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*The Effect of a Program Based on Thinking Maps on
Developing EFL Learners' Reading Comprehension
Skills and their Attitudes Towards Reading*

BY

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Abstract

The purpose of this study was to investigate the effect of a program based on Thinking Maps on developing English language reading comprehension skills for first year college level students in the Integrated Technical Education Cluster at Al Ameeria (ITEC) and their attitude towards reading in general. The participants of the study consisted of 60 students who were equally divided into two groups; one experimental group and one control group. The two groups pre posttest quasi- experimental design was used. The instruments of the study included a checklist of reading comprehension skills, a pre post reading comprehension test and a scale to measure students' attitude towards reading. The reading comprehension test and the reading attitude scale were administered to both groups before and after the period of instruction, respectively. The findings of the study revealed that the Thinking Maps based program significantly developed students' English reading comprehension skills and their attitude towards reading when compared to the regular classroom experience.

Key words: Thinking Maps, Reading Comprehension Skills, Reading Attitude Scale

فاعلية برنامج قائم على خرائط التفكيرى تنمية مهارات الفهم القرائى والاتجاه نحو القراءة لدى الطلاب الدارسين للغة الانجليزية كلغة اجنبية

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المستخلص

هدفت هذه الدراسة الى التحقق من فاعلية برنامج قائم على خرائط التفكير فى تنمية مهارات الفهم القرائى والاتجاه نحو القراءة لدى طلاب الفرقة الاولى الجامعية بمجمع التعليم التكنولوجى المتكامل بالاميرية. تضمنت عينة الدراسة عدد ٥٠ طالب وطالبة. تم تقسيم العينة الى مجموعة تجريبية (٢٥ طالبا) ومجموعة ضابطة (٢٥ طالبا). استخدم الباحث المنهج شبه التجريبي (التصميم القبلى - البعدى) فى هذه الدراسة وذلك عن طريق قياس قبلى وبعدي لكل من المجموعتين التجريبية والضابطة. واشتملت ادوات الدراسة على قائمة بمهارات الفهم القرائى واختبار فهم قرائى ومقياس اتجاه نحو القراءة. تم تطبيق اختبار الفهم القرائى والمقياس نحو القراءة قبلها على المجموعتين ثم طبق البرنامج القائم على خرائط التفكير على المجموعة التجريبية بينما درست المجموعة الضابطة بالطرق المعتادة ثم طبقت ادوات الدراسة بعديا على المجموعة التجريبية والضابطة للتحقق من فاعلية البرنامج . اظهرت نتائج البحث فاعلية البرنامج وتحققت فروض الدراسة مما يعنى ان البرنامج القائم على خرائط التفكير ادى الى تنمية مهارات الفهم القرائى والاتجاه نحو القراءة لدى طلاب المجموعة التجريبية.

الكلمات الافتتاحية: خرائط التفكير، مهارات الفهم القرائى ، مقياس الاتجاه نحو

القراءة

I. Introduction

Reading is very essential and crucial for learning in general and language learning in particular (Collins & Collins, 2002; Nurhana, 2014). Through reading, learners can build their own vocabulary, improve and enhance language learning skills, fostering their thinking abilities and make lifelong learning easier (McShane, 2005). Moreover, reading is essential to achieve academic success in both schools and universities. It is also a useful source of information and can speed up foreign or second language learning and improve other language skills and aspects such as writing, vocabulary, and spelling. In other words, academic success, personal independence and employment depend in one way or another on reading. Thus, reading is the foundation for learning and academic achievement (Hussein, 2007; Calhoon, 2005; Marzano, 2003 and Paris, 2005).

The main goal of reading is stated to be comprehension. Without it, students could not grasp meaning from the text (Block & Pressley, 2002). Moreover, reading comprehension skills allow students to read proficiently, learn effectively and conceptualize; a process that should start from earlier stages which is effectively achieved when students have the ability to make connections between their prior knowledge and the new information encountered in the text (Grabe & Stoller, 2002).

Therefore, enhancing reading comprehension through effective instruction has been a major concern for researchers and educators (Pressley, 2000). However, research has indicated that there is a lack of effective reading comprehension instruction in the classrooms. While comprehension is continuously assessed, little time is devoted to effective instruction that enhances reading comprehension (Russell, 2010). Therefore, both researchers and educators have confirmed that it is necessary to provide students with instruction that seeks to help them develop their reading comprehension skills (Russell, 2010).

Many strategies have long been used to teach reading for better comprehension. Thinking Maps which is defined as a specific set of graphic organizers or visual teaching tools for “helping younger students with the process of building conceptual understanding of content and promoting achievement” (Abi-El-Mona & Adb-Khalick, 2008, p. 298), has been reported to positively affect students’ achievement (e.g.,

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Holzman, 2004; Leary, 1999; Lopez, 2011). Thinking Maps has also been proved to foster lifelong learning; provide learners with the skills to be “successful thinkers, problem solvers, and decision makers” (Hyerle, 2004, p. 2); and help them improve through interaction with other learners (Hyerle, 1993; Oakley, 2004).

Each Thinking Map correlates with a single thinking process and has a specific purpose to achieve, but they all support and enhance the learner’s recall of information through visualization (Alikhan, 2014; Hickie, 2006; Holzman, 2004; Hyerle, 1996; Hyerle & Yeager, 2000; Long & Carlson, 2011; Murbayan, 2015; Reubell, 1999; Weis, 2011). For instance, the circle map is used for brainstorming, the bubble map for description, the double bubble map for comparing and contrasting, the brace map for whole/part relationships, the flow map for sequencing events, the multi-flow for determining cause and effect, and the bridge map for comparing the ideas of the text. Moreover, research reports positive student attitudes towards, and perceptions of, the usability and usefulness of Thinking Maps (e.g., Madiri, 2008). These challenges draw the attention to the importance of using strategies like thinking maps to develop students’ learning, transfer thinking processes, integrate learning, and for continuously assess progress and to improve reading comprehension skills (Hyerle, 1995 & Edwards, 2010).

Based on what has been mentioned above, it is obvious that thinking maps may enhance and improve students’ learning in general and for the purpose of this study, the researcher attempted to investigate the effect of thinking maps on improving EFL Learners’ reading comprehension skills and their attitudes towards reading.

1.1 The context of the problem

As stated above, reading comprehension is very important to language learners in general and EFL learners in particular. Despite its importance, it still represents a challenge for EFL learners in Egypt. This is evident to the researcher from his pilot study in the form of classroom observation (four classes) to EFL learners who study English courses at Al Ameeria Integrated Technical Education Cluster where the researcher is currently working as a lecturer and curriculum developer.

Based on the researcher’s observation of EFL learners during their reading lessons, the following points were highly observed:

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- Most of the EFL learners have difficulty reading comprehendingly which may be attributed to the traditional instruction adopted by their language instructors which is mainly focusing on introducing the meaning of new or unknown vocabulary after asking students either to silently read the text and underline the words they do not know or asking them to read the text loudly and then introduce the meaning of the new or unknown words.
- Noticeable problems concerning students' reading comprehension skills were detected. Students were passively engaged in reading classes and their academic performance was weak.

Such observation and conclusion were supported by the pilot study conducted by the researcher in the form of a reading comprehension test administered on 30 students as a random sample of the first year college students who study English courses as a graduate requirement at Al Ameeria Integrated Technical Education Cluster. As the researcher designed a reading comprehension test that included 40 items and applied it to 30 students. The results of the test revealed that students have weaknesses in their reading comprehension skills as 70 % of the sample included in the pilot test did not pass the test and showed clear weaknesses in most of the reading comprehension skills that were included in the pilot test such as :

- Identifying the main idea of the text.
- Distinguishing between facts and opinions.
- Drawing conclusions.
- Making inferences.
- Comparing and contrasting.

Also, the researcher conducted an interview with five teachers who are teaching English for those students and asked them about students' attitude towards reading classes and their answers revealed that most students are not motivated and are not willing to be engaged in the reading process.

In light of the results of the pilot study, it becomes crystal clear that there is a strong need to develop those students' reading comprehension skills and their attitude towards reading in order to help

them do better in this skill and this is the main aim of the current study through using thinking maps.

1.2 The statement of the problem

The study problem could be identified in EFL college level students' poor mastery of the necessary EFL reading comprehension skills as well as their attitude towards reading which was partly attributed to the adopted traditional reading instruction methods. Hence, this study sought to find answers to the following main question:

How can a program based on thinking maps be designed to develop reading comprehension skills and attitudes towards reading for the integrated technical education cluster first year college students?

The following sub- questions were derived from the main question:

- 1- What are the EFL reading comprehension skills necessary for the integrated technical education cluster first year college students?
- 2- To what extent do Integrated Technical Education Cluster first year college students acquire these skills?
- 3- What are the theoretical bases of designing a program based on Thinking Maps to develop reading comprehension skills and attitude towards reading for Integrated Technical Education Cluster first year college students?
- 4- What are the components of a program based on Thinking Maps to develop reading comprehension skills and attitude towards reading for Integrated Technical Education Cluster first year college students?
- 5- How far is using the program based on Thinking Maps effective in developing Integrated Technical Education Cluster first year college students' reading comprehension skills?
- 6- How far is using the program based on Thinking Maps effective in developing Integrated Technical Education Cluster first year college students' attitudes towards reading?

1.3 Hypotheses of the study

Based on the discussion of literature and related studies, the following hypotheses were derived:

- 1- There would be a statistically significant difference between the mean scores of the experimental group students exposed to the thinking maps- based program and the control group students who received regular instruction on the post application of the overall reading comprehension test and in each reading comprehension sub- skill in favor of the experimental group.
- 2- There would be a statistically significant difference between the mean scores of the experimental group students on the pre and post application of the overall reading comprehension test in favor of the post application.
- 3- There would be a statistically significant difference between the mean scores of the control group and experimental group students on the post application of the overall reading attitude scale and in each dimension separately.
- 4- There would be a statistically significant difference between the mean scores of the experimental group students on the pre and post application of the overall reading attitude scale in favor of the post application.

1.4 Purpose of the study

The purposes of the study were twofold:

- 1- Investigating the effect of using a program based on thinking maps on developing EFL learners' reading comprehension skills.
- 2- Investigating the effect of using a program based on thinking maps on developing EFL learners' attitude towards reading.

1.5 Significance of the study

The significance of the study stems from the following considerations:

- 1- The study may be useful for EFL learners as it helps them improve their reading comprehension skills and attitudes towards reading.

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- 2- The reading comprehension skill checklist, the pre post reading comprehension test and the reading attitude scale might be beneficial to EFL researchers.
- 3- The study may be beneficial for EFL teachers as it provides them with information related to using new methods of teaching English reading comprehension skills represented in Thinking Maps.
- 4- The study may be of importance to curriculum developers and designers who are interested in incorporating Thinking Maps in EFL courses and textbooks.
- 5- The study might provide specialists with guidelines up on which further strategies may be used to develop English reading comprehension skills.

1.6 Delimitations of the study

Since it is beyond the limits of a single study to consider a wide range of factors, this study was delimited to:

- 1- A sample of first year college level students who study English as foreign language at Al Ameeria Integrated Technical Education Cluster in Cairo. 50 students were randomly chosen and assigned to be the experimental group and the control group of the study.
- 2- Some reading comprehension skills appropriate for first year college students at the Integrated Technical Education Cluster that include literal, inferential, critical and creative levels.
- 3- Eight thinking maps developed by Dr. David Hyerle which include Circle Map, Bubble Map, Double Map, Tree Map, Brace Map, Flow Map, Multi-Flow Map and The Bridge Map.
- 4- A limited duration for implementing the treatment (twelve weeks) in the first semester of the academic year 2019-2020.

1.7 Definitions of terms

1.7.1 Thinking maps

Thinking maps are defined as a language of eight visual patterns; each one of these eight visual patterns is based on a main thinking process (Hyerle, 2000). Also, thinking maps can be seen as types of graphic organizers that are used in the classroom to help students

organize their knowledge and think critically about what they study and examine (Hyerle & Yeager, 2007). In this study, thinking maps are defined as a set of visual patterns that correlates with thinking skills with the purpose of developing and enhancing first year Integrated Technical Education Cluster students' reading comprehension skills and their attitudes towards reading.

1.7.2 Reading comprehension

According to Crutis and Kruidenier (2005, p.9), "reading comprehension is the process of constructing meaning from what is read. to comprehend, a reader must decode words and associate them with their meanings." According to the National Reading Panel (2000), reading comprehension is defined as the ability to make connections between the known and the new information encountered in texts. In this study, reading comprehension is operationally defined as an active, complex, and intellectual process in which first year college students at ITEC, Ameeria can use information in the reading text to construct meaning. Such process includes literal, inferential, critical and creative skills that students need to develop using thinking maps.

2.Review of literature

The following section sheds more light on the main variables of this study which are reading comprehension skills, attitude towards reading and thinking maps.

2.1 Reading comprehension

When teaching English as a second or foreign language, reading receives a special focus. Many foreign or second language learners consider reading to be one of their biggest goals. They seek to be able to read for information, for pleasure, for their career, and for study purposes (Hardin, 2001). Reading is a complex, purposeful, interactive, comprehending, flexible activity that takes considerable time and resources to develop. The reader has a purpose for reading, whether it is for entertainment, information, or research. Reading for a purpose provides motivation - an important aspect of being a good reader. It is interactive activity - the reader makes use of information from his/her background knowledge as well as information from the printed page; reading is also interactive in the sense that many skills work together

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simultaneously in the process. The reader typically expects to understand what he/she is reading. Reading is flexible, meaning that the reader employs a range of strategies to read efficiently. Finally, reading develops gradually; the reader does not become fluent suddenly, or immediately following a reading development course (Bojovic, 2010).

Reading comprehension is one of the most essential ESL/ EFL skills. For English language learners, reading is considered to be the most important skill in order to achieve success in schools and universities (Anderson, 2003 & Takala, 2006 & Al-Nifayee, 2010 and Haboush,2010). Reading comprehension is an interactive compensatory process in which readers actively adjust their processing in response to the particular demands of the text and the context (Chial, 2001 & Almas, 2001, Yee, 2010 & and Li, 2010).

According to the National Reading Panel (2000), reading comprehension is defined as the ability to make connections between the known and the new information encountered in texts. It is also the ability to ask questions of the text, draw inferences during reading, synthesize information across text, and visualize images while reading.

Reading comprehension is a very complicated process where the brain is activated through noting a word, decoding it and identifying the related meaning. The reader constructs meaning by interacting with the text using his or her previous knowledge and experience that can be found in the texts. It means a students' ability to understand information that is presented through the written words (Storm, 2007& Petersen and Diego 2008).

Nasr (2007) asserts that reading comprehension is a process of negotiating understanding between the reader and the writer. For him, it is a more complex psychological process that includes linguistic factors such as phonological, morphological, syntactic and semantic elements. It also includes cognitive and emotional factors as the reader when receiving information about the text in the form of words, sentences and paragraphs, he or she tries to recognize the attitude and feeling conveyed by the author.

According to Whitaker (2009), Effective reading comprehension is based upon many factors related to the reader, the text and the behavior of comprehension. The ingredients of reading comprehension consist of

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accurately decoding words, understanding the language to monitor reading, memory skills, vocabulary acquisition, previous knowledge and complicated reasoning skills.

Generally speaking, comprehension is defined as the reader's ability to obtain meaning from the text. In this process, readers actively use a number of cognitive processes before, during, and after reading (Riot, 2008). Reading is a highly strategic process during which readers are always constructing meaning using several strategies such as activating background knowledge, monitoring and clarifying, making predictions, drawing inferences, asking questions and summarizing. Therefore, teaching reading comprehension should focus on thinking, problem solving and monitoring understanding (Harvey & Goudvis, 2000).

Researchers and educators differentiate between reading comprehension skills and reading comprehension strategies as reading comprehension strategies are used in a deliberate conscious way from the part of the reader to monitor and check understanding, to clarify misunderstanding in the text, and to process text (McEwan, 2004). On the other hand, reading comprehension skills are applied automatically rather than deliberately (Afflerbach et. al, 2008). In other words, once the reading comprehension skills are learned, they are used unconsciously. Also, such skills are the tools that readers use to the structure of the text such as main idea and supporting details, compare and contrast, sequencing (Roit, 2008).

On the other hand, Grabe and Stoller (2002) presented another difference between reading comprehension skills and strategies. For them, reading comprehension skills are the learning outcome of the reading process itself, while reading comprehension strategies are the techniques which are used to develop the skills. In other words, to develop reading comprehension skills, the reader should follow specific strategies.

There are some levels of comprehension in reading that is different depth of understanding and different analysis. According to Berry (2005), there are four levels of reading comprehension. The first level is the literal level. At this level, the main concern is understanding basic facts. The questions in the literal level can be answered by reading the text quickly because such questions are explicitly stated in the text. The

second level is the inferential level. At this level, readers can go beyond what's explicitly stated in the text and they are able to add meaning or draw conclusions. The questions in this level are only answered well if the reader could understand the whole reading text well. Therefore, the answers are not stated directly in the text, but they are implicitly understood from the text. The third level is the critical level. At the critical level, the reader is able to assess what's read as well as its clarity, accuracy and any bias or exaggeration. The fourth level is the creative level. At this level, the reader can develop new ideas and thoughts of the information and ideas presented in the text. The creative level encourages the reader to reflect. With these four levels of comprehension, the reader becomes skilled.

Roit (2008) identifies the following reading comprehension skills: identifying the author's point of view, determining the author's purpose, differentiating between main ideas and details, identifying cause and effect relationships, ordering a sequence of events, comparing and contrasting ideas, drawing conclusions, making inferences, distinguish fact from opinion and distinguish fantasy from reality. Such skills enable students to organize information, develop understanding, and analyze the reading text.

According to Vaughn and Thompson (2004), teaching reading comprehension skills should start from the early stages of students' learning process due to their importance as many researchers place comprehension at the center of the reading process. In this context, teachers should deliver appropriate teaching strategies as well as offer students several opportunities to practice and provide them with feedback to be able to organize and construct meaning of the texts; an idea that the current study is seeking to achieve through using Thinking Maps which many researchers have linked between them.

2.2 Reading attitude

Reading attitude is a complex theoretical construct. It is defined in different ways. According to Yamashita (2004 p. 3), "reading attitude is defined as a system of feelings related to reading which causes the learner to approach or avoid a reading situation or a state of mind accompanied by feelings and emotions, that make reading more or less probable".

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In fact, it is very important to confirm the role of reading attitude in developing readers because it was stated that positive attitude towards reading is related to enhancing students' achievement in general. Also, the highest success in education is a result of reading attitude (Lazarus & Callahan, 2000).

According to Reeves (2002), there is a strong agreement among educators and researchers who are involved in studies on reading that reading attitude can be defined by three components: a cognitive component represented in the personal and evaluative beliefs ; affective component represented in feelings and emotions ; and conative component represented in action readiness and behavioral intentions. To measure students' attitude towards reading, the current study focuses on only two main components of the three. The first one is the cognitive component and the second one is the affective one. The conative component will not be included in the measurement process to students' attitude towards reading due to the difficulty of its implementation in the context in which the study was conducted.

2.3 Thinking maps

Thinking Maps is considered one of the teaching- learning strategies that aim at improving and enhancing the learning process by making learning meaningful to learners as it provides different ways that help learners improve through interacting with the text and with other learners (Oakley, 2004). One of the pioneers and founders of thinking maps is David Hyerle who confirmed that thinking maps can encourage learners to build different knowledge about a topic considering what they already know. Such thinking maps can support learners at different stages with the ability to recall the information once they are visualized (Alikkan, 2014; Long & Carlson, 2011).

Thinking Maps are defined as a language of eight visual patterns; each one of these eight visual patterns correlate to a main thinking process (Hyerle, 1996). Also, thinking maps can be seen as types of graphic organizers that are used in the classroom to help students organize their knowledge and think critically about what they study and examine (Hyerle & Yeager, 2007). In other words, the strategy of thinking maps is a set of eight interactive, specific graphic organizers linked to thinking processes.

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According to Hyerle and Alper (2011), Thinking Maps have great influence on different learning aspects as they can support language acquisition, reading, writing, problem solving, and scientific inquiries. Furthermore, Thinking Maps as a strategy can be used with all learning stages; from early childhood through adulthood. Moreover, thinking maps provide teachers with a tool that meets the individual differences of students. Also, Thinking Maps can be used to support visual learning in the classroom. Thinking Maps can help visual learners to organize information related to the content they learn (Hyerle and Yeager, 2007). Thus, Thinking Maps are an innovative way to help students to think critically about the content they are learning.

Also, Holzman (2004) & Hyerle (1996), added the following advantages of Thinking Maps on the leaning process. First, they provide students with the tools that help them analyze complex texts. Second, they help students work together for deeper comprehension. Third, they allow students to produce different writing prompts. They can be used as learning and assessment tools. Fourth, they help students solve problems and make decisions. Fifth, they provide access to higher order thinking skills. Finally, they meet the needs of all learners and develop students' performance.

As stated earlier, each of the eight Thinking Map correlates with a precise thinking process which, in turn has a specific function. The Circle Map defines words or items in context and presents points of view. The Bubble Map charts sensory, emotional and logical qualities. The Double Bubble Map compares and contrasts items. The Tree Map relates main idea and details. The Flow Map sequences events. The Multi Flow Map presents causes and effects as well as predicts outcomes. The Brace Map physically relates part to whole relationships. Lastly, the Bridge Map forms analogies and metaphors (Hyerle, 1995).

Research has indicated that one of the features that makes Thinking Maps worth to be studied is its theoretical breadth (Hyerle, 2004). Thinking Maps are thought to be uprooted in many different theoretical foundations. In this study, the focus will be on three main theoretical bases: constructivism theory, brain based learning and graphic organizers.

First, Thinking Maps are often associated with Piaget's constructivist theory. Cognitive research which is supported by

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Constructivism confirms that the key to develop long-term memory and the ability to improve learning in the classroom is represented in the connections that are made in the brain due to the cognitive processes which Thinking Maps have adapted (Squire, 2017). Also, Thinking Maps represent a concrete example of Vygotsky's ZED theory in which tasks are chosen carefully for students based upon what they can achieve with some help from either teachers or peers (Vygotsky, Hanfmann, & Vakar, 2012) because Thinking Maps produce organized models that students can use to accelerate their learning when they describe concepts on paper (Sunseri, 2011).

Second, according to Hyerle and Yeager (2000), many of the 12 principles of brain-based learning research summarized by Caine and Caine (1997) provide the basis of the theoretical background for Thinking Maps. These principles include the following: all learning engages physiology; the brain/mind is social.; the search for meaning is innate; the search for meaning occurs through patterning; emotions are critical to patterning; the brain/mind processes parts and wholes simultaneously; learning involves both focused attention and peripheral perception; learning is both conscious and unconscious; There are at least two approaches to memory; learning is developmental; complex learning is enhanced by challenge and inhibited by threat associated with helplessness and/or fatigue; each brain is uniquely organized.

Hyerle and Yeager (2000) linked between these 12 principles and Thinking Maps by stating that through using Thinking Maps, students are given a concrete way to see abstract ideas as students use each thinking map personally with their own information, so they get emotionally affected. These first personal experiences with Thinking Maps make students feel less threatened when they use them later for deeper thinking. Also, once the maps have been taught to students, the brain unconsciously pays attention to the eight thought processes. When the brain pays attention to information that has emotion or meaning, it tries to store that information in short- term memory. Then, Thinking Maps allow students to analyze the material and thus strengthen the neural networks that have stored the information. Information is then stored in long-term memory.

For Sylwester (1995), when a network of neurons is established for a specific purpose with repeated firings, the brain begins to recognize a

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pattern automatically. As teachers and students establish a pattern for what each type of thinking “looks like” with repeated use of that pattern in a wide variety of content areas, the brain begins to choose that pattern automatically (Hyerle & Yeager, 2000). Moreover, Hyerle (1996) stated that Thinking Maps provide the experiences that allow students to realize the patterns that connect as each of the maps supports patterning and the networking of information, help organize information into knowledge from several sources and support the search for meaning through prior knowledge.

Third, according to Hyerle & Williams (2010), Thinking Maps have been developed out of the rich background offered by graphic organizers. Thinking Maps are viewed as a learner-centered model that share both the energy of hand-drawn map and eight consistent graphic structures. Each of these eight graphic structures are represented by eight basic cognitive processes. This idea was based on a theoretical model of six thinking processes which were originally developed by Dr. Albert Upton in the early 1960s. This model was further cultivated in the mid-1980s, based on cognitive science research. These eight cognitive processes included defining in context, describing qualities, comparing and contrasting, categorizing, part-whole, sequencing, cause-effect and seeing analogies. Thinking Maps as an instructional strategy emerged from such cognitive processes as at the time cognitive scientists and educators have used such processes for different purposes such as testing, mediation, establishing standards-based assessment, Thinking Maps defined these eight cognitive processes visually using eight unique graphic starters.

In this context, many educators and specialists discuss the similarities and differences between thinking maps and graphic organizers. According to Woodford (2015), graphic organizers were developed as a result of Ausubel’s research into the possible advantages of using an advanced organizer as a pre-reading tool to link between students’ prior knowledge and the new information and knowledge students acquire from the text they read. Graphic organizers were basically called structured overviews and were mainly used to check the learners’ readiness prior to the reading process. The first graphic organizers were simple and aimed to encourage students to brainstorm their ideas and knowledge about the topic they were about to study.

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On the other hand, thinking maps were designed by David Hyerle for the innovative learning group (Hyerle, 2004). Hyerle (2001) describes thinking maps as an integration between three types of visual tools that have been used for several years: brainstorming webs, graphic organizers and thinking process tools, such as concept maps. Hyerle (2011) believes that the integration between the three tools can eliminate the weaknesses of each. Brainstorming webs of the 1970s facilitated a “dumping” of knowledge into a web, but lacked the structure and organization needed by students. Graphic organizers which appeared in the 1980s were more structured but were isolated to the specific content being taught. This made the visual maps nontransferable between content areas. Finally, the thinking process maps explore more complex thinking processes, but often become so complicated that they were difficult for students and teachers.

Moreover, Sunseri (2011) added and clarified other similarities and differences between graphic organizers and thinking maps in specific points. For him, both present information graphically in a similar way that is using circles and boxes. Both can be used to improve and develop students’ learning especially reading and writing. Yet, there are some differences between them as graphic organizers are used by teachers for several instructional reasons and purposes. Teachers’ selection of the graph to use with students depends on the skills he or she wants students to learn. On the other hand, teachers are trained to use thinking maps in order to teach their students to use them to be able to graph the relationship between content area and concepts.

According to Holzman, 2004; Hyerle & Yeager, 2007; Hyerle 2011 & Weis 2011, there are eight thinking maps that can be used with students and which are based on the eight fundamental cognitive processes as follows:

- **The Circle Map**

The Circle Map is used to define or explain concepts. Students often use this map to brainstorm. The Circle Map consists of a large circle with a smaller circle inside. The term or concept to be defined is written inside the small circle, while brainstormed thoughts and ideas are written in the larger circle. When teaching students to use a Circle Map, verbs such as define, list, and identify should be used. The Circle Map is often used first to introduce a topic before any other maps are used. Once students can define a topic, they then are able to form related thoughts about it. Students can activate their own prior knowledge about a specific topic as well as reflect upon what they may know about that particular topic. Circle Maps are used in several ways. Circle Maps can be used as a formative assessment tool as students can create a Circle Map before they learn the topic and another once they have actually learned the topic. Students can then compare the two Circle Maps. It is very important to encourage students to be general when completing a Circle Map and to fully express all their thoughts and ideas about the topic. Another point to remember when using a Circle Map is to include a frame of reference outside of the larger circle to express how the student knows that particular information, they wrote on their Circle Map.

- **The Bubble Map**

The bubble map is used to describe things. The Bubble Map is created by forming a large circle in the middle. Lines are drawn extending from that large circle. At the ends of the extended lines, there are smaller circles. In the large middle circle, the term to be described is written. When using the Bubble Map to describe, teachers should ask students to use their five senses and to think about characteristics of the chosen item. Only adjectives or adjective phrases should be used to describe an item. Many tasks can be implemented and achieved using the Bubble Map. The Bubble Map can be used for several purposes such as rubric if used to value and evaluate. The Bubble Map can also be used to complete a character analysis that includes factual characteristics of a literary character or historical figure. Students can use their five senses to complete a Bubble Map of scientific observations about the features of an object. After creating a Bubble Map, teachers can ask students to differentiate between factual and opinion descriptions on the map. A

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frame of reference is drawn outside the Bubble Map. In the frame of reference, students should include a point of view from which they are describing, evidence for their descriptions, tell which senses they are using, and why the describing qualities are significant.

- **The Double Bubble Map**

The Double Bubble Map is used to compare and contrast. To create a Double Bubble Map, two large circles are drawn on each side of the paper. Within the two large circles are the names of the two items that are required to be compared. Lines are drawn extending from the two larger circles to the middle of the paper. The center bubbles are used to describe similarities between the two items. Lines are drawn from the outside of the larger circles to the edges of the paper. Smaller circles are drawn at the ends of these lines. Within the smaller circles drawn at the ends of lines are the contrasting descriptors of each item. The Double Bubble Map can be used to compare and contrast anything in any academic subject. Within the frame of reference outside the Double Bubble Map students should include a source they are using, reasons as to why the comparisons are important, and what they have learned out of creating this particular map.

- **The Tree Map**

The Tree Map is used to categorize information. To create a Tree Map, write the category at the top of the page. Draw a line from the center of the category name. The middle line will be divided into lines for each subcategory. Details for each subcategory are then written under the subcategory names. When teaching students to use the Tree Map, the teacher asks things regarding how items relate and to which categories those things belong. Students can use Tree Maps for different purposes such as to sort and group information either inductively or deductively. Students can categorize story elements as well as categorize vocabulary words in any subject. To form the frame of reference for a Tree Map, students write about information they used to classify, how different points of view affect the way information was sorted and rate the importance of their sources.

The Brace Map

The Brace Map presents parts and the whole of a concept. To make a Brace Map, write the name of the whole part to the left side and draw a brace. Then list the parts of the whole to the right side. Subparts of each part can be listed to the further right of the brace. The Brace Map allows students to analyze concepts. When teaching students how to create Brace Maps, teachers can ask students about many things such as the name of the whole, name of parts or subparts, and if any of the parts are missing. The Brace Map is basically used for developing vocabulary. It can also be used to categorize the parts of a number, list the parts of a structure of an object or animal. When framing references around the Brace Map, the student should answer questions regarding how they knew what the parts were, what prior knowledge helped them be able to break down the whole, and where they obtained their information.

- **The Flow Map**

The Flow Map is used for sequencing events and ordering information. To make a Flow Map, write the name of the event at the top of the page. Starting on the left side of the paper, write each stage name and put a large rectangle around it. Sub-stages can be written in smaller rectangles under the stages. Draw arrows between each large rectangle to show progression of events. When teaching students to make a Flow Map, teachers should ask students questions regarding the sequence of events, to retell a story, explain patterns in what happened, and when specific events happened in the story. Flow Maps are basically used to show scientific life cycles, steps to problem solve, and historic timelines.

- **The Multi-Flow Map**

The Multi-Flow Map is used to present causes and effects. To create a Multi-Flow Map, write the event in the middle of the page with a large rectangle around it. To the left of the large rectangle, write the causes in small rectangles with arrows referring to the event. To the right of the event rectangle, write the effects in smaller rectangles. When students are learning to create their own Multi-Flow Maps, they should always begin by writing the event in the center before listing any causes or effects. There is no rule regarding the number of causes matching the number of effects. Students may even do a one-sided Multi-Flow Map that only lists the causes or the effects of an event. If a student has

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trouble creating this particular map, they can fold a sheet of paper into thirds, the middle for the event, the left for causes, and the right for the effects of the event. Some basic uses of the Multi-Flow Map are to analyze a historical event and predict events.

- **The Bridge Map**

The Bridge Map's purpose is to show how relationships can be like one another. The Bridge Map is used to represent analogies. To build a Bridge Map, write the factor that relates a pair of things. This term is called the "relating factor". To the right, write the first item, draw a triangle with the bottom left open, then, write the second item. The word "as" is added under the open triangle. When teaching students to create Bridge Maps, teachers should ask students questions regarding the relationship between the items, a sentence the students can write using both items, and about other relationships that could stem from an analogy they made. Within the frame of reference students should explain the importance of knowing the relationships between the pair of items they created in their Bridge Map.

Hyerle (2004) confirmed that despite the fact that there are eight thinking maps, there are five essential characteristics that make each map boundlessly expandable. The first quality of thinking maps is that they are consistent; that is, each map has a unique form which reflects in a visual way the skill being defined. The second one is that each map is flexible in form and has several ways that the map can grow. The third quality is that such maps are developmental. Because of being consistent and flexible, they are also developmental as they are easy to be designed and used by any learner at any age. The fourth characteristic is that they are integrative as they integrate between the content areas and the thinking processes. The fifth characteristic is that the maps are reflective in which they reveal how the learner is thinking and what he or she is thinking about. Also, in this sense, the teacher can reflect upon the content and the learning process being delivered.

According to Wallin and Wallin (2008) the implementation of Thinking

Maps follows specific steps. More specifically, one objective is presented to students each week over a nine-week period. First, teachers should post all eight maps so that the maps are visible to all students. Second, teachers add labels to posted maps that provide a short

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description of the purpose of each map. Third, students create their own maps. Fourth, as the teacher adds a new map, he or she will review previous maps and discuss the differences between each map. Fifth, model the use of each map on chart paper. Sixth, use every map in each subject according to each map's purpose. Seventh, use all eight maps. Also, it is stated that higher order thinking is best employed when all eight maps are used. Eighth, communicate with parents about the maps and the purpose of each one. Finally, be creative when using the maps.

Due to the great importance of Thinking Maps, there are a number of studies that have been implemented by researchers that investigated the effect and impact of Thinking Maps on the learning process in general as follows:

Santiago (2011) explored the effect of thinking maps on enhancing the recall of information and general critical thinking skills. He concluded that thinking maps have positive effect on our students in developing their critical thinking skills and better recall of information. Long (2011) investigated the effect of Thinking Maps on students' achievement. The results of this study revealed that Thinking Maps were beneficial to students' achievement.

Also, Cooks and Sunseri (2014) investigated the effect of thinking maps on writing skills. They concluded that students' writing performance was improved especially in terms of ideas and organization due to the use of thinking maps. On the other hand, Idek (2015) examined the practicability of Thinking Maps to foster students' ability to express their ideas orally in English. The researcher used both the Tree Map and the Flow Map together along with the speaking activities. The results showed that Thinking Maps had significant influence on students' oral skills.

Moreover, Fan (2016) investigated the impact of thinking maps on 17 Taiwanese EFL students' English writing. Bubble Map, Tree Map and Flow map were only used in the study. He reported that the application of thinking maps significantly improved the students' writing performance in general and writing structure in particular. In addition, Omar & Albakri (2016) implemented a case study on a group of secondary school students through employing Thinking Maps to develop English language learning. The study instruments included observations,

interviews and field notes to collect the data. The findings revealed that the use of Thinking Maps helped students to generate ideas, enhance students' written and oral language and build their self- confidence in presentations.

2.4 Thinking Maps and Reading Comprehension

Concerning the relationship between Thinking Maps and Reading comprehension, many researchers reported and confirmed that Thinking Maps have a significant impact on improving reading comprehension as follows:

Schultz (2005) concluded that Thinking Maps had a significant influence on improving reading comprehension in three main reading comprehension skills : Defining in context improved by the use of circle map, Sequencing which was improved by the use of flow map, and cause and effect which was improved by the use of multi-flow map.

Russell (2010) agreed that Thinking Maps help improve reading comprehension for elementary school students. The researcher studied four schools in Texas that adopted Thinking Maps in their instruction to improve reading comprehension. The results revealed that Thinking Maps helped students a lot to improve their reading comprehension and students' achievement in general.

Edwards (2011) confirmed that Thinking Maps positively affect student reading achievement. Edward's research took place in a large Midwest school district. The findings of the study showed that most of the participants thought that Thinking Maps were a fun way to learn. Furthermore, the students preferred Thinking Maps their teachers used versus other teaching strategies. Edwards (2011) concluded that teachers and students used Thinking Maps to help in comprehension. Furthermore, Thinking Maps proved to be a useful visual aid and improved critical thinking. Teachers reported the Thinking Maps also helped to improve student writing scores, standardized test scores, and overall recall of information.

In the same context, Manning (2003) confirmed that Thinking Maps are mainly intended to be used by David Hyerle - as comprehension aids at all educational levels. Nearly the same point was reflected by DePinto (2006) who stated that "Thinking Maps are the road to reading

comprehension. In other words, when the teacher brings students to such a high level of fluency with Thinking Maps and they begin to identify text patterns on their own, they will be able to use fundamental skills (describing, compare, causes, etc.) and respective cognitive maps (bubble, double bubble, multi-flow, etc.) and have the meta cognitive awareness of being able to explicitly transfer these processes and tools to reading comprehension through identifying text structures, (P. 5)".

3. Method

3.1. Research design: A pre- post control quasi- experimental design was used in this study. An experimental group and a control group were exposed to the pre and post application of the instruments of the study. The experimental group only was instructed using a program based on Thinking Maps while the control group was exposed to regular instruction.

3.2. Participants: The participants of the study included 50 first year college level students at Ameeria Integrated Technical Education Cluster who study general English courses (pre-intermediate level) as a graduate requirement to obtain their international certificate from Pearson U.K. during the first semester of the academic year 2019-2020. They were randomly selected and allocated into two groups; an experimental group (25) which was taught through Thinking Maps based program and a control group (25) which was taught conventionally. The two groups were taught by the researcher. The researcher provided the control group with the opportunity to use the same reading comprehension passages studied by the experimental group and being trained on the same reading comprehension skills and for the same period of time (12 weeks) but without being instructed by Thinking Maps based program. The students' ages ranged from 18-19 years.

In addition, to control variables before implementing the treatment, statistical analysis was done for the results of the pre reading comprehension skill test and the reading attitude scale on both groups to detect whether there were any statistical significant differences between the control group and experimental group before the treatment. In this context, the researcher used independent samples t- test. The results revealed that there was no statistically significant difference between the mean scores of the two groups on both the reading comprehension test

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and the reading attitude scale. In other words, both groups were similar in their actual performance on entry level. This was done to attribute any variance or performance difference between the two groups after implementing the treatment to the treatment itself.

3.3 Variables of the study

Independent Variable

- A program based on Thinking Maps

Dependent Variables

1- Developing students' reading comprehension skills.

2- Developing students' attitude towards reading.

Control Variable

-Performance level in the pre-reading comprehension test

The results indicated that there were no statistically significant differences between the mean scores of the experimental group (treatment) and the control group(non-treatment) on the pre reading comprehension test as shown in table (1).

Table (1)

T. test results for the pre application of the reading comprehension test for both groups

The pre application	Group	N	mean	Standard deviation	Critical value	Significance
Reading Comprehension Test	The control group	25	4.52	4.92	0.73	Not significant at 0.05
	The experimental group	25	5.48	4.36		

The previous table points out that the t value is not statistically significant which reveals that there are no statistically significant

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differences between the mean scores of the experimental group (treatment) and the control group(non-treatment) on the pre application of the reading comprehension test as well as shows that the two groups are equivalent.

- Students’ attitude towards reading responses

The results indicated that there were no statistically significant differences between the mean scores of the experimental group (treatment) and the control group(non-treatment) on the pre application of the reading attitude scale as shown in table (2).

Table (2)

T. test results for the pre application of the reading attitude scale for both groups

The pre application	Groups	N	mean	Standard deviation	Critical value	Significance
Reading attitude scale	The control group	25	35.92	9.41	0.015	Not significant at 0.05
	The experimental group	25	35.88	9.47		

group(non-treatment) on the pre application of the reading attitude scale as well as shows that the two groups are equivalent.

3.4 Instruments of the study

The current study utilized four main instruments as follows:

3.4.1. The reading comprehension skills checklist: this checklist was designed to identify the most important reading comprehension skills to be developed by first year college level students at ITEC. It was designed in light of the objectives of the college level English language program syllabus at ITEC, previous literature and related studies that dealt with EFL reading comprehension skills (Grabe and Stoller 2002; Berry 2005; Roit 2008).

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The first form of the checklist (See Appendix B) which included ٧ reading comprehension skills was presented to a panel of jury members in the field of EFL methods of teaching and applied linguistics to determine the appropriateness of the suggested reading comprehension skills to EFL college level(pre-intermediate) students. Based on the modifications of the panel of jury members, 12 frequent skills were chosen and used in the study. The selected reading comprehension skills according to their high percentages were as follows :(See Appendix C)

Literal level

- 1- Identifying the main idea of the text. (skim)
- 2- Identifying specific related details of the text. (scan)
- 3- Recognizing the sequence of ideas, events or information stated in the passage.
- 4- Identifying causes and effects.

Inferential level

- 5- Identifying the meaning of unknown words out of context.
- 6- Drawing conclusions about the text.
- 7- Making inferences about the text.
- 8- Making predictions about the text.

Critical level

- 9-Identifying the similarities and differences
- 10-Distinguishing between facts and opinions

Creative level

- 11- Giving several synonyms and antonyms for the words in the text
- 12- Suggesting different titles and ideas for the text.

3.4.2. The reading comprehension test

A reading comprehension test with 24 items in the form of short reading comprehension passages or statements followed by multiple choice questions was designed by the researcher in light of a table of specifications based on the specified 12 EFL reading comprehension skills. Two questions were assigned to measure each reading comprehension skill that was targeted by the study (See Appendix D).

3.4.2.1 Test validity

a- The validity of jury members:

The test was given to a group of jury members in order to determine whether the items of the test represent what they were supposed to represent and whether they were linguistically appropriate. Very few modifications were made according to the opinions of the jury members until the test was prepared in its final version (See Appendix E).

-The self-validity

This was done through the square root of the validity Coefficient which reached (0.90), and it is a high coefficient validity which indicates the accuracy of the phrases of the test and their abilities to measure what they are intended to measure.

b- Formative validity:

The validity of the sub-skills of the test was calculated as follows:
The calculation of the coefficient correlation between the score of the sub test and the total test.

Table (3)
Coefficient correlations between the total scores and the sub contents which indicate the validity of the test.

The contents of the test	Coefficient correlation	Significant at (0.01)
Literal level	0.702	Significant
Inferential level	0.783	Significant
Critical level	0.708	Significant
Creative level	0.559	Significant

3.4.2.2. Test reliability

The reliability of the test was calculated through Cronbach's Alpha (Coefficient Alpha). Cronbach's alpha is the most common measure of internal consistency ("reliability"). It is most commonly used when you have multiple questions and you wish to determine if the test is reliable. In order to calculate the reliability of the test, it was applied to a sample of 15 students who were not included in the treatment and it was done for the overall test using the following equation:

$$a = \frac{N \cdot \bar{c}}{\bar{v} + (N - 1) \cdot \bar{c}}$$

N = the number of items.

\bar{c} = average covariance between item-pairs.

\bar{v} = average variance.

Table (4)
the consistency coefficient of the test

The test	Alpha
Coefficient	0.809

After analyzing the statistical value of the previous table, it can be said that the coefficient reliability of the overall test as is high.

3.4.2.3 Scoring test

The total score of the test was 24. It was assigned as follows: one score for each correct answer, zero for incorrect answers or missing questions.

3.4.2.4. Duration of the test

The test was piloted on a group of 15 students (not included in the treatment) to calculate average time of the test according to the following formula and was found to be 90 minutes.

$$A1 + A2$$

$$N$$

A1= the time the first student takes in answering the test.

A2= the time the last student takes in answering the test.

N= 2.

3.4.3 The reading attitude scale

The researcher developed a reading attitude scale in light of related literature and previous studies and researches (Alnassar, 2000 & Vega, 2001) in order to investigate students' attitude before and after the treatment. The reading attitude scale included two main dimensions / domains; affective domain and cognitive domain. Each domain included 8 items. All items were positive statements except for items number (3, 4, 5,6, 8) that were reverse statements in order to balance and verify students' answer. Also, all the 16 items of the scale were answered on a 5- point Likert Scale as follows: For the positive statements, points: 1 strongly disagree, 2 disagree, 3 neutral, 4 agree, and 5 strongly agree. For the reverse statements, points: 5 strongly disagree, 4 disagree, 3 neutral, 2 agree, and 1 strongly agree.

3.4.3.1 The content validity of the reading attitude scale

The first version of the reading attitude scale (See Appendix F) was given to TEFL specialists and experts to determine if the items of each domain measured its domain in particular and reading attitude in general. The number of the items of the scale in its first version was 22. The jury members omitted some items, but they accepted most of its designed items as they were, which proved the validity of the scale.

The final version of the reading attitude scale, after deleting the items suggested by most jury members, consisted of two domains that included 16 items. Eight items that measured the affective domain related to students' reading attitude and eight other items that measured the cognitive domain associated with students' reading attitude. Each domain was statistically analyzed separately by summing and taking an average. The minimum possible score was 8 and the maximum score was 40 for each domain of the scale (See Appendix G).

3.4.3.2 The self-validity of the reading attitude scale

This was done through the square root of the validity Coefficient which reached (0.90), and it is a high coefficient validity which indicates the accuracy of the phrases of the scale and their abilities to measure what they were intended to measure.

3.4.3.3 The formative validity of the reading attitude scale

The validity of the items of the scale was calculated as follows:
The calculation of the coefficient correlation between the score of the sub and the total items.

**Table (5)
the coefficient correlations between the total scores and the sub contents
which indicate the validity of the scale.**

The contents of the scale	Coefficient correlation	Significance at (0.01)
Dimension 1(affective domain)	0.625	Significant
Dimension 2(cognitive domain)	0.541	Significant

3.4.4. The program

3.4.4.1 The aims of the program

The program which is based on using Thinking Maps aimed at developing ITEC first year college level students' reading comprehension skills and their attitude towards reading.

3.4.4.2 The learning objectives of the program

By the end of the program, students should be able to:

- Identify the main idea of the text. (skim)
- Identify specific related details of the text. (scan)
- Recognize the sequence of ideas, events or information stated in the passage.
- Identify causes and effects.
- Identify the meaning of unknown words out of context.
- Draw conclusions about the text.
- Make inferences about the text.
- Make predictions about the text.
- Identify the similarities and differences.
- Distinguish between facts and opinions.
- Give several synonyms and antonyms for the words in the text.
- titles and ideas for the text Suggest different.

3.4.4.3 The duration of the program

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The program started in the first semester of the academic year 2019-2020. Two sessions weekly (each session is 2 hours) were held to instruct students on using thinking maps to develop their reading comprehension skills and their attitude towards reading. The program was implemented at Ameeria, ITEC over a period of twelve weeks (three months). Students received 16 sessions in total which can be classified as follows: (a) 2 sessions for the pre-post reading comprehension test (90 minutes each) ; (b) 2 sessions for the pre and post application of the reading attitude scale (20 minutes each); and (c) 24 sessions for the lessons that aimed at developing students' reading comprehension skills through using the Thinking Maps based program (2 hours each) as each lesson was taught in two sessions (4 hours in total) as the actual plan of the English course in ITEC. The following table shows these points in detail:

Table (6)

The outline of the program

Lessons	Reading comprehension skills	The number of sessions
Lesson One: introduction to Thinking Maps	<ul style="list-style-type: none"> • Recognize thinking maps • Identify the aims and objectives of the program 	2 sessions (4 hours)
Lesson Two: The weather in the UK	<ul style="list-style-type: none"> • Identify the main idea of the text. (skim) • Identify specific related details of the text. (scan) 	2 sessions (4 hours)
Lesson Three: Television	<ul style="list-style-type: none"> • Recognize the sequence of ideas, events or information stated in the passage. 	2 sessions (4 hours)
Lesson Four: The Rio Grande	<ul style="list-style-type: none"> • Identify causes and effects. 	2 sessions (4 hours)
Lesson Five: Once in a blue moon	<ul style="list-style-type: none"> • Identify the meaning of unknown words out of context. 	2 sessions (4 hours)
Lesson Six: Snowbirds	<ul style="list-style-type: none"> • Draw conclusions about the text. 	2 sessions (4 hours)
Lesson Seven: The young woman	<ul style="list-style-type: none"> • Make inferences about the text. 	2 sessions (4 hours)
Lesson Eight: Birthday	<ul style="list-style-type: none"> • Make predictions about the text. 	2 sessions (4 hours)
Lesson Nine: Travelling	<ul style="list-style-type: none"> • Identify the similarities and differences. 	2 sessions (4 hours)
Lesson Ten:	<ul style="list-style-type: none"> • Distinguish between 	2 sessions (4 hours)

Antarctica	facts and opinions.	
Lesson Eleven: Living in a Big City	<ul style="list-style-type: none">• Give several synonyms and antonyms for the words in the text.	2 sessions (4 hours)
Lesson Twelve: Seat belt	<ul style="list-style-type: none">• Suggest different titles and ideas for the text.	2 sessions (4 hours)

3.4.4.4 Content of the program

The program included a teacher’s book as well as student’s materials. The content of the program is activity/ task- based. The content of the program was selected and organized by the researcher and included both in class activities based on thinking maps and assignments to be completed by students at home. The content of the program employed the use of the eight thinking maps-based tasks/ activities for teaching the targeted reading comprehension skills at the literal, inferential, critical and creative levels. Such activities/ tasks were performed either in groups (for in class activities or individually (for homework or assignments) (See Appendix H).

3.4.4.5 The implementation of the program (procedures)

Before delivering the program to the experimental group, the researcher has applied the instruments of the research as on week 2 of the first semester of the academic year 2019-2020, the researcher administered the reading comprehension test and the reading attitude scale on the participants of the study(the two randomly selected classes) who were then divided into an experimental group and a control one. Starting from week 3, the control group received the regular reading course that focused on the targeted reading comprehension skills and the experimental group received the Thinking Maps based- program according to the following stage procedures:

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- Program orientation procedures

- The researcher explained the nature, aims and objectives of the program to the experimental group students.
- The researcher started with drawing the eight thinking maps on the board. Then got engaged in a discussion about what these maps are, their usefulness and how easy to draw them.
- The researcher modeled Thinking Map strategy and explained to his or her students why they are used and how stating that Thinking Maps is one of the teaching strategies that aims at developing and enhancing their own learning as well as making their learning meaningful by helping students to recall and remember information through visualizing their own language learning.
- The researcher asked students about the importance of reading and engaged into discussion about it and introduced the targeted reading comprehension skills.

- Delivering lesson procedures

- The researcher started each lesson with reminding students with the eight thinking maps paying more attention to the thinking map/ maps that was intended to be employed in the reading lesson.
- The researcher introduced the objectives of the lesson; that was, one of the targeted reading comprehension skills.
- The researcher selected a lead in; that is, appropriate to the reading lesson either asking students some questions related to the topic of the lesson, brainstorming ideas about the lesson or activating their prior knowledge utilizing the use of thinking maps if possible (either pair or group work activity).
- The researcher asked students to read the text silently (individual activity). Then asked them to get into discussion about the text (group activity).
- The researcher provided students with a hand-out that highlighted the definition, explanation and how to identify the targeted reading comprehension skill to be developed through using the lesson (group activity).
- The researcher started to write some questions on the board that address the targeted reading comprehension / the objective of the lesson

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- The researcher presented and explained one of the eight thinking maps that were intended to be employed in the lesson to achieve its objectives.
- The researcher asked students to work in groups to respond to the questions through drawing and adjusting the selected thinking map on the flip chart (group activity).
- The different groups presented their work on the flip chart.
- The researcher and the students engaged into discussion and provided feedback about the thinking map used and how it is related to the targeted reading comprehension skill in this lesson.
- The researcher gave assignments to be done at home by students that address the thinking map and the targeted reading comprehension skill (individual activity).

3.4.4.6 The assessment of the program

The assessment of the program proceeded through two phases:

- Formative assessment

The purpose of formative assessment was to assess the students' gradual progress in reading comprehension skills and providing feedback. Such formative assessment; which is intentionally used as an assessment for learning tool represented in the assignments and activities students were asked to complete during and after each lesson.

- Summative assessment

The main purpose of summative assessment was to determine whether the students have achieved the objectives of the program represented in the targeted reading comprehension skills. Such type of assessment was conducted at the end of the treatment period through the application of the pre- post reading comprehension test and the reading attitude scale. This type of assessment aimed at investigating the effect of the thinking map-based program on developing reading comprehension skills and attitude towards reading for the participants of the study.

4. Data analysis and results

The quantitative results of this study are presented by relating them to the study hypotheses.

Hypothesis one

In order to verify the hypothesis, t- test for independent samples was used. Results of the t- test proved to be statistically consistent with the hypothesis. See table (7)

Table 7
T- test results comparing the post – reading comprehension test mean scores for the experimental group and the control group in overall reading comprehension skills and in each sub- skill

Skills	The post application	N	Mean	SD	Critical value	Significance	Effect size
Identifying the main idea of the text. (skim)	The control group	25	.48	.586	11.11	significance at 0.05	0.72
	The experimental group	25	1.92	.277			Large
Identifying specific related details of the text. (scan)	The control group	25	.47	.586	10.39	significance at 0.05	0.69
	The experimental group	25	1.88	.332			Large
Recognizing the sequence of ideas, events or information stated in the passage.	The control group	25	.44	.583	7.90	significance at 0.05	0.56
	The experimental group	25	1.76	.597			Large
Identifying causes and effects.	The control group	25	.56	.583	9.23	significance at 0.05	0.64
	The experimental group	25	1.84	.374			Large
Literal	The control group	25	1.95	2.226	11.47	significance	0.73

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Skills	The post application	N	Mean	SD	Critical value	Significance	Effect size
level	The experimental group	25	7.40	.816		ce at 0.05	Large
Identifying the meaning of unknown words out of context	The control group	25	.52	.586	6.40	significance at 0.05	0.46
	The experimental group	25	1.68	.690			Large
Drawing conclusions about the text.	The control group	25	.50	.586	8.76	significance at 0.05	0.61
	The experimental group	25	1.84	.473			Large
Making inferences about the text.	The control group	25	.48	.586	6.62	significance at 0.05	0.47
	The experimental group	25	1.68	.690			Large
Making predictions about the text.	The control group	25	.40	.577	7.20	significance at 0.05	0.52
	The experimental group	25	1.64	.638			Large
Inferential level	The control group	25	1.90	2.060	10.85	significance at 0.05	0.71
	The experimental group	25	6.84	.943			Large
Identifying the similarities and differences	The control group	25	.60	.577	9.39	significance at 0.05	0.64
	The experimental group	25	1.92	.400			Large
Distinguishing between facts and opinions	The control group	25	.56	.583	9.83	significance at 0.05	0.66
	The experimental group	25	1.88	.332			Large

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Skills	The post application	N	Mean	SD	Critical value	Significance	Effect size
Critical level	The control group	25	1.16	1.028	10.87	significance at 0.05	0.71
	The experimental group	25	3.80	.645			Large
Giving several synonyms and antonyms for the words in the text.	The control group	25	.44	.583	8.70	significance at 0.05	0.61
	The experimental group	25	1.84	.554			Large
Suggesting different titles and ideas for the text	The control group	25	.68	.557	5.67	significance at 0.05	0.40
	The experimental group	25	1.64	.638			Large
Creative level	The control group	25	1.12	.971	9.04	significance at 0.05	0.63
	The experimental group	25	3.48	.872			Large
Overall skills	The control group	25	6.16	5.65	13.09	significance at 0.05	0.78
	The experimental group	25	21.52	1.55			Large

Table (7) shows that the estimated t value (13.09) for the overall reading comprehension skills is statistically significant at 0.05 level. Thus, it is evident that there is a statistically significant difference between the mean scores of the control group and experimental group on the post- test in overall reading comprehension skills in favor of the experimental group as the mean scores of the experimental group students are higher than that of the control group students in the overall test. For further verification, the effect size for the overall reading comprehension skills was calculated as shown in the previous table and found to be (0.78). Therefore, it can be said that the program had a large

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effect on the experimental group students' overall reading comprehension skills compared with the control group students who received regular instruction.

Also, the table shows that the estimated t value (11.47) for the overall literal reading comprehension skills is statistically significant at 0.05 level. Thus, it is clear that there is a statistically significant difference between the mean scores of the control group and experimental group on the post- test in overall literal reading comprehension skills and in each sub skill in favor of the experimental group as the mean scores of the experimental group students are higher than that of the control group students in the overall literal reading test and in each sub skill. For further verification, the effect size was calculated as shown in the previous table for the overall literal reading comprehension skills and found to be (0.73) and higher than (0.14) for each literal level sub skill. Therefore, it can be said that the program had a large effect on the experimental group students' overall literal reading comprehension skills and in each literal level sub skill compared with the control group students who received regular instruction.

In addition, the table shows that the estimated t value (10.85) for the overall inferential reading comprehension skills is statistically significant at 0.05 level. Thus, it is clear that there is a statistically significant difference between the mean scores of the control group and experimental group on the post- test in overall inferential reading comprehension skills and in each sub skill in favor of the experimental group as the mean scores of the experimental group students are higher than that of the control group students in the overall inferential reading test and in each sub skill. For further verification, the effect size was calculated as shown in the previous table for the overall inferential reading comprehension skills and found to be (10.85) and higher than (0.14) for each literal level sub skill. Therefore, it can be said that the program had a large effect on the experimental group students' overall inferential reading comprehension skills and in each inferential level sub skill compared with the control group students who received regular instruction.

Moreover, the table shows that the estimated t value (10.87) for the overall critical reading comprehension skills is statistically significant at 0.05 level. Thus, it can be said that there is a statistically significant

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difference between the mean scores of the control group and experimental group on the post- test in overall critical reading comprehension skills and in each sub skill in favor of the experimental group as the mean scores of the experimental group students are higher than that of the control group students in the overall critical reading test and in each sub skill. For further verification, the effect size was calculated as shown in the previous table for the overall critical reading comprehension skills and found to be (0.71) and higher than (0.14) for each critical level sub skill. Therefore, it can be said that the program had a large effect on the experimental group students' overall critical reading comprehension skills and in each critical level sub skill compared with the control group students who received regular instruction.

Also, the table shows that the estimated t value (9.04) for the overall creative reading comprehension skills is statistically significant at 0.05 level. Thus, it can be said that there is a statistically significant difference between the mean scores of the control group and experimental group on the post- test in overall creative reading comprehension skills and in each sub skill in favor of the experimental group as the mean scores of the experimental group students are higher than that of the control group students in the overall creative reading test and in each sub skill. For further verification, the effect size was calculated as shown in the previous table for the overall creative reading comprehension skills and found to be (0.63) and higher than (0.14) for each creative level sub skill. Therefore, it can be said that the program had a large effect on the experimental group students' overall creative reading comprehension skills and in each creative level sub skill compared with the control group students who received regular instruction.

Hypothesis Two

In order to verify the hypothesis, t- test for dependent samples was used. Results of the t- test proved to be statistically consistent with the hypothesis. See table (8)

Table 8

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T- test results comparing the pre- post application of the overall reading comprehension test mean scores for the experimental group in overall reading comprehension skills.

Skills	The experimental group	N	mean	SD	Critical value	Significance
Identifying the main idea of the text. (skim)	The Pre-test	25	.40	.500	11.63	significance at 0.05
	The Post test	25	1.92	.277		
Identifying specific related details of the text. (scan)	The Pre-test	25	.44	.507	10.11	significance at 0.05
	The Post test	25	1.88	.332		
Recognizing the sequence of ideas, events or information stated in the passage.	The Pre-test	25	.40	.500	10.66	significance at 0.05
	The Post test	25	1.76	.597		
Identifying causes and effects.	The Pre- test	25	.56	.507	10.42	significance at 0.05
	The Post test	25	1.84	.374		
Literal level	The Pre- test	25	1.80	1.826	13.58	significance at 0.05
	The Post test	25	7.40	.816		
Identifying the meaning of unknown words out of context	The Pre-test	25	.44	.507	9.34	significance at 0.05
	The Post test	25	1.68	.690		
Drawing conclusions about	The Pre-test	25	.48	.510	10.66	significance at 0.05
	The Post test	25	1.84	.473		

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Skills	The experimental group	N	mean	SD	Critical value	Significance
the text.						
Making inferences about the text.	The Pre- test	25	.40	.500	6.53	significance at 0.05
	The Post test	25	1.68	.690		
Making predictions about the text.	The Pre- test	25	.28	.458	9.71	significance at 0.05
	The Post test	25	1.64	.638		
Inferential level	The Pre- test	25	1.60	1.658	13.95	significance at 0.05
	The Post test	25	6.84	.943		
Identifying the similarities and differences	The Pre- test	25	.56	.507	9.71	significance at 0.05
	The Post test	25	1.92	.400		
Distinguishing between facts and opinions	The Pre- test	25	.48	.510	9.89	significance at 0.05
	The Post test	25	1.88	.332		
Critical level	The Pre- test	25	1.04	.889	10.88	significance at 0.05
	The Post test	25	3.80	.645		
Giving several synonyms and antonyms for the words in the text.	The Pre- test	25	.32	.476	9.86	significance at 0.05
	The Post test	25	1.84	.554		
Suggesting different titles and ideas for the text	The Pre- test	25	.72	.458	5.05	significance at 0.05
	The Post test	25	1.64	.638		

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Skills	The experimental group	N	mean	SD	Critical value	Significance
Creative level	The Pre- test	25	1.04	.735	9.20	significance at 0.05
	The Post test	25	3.48	.872		
Overall skills	The Pre- test	25	5.48	4.360	15.92	significance at 0.05
	The Post test	25	21.52	1.558		

Table (8) shows that the estimated critical t value (15.92) for the overall reading comprehension skills is statistically significant at 0.05 level. Thus, it is evident that there is a statistically significant difference between the mean scores of experimental group on the pre- posttest in overall reading comprehension skills in favor of the post application as the mean scores of the experimental group students on the post application are higher than that of pre application in the overall test.

Also, the table shows that the estimated t value (13.58) for the overall literal reading comprehension skills is statistically significant at 0.05 level. Thus, it is clear that there is a statistically significant difference between the mean scores of the experimental group on the pre-posttest in overall literal reading comprehension skills and in each sub skill in favor of the post application as the mean scores of the experimental group students on the post application are higher than that of pre application in the overall literal reading test and in each sub skill. Therefore, it can be said that the program had a large effect on the experimental group students' overall literal reading comprehension skills and in each literal level sub skill.

In addition, the table shows that the estimated t value (13.95) for the overall inferential reading comprehension skills is statistically significant at 0.05 level. Thus, it is clear that there is a statistically significant difference between the mean scores of the experimental group on the pre-posttest in overall inferential reading comprehension skills and in each sub skill in favor of the post application as the mean scores of the experimental group students on the post application are higher than that of the pre application in the overall inferential reading test and in each sub skill. Therefore, it can be said that the program had

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a large effect on the experimental group students' overall inferential reading comprehension skills and in each inferential level sub skill.

Moreover, the table shows that the estimated t value (10.88) for the overall critical reading comprehension skills is statistically significant at 0.05 level. Thus, it is clear that there is a statistically significant difference between the mean scores of the experimental group on the pre-posttest in overall critical reading comprehension skills and in each sub skill in favor of the post application as the mean scores of the experimental group students on the post application are higher than that of the pre application in the overall critical reading test and in each sub skill. Therefore, it can be said that the program had a large effect on the experimental group students' overall critical reading comprehension skills and in each critical level sub skill.

Also, the table shows that the estimated t value (9.20) for the overall creative reading comprehension skills is statistically significant at 0.05 level. Thus, it is clear that there is a statistically significant difference between the mean scores of the experimental group on the pre-posttest in overall creative reading comprehension skills and in each sub skill in favor of the post application as the mean scores of the experimental group students on the post application are higher than that of the pre application in the overall creative reading test and in each sub skill. Therefore, it can be said that the program had a large effect on the experimental group students' overall creative reading comprehension skills and in each creative level sub skill.

Hypothesis Three

In order to verify the hypothesis, t- test for independent samples was used. Results of the t- test proved to be statistically consistent with the hypothesis. See table (9)

Table 9
T- test results comparing the post- application of the reading attitude scale mean scores for the experimental group and the control group in overall reading attitude scale and in each dimension separately

Items	The post application	N	mean	SD	Critical value	Significance	Effect size
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Items	The post application	N	mean	SD	Critical value	Significance	Effect size
When I read, I feel that I am totally engaged.	The control group	25	2.36	0.75	10.83	significance at 0.05	0.71
	The experimental group	25	4.00	0.00			Large
Reading makes me feel good.	The control group	25	2.32	0.74	10.02	significance at 0.05	0.67
	The experimental group	25	3.92	0.27			Large
I seldom read except when I have to	The control group	25	2.40	0.81	9.27	significance at 0.05	0.64
	The experimental group	25	3.96	0.20			Large
Reading is boring.	The control group	25	2.35	0.81	8.81	significance at 0.05	0.61
	The experimental group	25	3.92	0.27			Large
If it is not necessary, I prefer to avoid reading as much as possible.	The control group	25	2.32	0.81	8.35	significance at 0.05	0.59
	The experimental group	25	4.00	0.50			Large
I feel tired when I am presented with a reading text.	The control group	25	2.42	0.76	8.08	significance at 0.05	0.57
	The experimental group	25	3.78	0.40			Large

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Items	The post application	N	mean	SD	Critical value	Significance	Effect size
Reading is an important part of my life.	The control group	25	2.36	0.75	8.37	significance at 0.05	0.59
	The experimental group	25	3.80	0.40			Large
I always think of an excuse to get out of the reading classes.	The control group	25	2.34	0.75	8.37	significance at 0.05	0.59
	The experimental group	25	3.84	0.40			Large
Affective dimension/domain (comfort vs anxiety)	The control group	25	19	6.14	9.55	significance at 0.05	0.65
	The experimental group	25	31.20	1.73			Large
I think reading many books is advantageous to getting a job.	The control group	25	2.36	0.75	8.37	significance at 0.05	0.77
	The experimental group	25	3.80	0.40			Large
I think reading many books is advantageous to my major study.	The control group	25	3.32	0.80	8.22	significance at 0.05	0.76
	The experimental group	25	3.85	0.40			Large
I think reading many books is advantageous to getting qualifications.	The control group	25	2.36	0.75	8.37	significance at 0.05	0.77
	The experimental group	25	3.80	0.40			Large

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Items	The post application	N	mean	SD	Critical value	Significance	Effect size
I think reading many books enables me to acquire depth of knowledge and skills.	The control group	25	2.38	0.75	9.10	significance at 0.05	0.79
	The experimental group	25	3.92	0.40			Large
I think reading is useful to shape personality.	The control group	25	2.42	0.75	8.37	significance at 0.05	0.77
	The experimental group	25	3.80	0.40			Large
I feel a real sense of achievement after finishing reading.	The control group	25	2.36	0.75	8.37	significance at 0.05	0.77
	The experimental group	25	2.82	0.40			Large
I think my reading ability is advanced.	The control group	25	2.40	0.75	8.37	significance at 0.05	0.77
	The experimental group	25	3.80	0.40			Large
I think I read a lot.	The control group	25	2.42	0.75	5.22	significance at 0.05	0.60
	The experimental group	25	3.64	0.40			Large
Cognitive dimensions/ domain (Value vs self-perception)	The control group	25	18.88	6.06	8.50	significance at 0.05	0.77
	The experimental group	25	30.36	2.97			Large

Items	The post application	N	mean	SD	Critical value	Significance	Effect size
Overall scale	The control group	25	37.88	12.19	9.08	significance at 0.05	0.80
	The experimental group	25	61.65	4.59			Large

Table (9) shows that the estimated t value (9.08) for the overall reading attitude scale is statistically significant at 0.05 level. Thus, it is evident that there is a statistically significant difference between the mean scores of the control group and experimental group on the post application of the overall reading attitude scale and in each dimension separately in favor of the experimental group as the mean scores of the experimental group students are higher than that of the control group students in the overall scale. For further verification, the effect size for the overall reading attitude scale was calculated as shown in the previous table and found to be (0.80). Therefore, it can be said that the program had a large effect on the experimental group students' overall attitude towards reading compared with the control group students.

For the affective dimension (comfort vs anxiety), Table (9) shows that the estimated t value (9.55) is statistically significant at 0.05 level. Thus, it is clear that there is a statistically significant difference between the mean scores of the control group and experimental group on the post application of the affective scale and in each of its items separately in favor of the experimental group as the mean scores of the experimental group students are higher than that of the control group students in the overall scale. For further verification, the effect size for the affective dimension/ domain was calculated as shown in the previous table and found to be (0.65) and higher than (0.14) for each of its items. Therefore, it can be said that the program had a large effect on the experimental group students' overall affective dimension / domain compared with the control group students.

For the cognitive dimension (value vs self- perception), Table (9) shows that the estimated critical t value (8.50) is statistically significant at 0.05 level. Thus, it is clear that there is a statistically significant

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difference between the mean scores of the control group and experimental group on the post application of the cognitive scale and in each of its items separately in favor of the experimental group as the mean scores of the experimental group students are higher than that of the control group students in the overall scale. For further verification, the effect size for the cognitive dimension/ domain was calculated as shown in the previous table and found to be (0.77) and higher than (0.14) for each of its items. Therefore, it can be said that the program had a large effect on the experimental group students' overall cognitive dimension / domain compared with the control group students.

Hypothesis four

In order to verify the validity of this hypothesis, t- test for dependent samples was used. Results of the t- test proved to be statistically consistent with the hypothesis. See table (10)

Table 10

T- test results comparing the pre-post application of the reading attitude scale mean scores for the experimental group in overall reading attitude scale and in each dimension separately

Items	The experimental group	N	mean	SD	Critical value	Significance
When I read, I feel that I am totally engaged.	The Pre- test	25	2.30	0.59	14.73	significance at 0.05
	The Post test	25	4	0.00		
Reading makes me feel good.	The Pre- test	25	2.24	0.59	12.16	significance at 0.05
	The Post test	25	3.92	0.27		
I seldom read except when I have to	The Pre- test	25	2.20	0.59	14.01	significance at 0.05
	The Post test	25	3.96	0.20		

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Items	The experimental group	N	mean	SD	Critical value	Significance
Reading is boring.	The Pre- test	25	2.22	0.59	13.39	significance at 0.05
	The Post test	25	3.92	0.27		
If it is not necessary, I prefer to avoid reading as much as possible.	The Pre- test	25	2.26	0.59	11.29	significance at 0.05
	The Post test	25	4.00	0.000		
I feel tired when I am presented with a reading text.	The Pre- test	25	2.25	0.59	10.15	significance at 0.05
	The Post test	25	3.78	0.40		
Reading is an important part of my life.	The Pre-test	25	2.21	0.59	10.15	significance at 0.05
	The Post test	25	3.80	0.40		
I always think of an excuse to get out of the reading classes.	The Pre- test	25	2.29	0.59	10.15	significance at 0.05
	The Post test	25	3.84	0.40		
Affective	The Pre-test	25	17.92	4.77	12.71	significance

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Items	The experimental group	N	mean	SD	Critical value	Significance
dimension/domain (comfort vs anxiety)	The Post test	25	31.2	1.73		significance at 0.05
I think reading many books is advantageous to getting a job.	The Pre- test	25	2.20	0.59	10.15	significance at 0.05
	The Post test	25	3.80	0.40		
I think reading many books is advantageous to my major study.	The Pre- test	25	2.27	0.59	10.15	significance at 0.05
	The Post test	25	3.85	0.40		
I think reading many books is advantageous to getting qualifications.	The Pre- test	25	2.23	0.59	10.15	significance at 0.05
	The Post test	25	3.80	0.41		
I think reading many books enables	The Pre- test	25	2.25	0.59	13.39	significance at 0.05
	The Post test	25	3.92	0.42		

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Items	The experimental group	N	mean	SD	Critical value	Significance
me to acquire depth of knowledge and skills.						
I think reading is useful to shape personality.	The Pre- test	25	2.28	0.59	9.86	significance at 0.05
	The Post test	25	3.80	0.41		
I feel a real sense of achievement after finishing reading.	The Pre- test	25	2.20	0.59	10.15	significance at 0.05
	The Post test	25	2.82	0.42		
I think my reading ability is advanced.	The Pre-test	25	2.26	0.59	10.15	significance at 0.05
	The Post test	25	3.80	0.39		
I think I read a lot.	The Pre-test	25	2.28	0.59	7.00	significance at 0.05
	The Post test	25	3.64	0.43		
Cognitive dimensions/ domain (Value vs self-perception)	The Pre- test	25	17.96	4.70	10.91	significance at 0.05
	The Post test	25	30.36	2.97		

Items	The experimental group	N	mean	SD	Critical value	Significance
Overall scale	The Pre- test	25	35.88	9.47	11.89	significance at 0.05
	The Post test	25	61.65	4.59		

Table (10) shows that the estimated critical t value (11.89) for the overall reading attitude scale is statistically significant at 0.05 level. Thus, it is evident that there is a statistically significant difference between the mean scores experimental group on the pre and post applications of the overall reading attitude scale and in each dimension separately in favor of the post application as the mean scores of the experimental group students on the post application are higher than that of the pre application in the overall scale.

For the affective dimension (comfort vs anxiety), Table (10) shows that the estimated critical t value (12.71) is statistically significant at 0.05 level. Thus, it is clear that there is a statistically significant difference between the mean scores of the experimental group on the pre and post applications of the affective domain and in each of its items separately in favor of the post application as the mean scores of the post application are higher than that of pre application in the overall scale. Therefore, it can be said that the program had a large effect on the experimental group students' overall affective dimension / domain.

For the cognitive dimension (value vs self- perception), Table (10) shows that the estimated critical t value (10.91) is statistically significant at 0.05 level. Thus, it is clear that there is a statistically significant difference between the mean scores of experimental group on the pre and post applications of the cognitive domain and in each of its items separately in favor of the post application as the mean scores of the post application are higher than that of pre application. Therefore, it can be said that the program had a large effect on the experimental group students' overall cognitive dimension / domain.

5. Discussion

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“to what extent do Integrated Technical Education Cluster The aim of the present study was to develop reading comprehension skills and attitude towards reading for first year college level students at ITEC, using a program based on Thinking Maps. To achieve this aim, six questions were to be addressed and answered.

In order to answer the first question “ What are the EFL reading comprehension skills necessary for the integrated technical education cluster first year college students?”, the researcher reviewed literature and previous related studies to reading comprehension and provided a list of the necessary reading comprehension skills for first year college level students at ITEC after giving it to a panel of jury members and therefore modifying it in light of their suggestions.

In order to answer the second question first year college students acquire these skills?”, the researcher reviewed literature and previous related studies to reading comprehension and designed a reading comprehension test which was pre-administered on the participants of the study to measure their actual performance on the targeted reading comprehension skills before the treatment.

In order to answer the third and fourth questions, the researcher reviewed literature and previous related studies to the main variable of the study; thinking maps, reading comprehension skills, and attitude towards reading to determine the theoretical bases and the components of the program.

In order to answer the fifth and sixth questions", the researcher verified four hypotheses related to the main research question, as presented in the previous section of this chapter.

The results gained from this study confirmed that the program based on Thinking Maps significantly developed reading comprehension skills and attitudes towards reading among EFL learners, as the experimental group performed better and higher than the control group on the post applications of the study instruments after the treatment on overall reading comprehension skills and attitude towards reading. Also, the experimental group performed higher than the control group on the post application of the reading comprehension test and reading scale attitude as shown in the tables above. Also, the results of the study showed correlation between the development of reading comprehension skills and attitude towards reading as both variables have been developed

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together when comparing between the pre and post applications of the study instruments on both groups.

According to the results of the experimental group on the post application of the reading comprehension test, it can be concluded that students performed well at overall comprehension skills and in each sub-skill, yet variation in their performance was also clear as follows: the highest reading level to be developed was literal level skills; then the critical level skills came second while inferential level skills came third and the lowest level was the creative reading comprehension skills.

On the other hand, the results of the experimental group on the post application of the reading attitude scale indicated that Thinking Maps had effect on the students' attitudes related to emotions and feelings more than cognition and knowledge; one reason could be because of the nature of the thinking map program as it gave students more space to share ideas and work together and made them emotionally tied to reading due to the several activities of the program which asked students to work together and transfer their thoughts and ideas on the thinking maps through a visualization process.

Generally, the results of this study extend the results of previous studies such as (Schultz 2005; Russell 2010; Edwards 2011; Manning 2003, Holzman, 2004; Hyerle, 2000 - 2009). These effective results of the program based on Thinking Maps on developing EFL reading comprehension skills and attitudes towards reading may be attributed to the following:

- Using Thinking Maps as a visual thinking tools for developing reading comprehension skills and attitude towards reading helped students to create a visual approach that enabled them to organize their ideas, visualize their own learning and retain information. Visualizing thinking maps helped students to transfer their thoughts into words.
- Using Thinking Maps helped students to work together in pairs and groups and to activate their own prior knowledge and mentally represent the information and ideas they were attempting to achieve and reflect on what they have learned.
- Using the program based on Thinking Maps changed the traditional role of students in the learning process and encouraged

them to participate and share ideas which, in turn, put them at the center of the learning process.

- Using Thinking Maps urged and encouraged students to analyze, synthesizes and evaluate their ideas and recall them visually.
- The program helped students to be fully engaged in the learning process by providing them with opportunities to draw the maps and write the data and information they shared together on them as well as adjust such maps when possible.
- The program represented a new and unique experience for the students, so they were enthusiastic and exerted great effort to learn it which had a positive impact on their performance.

6. Conclusions, implications and suggestions for further research

6.1. Conclusion

It can be concluded that the program based on Thinking Maps is effective in developing EFL reading comprehension skills and their attitudes towards reading. These results support the success that Thinking Maps used to reveal in other contexts (Schultz 2005; Russell 2010; Edwards 2011; Manning 2003, Holzman, 2004; Hyerle, 2000 - 2009). To sum up, the results drawn from the present study can provide the basis for many other studies to be based on Thinking Maps to develop other language aspects and areas.

6. 2 Implications of the study

Based on the findings of the study, some implications for researchers, educators and curriculum designers are recommended as follows:

- It's recommended that EFL instructors should be trained well on using Thinking Maps in order to be able to deliver their reading lessons using such effective strategy.
- Students' attitudes towards reading should be investigated from the very beginning because, as observed in this study, it is an important element in the learning process.
- EFL Curriculum and course designers should take Thinking Maps and other visual tools into account when addressing reading comprehension skills.
- Giving students opportunities to work together in pairs and groups and visualize their learning is highly recommended.

6.3 Suggestions for further research

- While the main focus of this study was to investigate the effect of using Thinking Maps on developing EFL reading comprehension skills and attitude towards reading, further research is needed to address other language areas and aspects.
- Investigating the effect of Thinking Maps on reading comprehension skills in other educational stages.
- Research in the field of training pre- service and in-service teachers on using and adopting Thinking Maps is highly needed.

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