, individuals can comprehend ideas elucidated by the writer, allowing them to acquire information from the written message. To achieve comprehension, students must grasp cognitive skills such as attention, memorization, processing speed, and visualization (Kendeou et al., 2011; Calet et al., 2020). Furthermore, proficiency in reading

demands a solid foundation in grammar and vocabulary. Hence, teachers are required to demonstrate creativity in imparting reading skills.

The lack of excitement among students in reading comprehension courses is a challenge for lecturers in developing more engaging teaching practices. To do this, teachers must be creative in their teaching and well-prepared with the material to be presented. Furthermore, the learning practices of students who show a high level of interest an accomplishment in reading courses should be investigated more extensively so that they can be employed as references and motivations for other readers who are less motivated to read. For this reason, the researchers focus on the students who are interested in the Reading Comprehension course to investigate the strategy they used (Kendeou et al., 2011; Calet et al., 2020).

According to Engel (2014), there are four important components of reading including word level process, prior knowledge, motivation, attitude and reading skills. Each component may be strengthened in a variety of ways by adding pictures and animations to the text, for example, can assist with word acquisition, and employing technologies can enhance with reading interest. Despite its significance, reading is one of the most difficult subjects in the classroom setting.

Azmuddin et. al (2020) pointed out that reading comprehension is the ability to understand a reading well and can summarize it. Reading comprehension skills is the students' ability to conclude and understand the content and main ideas for reading correctly. The goals of reading for the student are to 1) determine the main idea, sentence, paragraph, or discourse; 2) determine core points; 3) understand the flow and instructions; 4) determine the organization of reading materials; 5) determine visual images and other images of reading; 6) conclude; 7) predict meaning and conclusion; 8) summarizing the discourse read; 9) distinguish between facts and opinions, and 10) get information from various sources, such as encyclopedias, atlases, maps, or digital annotation tools.

2.1.2. The Component Model of Reading

The literacy performance of students in the classroom is affected not only by cognitive factors, but also by environmental and psychological factors (e.g., Berninger, Dunn, Lin, & Shimada, 2004; Dudley-Marling, 2004). The component model of reading (CMR) is broadly conceptualized and takes this fact into account. Components that have an influence on the acquisition of literacy skills are organized into three domains and constitute the component model of reading.

The three domains of the CMR are (a) the cognitive domain, (b) the psychological domain, and (c) the ecological domain. The *cognitive domain* of the CMR has two components: word recognition and comprehension. The psychological domain includes components such as motivation and interest, locus of control, learned helplessness, learning styles, teacher expectation, and gender differences. The ecological domain includes the components of home environment and culture, parental involvement, classroom environment, dialect, and speaking English as a foreign language.

It should be added that the components of the cognitive domain satisfy the condition of independence quite well, whereas the components of the psychological and ecological domains do not meet this requirement nearly as effectively. The significance of these psychological and environmental factors has long been recognized by educators and has also been empirically documented (Berninger et al., 2004; Dudley-Marling, 2004).

2.1.3. The Importance of Reading Comprehension

Reading comprehension is one of the necessary tasks and activities that done in every language classroom for a number of reasons:

1. It functions as a mean of increasing students' knowledge of the language being learnt (Behjat, 2011).
2. It gives the enormous contribution to learners to perform their communication skills better (Afida, 2008).
3. It is one of the most frequently used language skills in daily life, as witnessed by the use of the internet (Medina, 2012).
4. It helps students to build meaning by focusing on the relevant features of the texts and to relate those features to their previous experiences.

The researcher sees that reading comprehension plays an extremely vital role in any language that people should acquire, as it is the tool of communication, enjoyment and pleasure. In addition, it has a social value where the human cultural and social heritage move from one generation to another and from one person to another through written text. Thus, Reading comprehension is necessary in the daily life such as understanding and involving with current events introduced in written forms like news and reports.

Comprehension occurs when words on a page are not just mere words but thoughts and ideas. Comprehension makes reading enjoyable, fun, and informative. It is needed to succeed

in school, work, and life in general. Reading is fundamental in helping us find and convey information. It is an essential skill that is developed at a very young age.

Reading comprehension is very important for everyone who wants to enlarge their knowledge and information about new things. Sometimes some students find it difficult to understand the texts they have read so that they get nothing out of the text especially nowadays most students use technology but are not exploited as best they can. So the teachers should pay more attention to the problem. Based on the understanding is reasonable from the text.

To address the reading comprehension challenges faced by students, teachers must adopt creative approaches that inspire them to read English literature. To this end, teachers need to create a conducive and fun environment in the classroom that can motivate students (Bai & Wang, 2020; Cho et al., 2019). Teachers have been using various reading and skimming strategies to improve students' reading abilities (Brevik, 2019; Bruen, 2020). However, improving reading abilities is not sufficient, as students must be able to connect with the text and recall the information they have learned (Cirino et al., 2017; Crosson & Lesaux, 2010). In this regard, the use of innovative teaching tools can be beneficial.

2.1.4. Purposes for Reading Comprehension

Readers have different reasons for reading, it depends on their interests and the requirements of the contexts where they perform and interact. Regarding this, reading surrounds our actions. Every day, students are exposed to reading tasks that satisfy different kind of purpose, for example: as reading the instructions for taking a medication, until reading a contract or reading an article to respond to an academic task. Grabe (2002) classified the purposes of reading as follows:

a- Reading to search information (scanning and skimming):

When we read to search, we typically scan the text for a specific word, or a specific piece of information, and skimming for a rapid understanding of the text.

b - Reading to skim quickly :

It can be used to comprehend the gist or main idea of a text, for example, Reading newspaper to get the most important news of the day, or when we read magazines to identify the articles of our interest.

c- Reading to learn from texts:

It is carried out in academic and professional contexts where the reader needs to process more information, connect his previous knowledge with the information of the text and infer hidden or unclear information in texts.

d- Reading to integrate information and critique texts:

It requires readers to develop skills such as decision making, composing, selecting complementary information in order to achieve this objective.

e- Reading for general comprehension

Although it is considered the most common of reading purposes, it is not as easy as it is supposed. The reader requires skills to represent the main ideas of a text and fast and automatic word processing.

2.1.5. The EFL Reading Comprehension Levels

According to Brown (2004) stated that there are four levels of comprehension. They are literal comprehension, interpretative comprehension, critical comprehension and creative comprehension. .

1- Literal Comprehension

Literal comprehension included the process to take in ideas or understanding the ideas and information explicitly in the passage. The basic of literal comprehension is recognizing stated main ideas, detail, caused, effect and sequence. Mastering of the basic literal comprehension can be done through understanding the vocabulary. Sentence meaning and paragraph meaning. The literal level is the easiest level of reading comprehension because a reader is not required to go beyond what is said.

2- Interpretative Comprehension :

Interpretative comprehension refers to the ability to go beyond what is stated directly, to understand what the writer means by looking for the inside meaning. Readers identify and derive ideas and meaning from a text they are explicitly stated. It can be said that interpretative comprehension the ability to get inference or implied meaning from the text, understanding of ideas and information not explicitly in the passage.

3- Critical Comprehension :

Critical comprehension is the ability to make analysis, evaluation and personally reacting about the ideas of information the writer offers in a passage. The critical comprehension must be an active read-

er, questioning, searching for the fact, and suspending judgment until students considered all of the materials.

4- Creative Comprehension:

Creative comprehension refers to the ability of the reader to use his/her imagination when reading the passage. Skill for creative reading comprehension includes the understanding cause effect relationship on a story solving a problem and producing the creation

Syaveny (2017) stated that different Levels of reading comprehension are distinguished according to the readers" purposes and type of reading that they use, that commonly referred to:

a) Literal Comprehension

literal reading is reading the specific words printed on a page. This is unfortunately the type of reading widely use in most learning situations. Literal reading it refers to the ideas and fact that is directly stated on the printed pages. It also the skill of getting the primary direct literal meaning of a word, ideas, or sentences in context. The basic of literal comprehension are recognizing the stated main ideas, details, cause and effect and sequences. This level of comprehension is fundamental to all reading skills at any levels because a reader must first understand what the author said before he can draw an inference or make an evaluation.

b) Inferential Meaning

Inferential meaning involves determining what the text means. You start with the stated information. This information is then used to determine deeper meaning that is not explicitly stated. Determining inferential meaning requires you to think about the text and draw a conclusion.

c) Evaluative Meaning

Evaluative meaning is what the text is telling us about the world outside the story. Readers must analyze what they have read. Then, they must form an opinion based on the information. The conclusion of the material from reading comprehension is Importance or everyone who wants to enlarge their knowledge and information and the reader must also be intentional and thoughtful while reading, monitoring the words and their meaning as reading progresses.

Furthermore, Weih (2018) presented four levels of reading comprehension: literal, inferential, application, and evaluation .

1. Literal level:

In this level, students grasp the direct denotation of a reading text. It is related to the direct and easy questions and in the literal level of reading comprehension, teachers may ask; what did the writer say? It means that students or readers can remember the needed information to answer such a question without understanding the deep meaning of a paragraph. Teachers can also ask their students to read the reading texts for facts, numbers, and dates. Students may memorize such numbers. However, students do not know the real inference of such facts, in case they are out of that text. The reading subskills in the literal level are predicting, scanning, determining the general ideas of a text, extracting specific information from a menu, advertisement, calendar, schedule, tickets...etc.).

2. Inferential level:

At this level, students understand the writer's message that he wants to convey through the text. In this regard, in the interpretive level, students are expected to answer what is meant by what is said. Students are also ready to explain the implication and indication of the numbers and facts which they have already memorized in the literal level.

3. Application-level:

At this level, students can understand and grasp the data included in the text and relate it to other situations. In other words, the students analyze or synthesize the given information.

4. Evaluation level:

It means to read what is beyond the lines. In other words, students can classify knowledge and information in a text into facts and opinions. Additionally, in this level students are expected to judge the logic of the text. It is worth mentioning that the critical level occurs in two stages i.e. understanding what is the reading text implies. Here, it is divided into three sections; what a text says (restatement), what a text does (description) and what a text means (interpretation).

2.2.1. Nature of Infographics

Infographic technology is, indeed, one of the information presentation tools as it empowers users to display required information in an organized way as well as its delivery using different visual stimuli. Infographic is abbreviation form of information and graphics. It means that the information has been presented in graphs form. The infographics or information graphics is a visual representation of information, data or knowledge. In infographics, mark, a symbol or visual element typically stand for quatitative information, data or knowledge. Color, size, and shape usually provide the qualitative aspect. Infographic uses text as labels and for short explanations to make the data useful. Think of charts, diagrams, graphs, map, timelines and modern visualizations that are not yet named. (Richard and Richard Schimdt, 2010).

According to Alrwele (2017), the infographics as the form of the combination of two words, namely, “info” is the shortest word for information and “graphics.” It means that, an infographic is a set of information, text that combined with visual representation to convey a short message in an attractive and understandable manner. Furthermore, the infographic media can combine data and design to convey knowledge to the viewer or reader clearly and understandably. It clear that infographic have an easiness to use and understand.

As stated by Matrix and Hodson (2014) an infographic is created using graphic design software, and uses pie charts, icons, decorative fonts, diagrams to illustrate information and statistics – creating a visual narrative. Similar to a traditional research essay, an infographic assignment challenges students to visually communicate a thesis, supported by citations and statistics sourced from the scholarly literature and the popular press. Rather than present this position in a text-based format, students must design an information visualization to illustrate their argument, using computer software or using online design tools to semi-automate the process.

According to Krum (2013), the infographic is a commonly used visual technology for displaying information in a believable manner, allowing for easier comparison of provided data and more clear information presentations. In other terms, an infographic is a visual depiction of complicated concepts and facts that are used to enhance their transmission to a target audience in an efficient and understandable manner. Notably, the infographic is known by a variety of terms, including, but not limited to, visual representation, data visual representation, information design, and information engineering.

Ferreira (2014:12) reported that "an infographic or information graphics is a type of picture that elaborates data with a design that can help individuals and organizations concisely communicate messages to their audience". Infographics is one of the types of media that mixing the data and text with design, helps people and organizations to concisely tell the message to their audiences. Siricharoen (2015) stated that infographics primarily focus on easy to view fonts, bold graphs, and simple charts; hence, technologies assist creators to visualize comprehensively; thereby, making the Infographics an effective aid for data representation. It facilitates the individual in the easy and effective communication of their message.

2.2.2. Benefits of Infographics

Dunlap & Lowenthal (2016) reported the following benefits of having students create infographics:

- Activates critical thinking skills
- Engages creativity
- Enhances long-term retention of information
- Offers practice with communication skills
- Requires summarization of critical course concepts
- Provides synthesis of newly acquired and long-term knowledge

Shanks et al (2017) found that using infographic assignment facilitate learning about accessing and translating data for college-age audiences in health education. It is supported by Smmiciklas (2012:11), who provided several benefits associated with infographics including:

- Improved comprehension of information, ideas, and concepts.
- Enhanced ability to think critically, develop, and organize ideas.
- Improved retention and recall of information.

According to Ozdamli et al. (2017:2), "learning by using infographics, provide a lot of data as a whole structure for individuals and thus, they create scheme in minds". They added that, infographics provide a much simpler and easier to understand information than having to read long texts. Students would also be more stimulated to read literary texts .

2.2.3. The Educational Uses of Infographics

Infographics are widely used by specialists of various branches of knowledge in their professional activities. Among these specialists are analysts, designers, journalists, political strategists, scientific workers, engineers, technicians, teachers, etc. Infographics change the way of thinking, allowing to quickly and effectively acquire information through capacious and short visual images. The term "instructional infographics" emerged in 2014, when reports and studies investigated the efficacy of infographics in an instructional context. Studies revealed that infographics could achieve a variety of instructional objectives.

Using infographics as educational resources enables students to analyze the material contents in a visual way from just reading it, thereby motivating them to begin discussions inside the classroom to make a virtual educational environment. However, infographics should not cancel out or replace academic articles, but are mainly supplementary or complementary learning instruments which encourage the students to effectively learn the course content. This finding was confirmed by Sudakov (2014) who showed that students responded positively to infographic availability at the beginning of a course material in experimental sciences. However, the response was not the same in the social sciences (Guzmán et al, 2015).

Johnson (2014) proposed five uses for infographics:

- a) Organizing ideas and coherent manners in a useful way;
- b) Illustrating biographical, scientific, art and design, historical, and social studies concepts in a visual way;
- c) Comparing information in an effective way.
- d) Making data meaningful by providing analogies, examples, and themes; plain data can be transformed into meaningful information.
- e) Telling a story to convey the ideas with visuals and words in an exciting way rather than using only words.

Method

Experimental procedures

1) Pre-testing

Before Implementing the program , The pretested students to ensure the participants homogeneity in their entry levels in reading comprehension inferential skills before treatment.

2) Treatment

The researcher taught the experimental group using a program based on educational infographics whereas the control group received regular instruction. The treatment lasted for 6 weeks (18 sessions) during the 2nd semester of the academic year 2022-2023

3) Post-testing

By the end of treatment, the researcher posttested both groups using the EFL inferential reading comprehension test. This was done to investigate the effectiveness of a program based on educational infographics in developing 2nd year secondary stage students' reading comprehension inferential skills.

The infographics based program

The components of the program were as follows:

Aims and objectives of the program

The program aimed to develop second-year secondary students' EFL inferential reading comprehension skills. By the end of the program sessions, the students will be able to:

- Draw inferences and conclusions
- Interpret the figurative language
- Rearrange ideas discussed in the text
- Predict the meaning
- Summarize the text
- Guess meaning from context

The content of the program

The program consisted of 18 sessions. The treatment lasted for 6 weeks in the second semester of the academic year 2022-2023. The researcher used to meet the experimental group students. The control group students received regular instruction. At the beginning of the pro-

gram, the objectives, importance and the characteristics of infographics were presented to the experimental group.

After the introductory session, the remaining instructional sessions were introduced to the students in the experimental group. At the beginning of each session, the students were informed about the role of the teacher, the role of the students, and the instructional materials. During each session, the researcher assigned the students some activities that aimed to help them practice and improve EFL inferential reading comprehension skills.

Activities and Techniques

The program techniques and activities were designed in the light of the program's aim and content. The researcher also reviewed the related previous studies and EFL inferential reading comprehension skills in order to benefit from the various activities that are used in this program. It is worth mentioning that researcher adopted a series of techniques and activities that suit secondary students.

Instructional media

The most important aid in the program is the infographic representation to develop the skills and improve interaction between students. Also, Power Point presentation, computers, Data show, internet connection, Chart paper, Smart Board, Student's Work Sheet and LCD, which were essential to save time. The researcher took the advantages of the infographic representation. It was an important issue to check the compatibility and the efficiency of the program components to ensure its effective role to develop the students' skills.

Evaluation

The researcher used formative as well as summative types of evaluation.

a. Formative Evaluation

At the end of each session one or more types of questions were used such as: completion items, true or false questions, multiple choice questions and open-ended questions. The researcher used formative evaluation and self-assessment. The role of the formative evaluation is to aid improvement of EFL inferential reading comprehension skills.

b. Summative Evaluation

It was conducted through the administration of EFL inferential reading comprehension skills Pre-post tests. Summative evaluation was also conducted at the end of the program to investigate the effectiveness of the program based on educational infographics in developing EFL inferential reading comprehension skills.

Results of the Study Hypothesis

4.1. Verifying the Main Hypothesis

The research hypothesis states that "There is a statistically significant difference at the 0.01 level between the mean scores of control and the experimental groups on the post measurement of the overall Reading Comprehension Test in favour the experimental group. By using t-test to compare the mean scores of the participants of experimental and control groups in the post administration of the overall reading comprehension test and determining the statistical significance of the difference between them. The results were as shown in the following table:

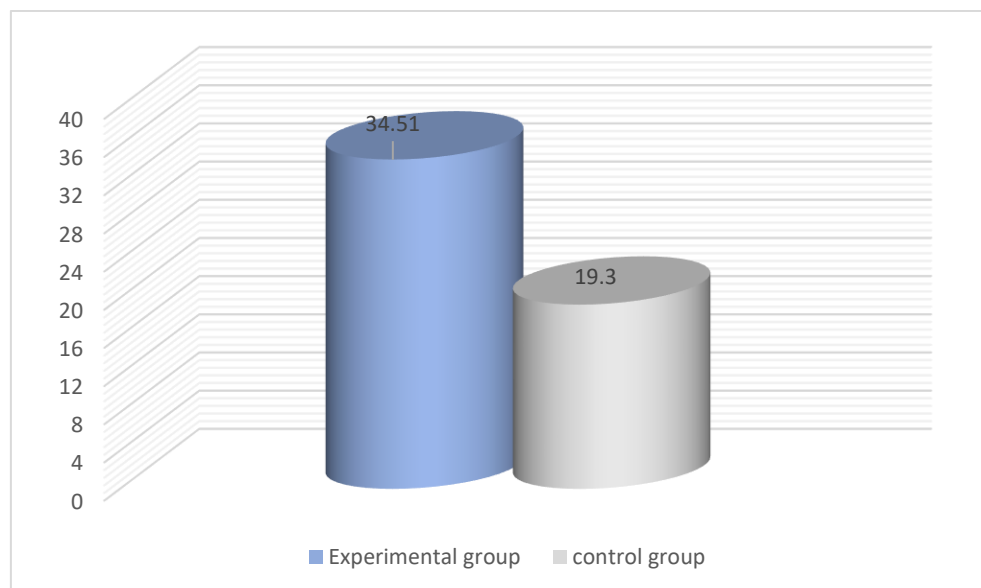
Table 1: t- test differences between the participants' mean scores in the post administration of the overall Reading Comprehension Test.

Group	No	Mean	S. D	D. F	t-value	Sig	Level of sig.
Control	47	19.3	1.94	93	37.11	sig.	0.01
Experimental	48	34.51	2.01				

* the tabular value of t-test at the level of (0.01) and 93 D.F is (2.62).

In light of the results of table 13, it is clear that the calculated t-value of is 37.11, exceeds its tabular value of 2.62 at the degree of freedom 93 with a level of statistical significance (0.01). These results indicate that there is a statistical difference between the mean scores of the research participants in the experimental and control groups, in the post administration of the overall Reading Comprehension Test in favor of the experimental group. This finding of the research can be clarified using the following graphical representation:

Figure 1: Participants' mean scores on the post-administration of overall Reading Comprehension Test.



Accordingly, it was confirmed that there was a statistically significant difference at the ($\alpha \leq 0.01$) level between the mean scores of the research participants of the experimental group that was taught using the Program based on Educational Infographics and the control group that received regular instruction in the post-administration of the overall Reading Comprehension Test in favour of the experimental group.

In order to calculate the effect size of the Program Based on Educational Infographic to develop secondary students' Reading Comprehension. The statistical significance alone was not sufficient to determine the importance of the research. Thus, the practical significance and the educational importance of the research results was clarified by determining the value of the ETA squared and its significance and the value of the effect size and its significance. The results are illustrated as follows:

Table 2: The effect size of the Program Based on Educational Infographics to develop overall Reading Comprehension.

Group	D. F	t-value	Sig.	η ² value	Effect size
Control				value	Sig. Value Level
Experimental	93	37.11	0.01	0.94	Sig. 7.70 Large

Based on the results, it becomes clear that the value of the ETA square for the results of the participants of the experimental groups in the overall Reading Comprehension Test exceeds the value indicating the educational importance of the statistical results in educational and psychological research. This indicates the large effect of the program based on educational Infographics on developing reading comprehension.

Further, The effect size also reached (7.70), which is a large level of influence, as the size of the effect is considered large if its value is greater than or equal to (0.8), thereby indicating the practical and educational significance of the results of the research and the large effect of the independent variables on the development of the dependent variable.

Thus, teaching through the Program Based on Educational Infographic to Enhance Reading Comprehension for secondary stage students had a large effective. The results of the research hypothesis are consistent with results of previous studies, which are concerned with the development of Reading Comprehension, among those studies are the studies of Baron (2013), Rodriguez (2014), Yunitasari (2015), unitasari's (2015), Tiala's (2017), Locher (2020) and Saavedra (2021).

4.2. Verifying the sub- hypothesis:

The research hypothesis states that "There is a statistically significant difference at the 0.01 level between the mean scores of control and the experimental groups on each of reading comprehension Inferential skills: By using t-test to compare the mean scores of the participants of two independent groups (experimental and control) in the post administration of the Reading Comprehension (Inferential comprehension skills) test and determining the statistical significance of the difference between them, the results were shown in the following table:

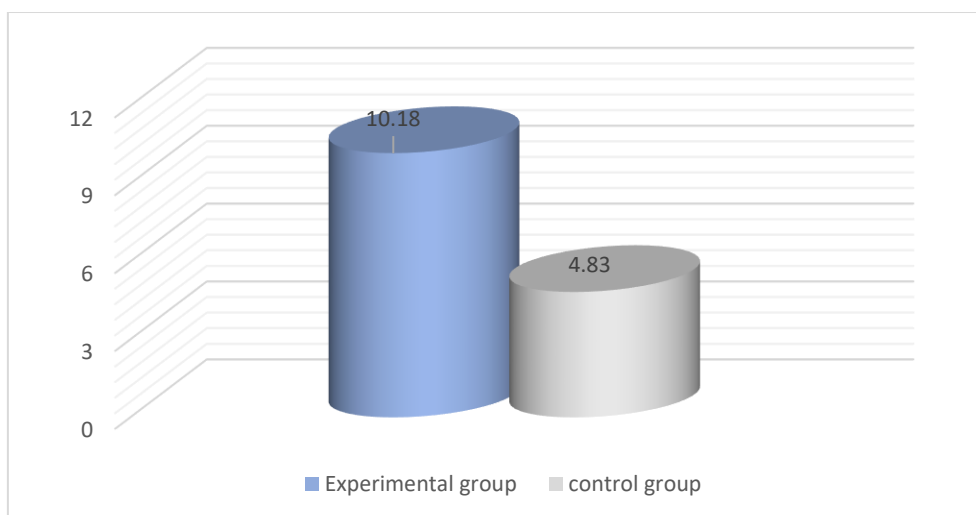
Table 3: t- test differences between the participants' mean scores in the post administration of the Reading Comprehension (Inferential comprehension skills) Test.

Group	No	Mean	S. D	D. F	t-value	Sig	Level of sig.
Control	47	4.83	1.5	93	18.39	sig.	0.01
Experimental	48	10.18	1.3				

* the tabular value of t-test at the level of (0.01) and 93 D.F is (2.62).

In light of the results of table 17, it is clear that the calculated t-value of is 18.39, exceeds its tabular value of 2.62 at the degree of freedom 93 with a level of statistical significance (0.01). These results indicate that there is a real difference between the mean scores of the research participants in the experimental and control groups, in the post administration of the Reading Comprehension (Inferential comprehension skills) Test in favor of the experimental group. These results can be clarified using the following graphical representation:

Figure 2: The graphical representation of the research participants' mean scores on the post-administration of the Reading Comprehension (Inferential comprehension skills) test.



Accordingly, it was confirmed that there was a statistically significant difference at the ($\alpha \leq 0.01$) level between the mean scores of the research participants of the experimental group that was taught using the Program Based on Educational Infographics and the control group that received regular instruction in the post-administration of the Reading Comprehension test.

sion (Inferential comprehension skills) test in favour of the experimental group and The percentage of improvement in performance is estimated at 44.58 %.

In order to calculate the effect size of the Program Based on Educational Infographic to develop Reading Comprehension (Inferential comprehension skills) for secondary school students. The statistical significance alone was not sufficient to determine the importance of the research. Thus, the practical significance and the educational importance of the research results was clarified by determining the value of the ETA squared and its significance and the value of the effect size and its significance, in order to determine the contribution of the independent variables in the development of the dependent variable while isolating the influence of other extraneous variables from the results of the experiment. The results are illustrated as follows:

Table 4: The effect size of the Program Based on Educational Infographics to develop Reading Comprehension (Inferential comprehension skills).

Group	D. F	t-value	Sig.	η ² value	Effect size
Control				value	Sig. Value level
Experimental	93	18.39	0.01	0.78	Sig. 3.81 Large

Based on the results, it becomes clear that the value of the ETA square for the results of the participants of the experimental groups in the Reading Comprehension (2: Inferential comprehension skills) Test exceeds the value indicating the educational importance of the statistical results in educational and psychological research. This indicates the large effect of a program based on educational infographics on developing reading comprehension (2: Inferential comprehension skills).

Further, The effect size also reached (3.81), which is a large (high) level of influence, as the size of the effect is considered large if its value is greater than or equal to (0.8), thereby indicating the practical and educational significance of the results of the research and the large effect of the independent variables on the development of the dependent variable.

Thus, teaching through a Program Based on Educational Infographics to enhance Reading Comprehension (Inferential comprehension skills) for secondary school students had a large effect. The results of the research hypothesis are consistent with results of previous studies, which are concerned with the development of Reading Comprehension (Inferential comprehension skills).

Discussion of Results:

The results of the study on the EFL inferential reading comprehension post-test showed that the infographic had a large effect on developing the experimental group students' reading comprehension inferential skills. The results revealed that there was a significant difference between the experimental and the control groups' mean scores in the post-test of the EFL inferential reading comprehension skills in favor of the experimental group.

Using Infographics encouraged the students to read and understand at the various inferential reading comprehension levels. They were provided with plenty of opportunities that enhanced self-esteem and interaction among them. In addition, Infographics, created an excellent environment that helped students enhance and develop their EFL inferential reading comprehension skills. Infographics also created a more-student-centered environment reading class where students practice inferential reading comprehension individually and in groups. Cooperative learning helped them work together and benefit from each other. They could confer and discuss their inferential reading comprehension tasks and activities.

The students of the experimental group exhibited improvement. They improved in each of reading comprehension inferential skills. Such improvement and development are due to using educational infographics. Encouragement and positive feedback on the part of the researcher helped the students read without any fear. They asked each other and revised each others' work. The teacher tolerated their minor mistakes and was supportive all the time. This helped students become interested and engaged in EFL reading classes.

Recommendations

Based on the results and conclusions of the current study, The following recommendations were presented:

- 1- Paying attention to developing students' reading comprehension skills through the use of infographics.

- 2- EFL teachers should pay more attention to technological innovation in response to the recent technological revolution.
- 3- Preparing training courses and workshops for English teachers to learn how to use infographics in planning and teaching in EFL classes.
- 4- Replacing regular teaching methods with more interactive methods that focus on active student participation in the learning process. Interactive methods that focus on active student participation are important.
- 5- EFL reading comprehension should get more attention in EFL classes.
- 6-Turning from a teacher dominating the classroom to a teacher who organizes, supports, guides, coordinates and assists students in EFL teaching and learning.
- 7- Rearranging and reorganizing secondary English text books according to educational infographics as it is interesting and appealing.
- 8- Creating a good atmosphere to help students learn and improve their educational and life skills.
- 9- Curriculum planners should provide more opportunities to use educational infographics and promote positive attitudes towards English language learning.
- 10 - Supervisors should provide teachers with educational materials that help them understand infographics and the importance of using them when teaching reading comprehension skills.

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