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Impact of Using Mind Maps to Improve Reading Comprehension Skills of Eighth Grade Students

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Abstract
Mind maps are the most effective tools to improve learners' reading comprehension skills, as learners can detect the relationships and connections between ideas, figures, examples and embedded details through these maps. The present study aimed to identify the impact of using mind maps on improving the reading comprehension of eighth grade students in Arsayfeh, Jordan. An experimental methodology of semi-experimental design was used on a sample of 60 students, studying in the first semester of the academic year (2023/2024), identified through purposive sampling technique. This sample was divided into two equal groups of 30 students each, experimental and control. The experimental group taught reading comprehension through mind maps techniques, while the control group was taught through using conventional teaching methods. A test of 30 items for assessing students' reading comprehension skills was developed. A significant difference between the control and experimental groups in terms of the means scores was found, in favor of the experimental group. The study recommends using mind maps in the process of teaching reading comprehension skills in the Arabic language to eighth grade students. For their effective use, training courses for 8th grade teachers about mind maps should be conducted. Studies may also be carried out addressing the impact of using mind maps with targeting other grades and variables, such as listening, speaking, and writing skills.

Keywords: Reading Comprehension, Mind Maps, Eighth Grade Students, Arabic Language.

Introduction

The global advancement in the different fields of knowledge has necessitated states to organize and invest their educational resources effectively. The development of educational systems has become vital in raising an educated generation, capable of facing the challenges of development in the future. It is not the amount of knowledge that indicates educational advancement, but the indicator lies in the manner pieces of information are organized and invested in real life. Hence, it is important to focus on the teaching-learning process, which is considered the main engine fostering advancement (Abdel Jalil, 2022; Alfeky, 2012; Alslaiti et al., 2023). One of the elements of the teaching-learning process is developing reading comprehension skills of students.

Reading plays an important role in developing one's personality in cognitive, emotional, behavioral and intellectual areas. It serves as a tool for expanding and acquiring factual knowledge, information and skills. As an integral part of teaching-learning process and meeting the learning goals, reading is the key for

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understanding texts of various genres (Al-Jubouri & Al-Sultan, 2013; Alkhateeb, 2009). When acquiring reading comprehension skills, a learner goes beyond the visual acknowledgement of written symbols (e.g. letters, words and sentences). The learner goes beyond pronouncing and understanding such symbols and connects the details in the written text with each other. In fact, reading is an audio-visual cognitive process that involves connecting written symbols –and its elements- with speech. In short, reading involves connecting the pronunciation of the written symbols with the mental meaning. Thus, reading is represented in pronouncing, understanding, criticizing, and analyzing the symbols and interacting with them. It is a real manifestation for speech and vocabulary, and also manifests the lives of people –who vary in terms of tastes, ideas and feelings- during various ages. Students cannot develop in academic and professional areas, unless they have good four language skills, i.e. listening, speaking, reading and writing skills (Al-Shabool, 2012; Lafi, 2015; Raslan, 2005).

The educational system in Jordan has been facing several challenges. Such challenges include students suffering from poor reading comprehension skills in basic schools. Al Qur'an (2018) found that (90 %) of the students in Irbid, Jordan, suffer from problems related to their reading comprehension. Due to the significance of being competent in Arabic language for acquiring knowledge in various scientific fields, the reading comprehension-related problems amongst many school students are considered an obstacle hindering those students from showing creativity (Muassomah, Yurisa, & Yahaya, 2022). Mathhar (2022) adds that the readiness of some students to acquire various reading skills rose from (14.4 %) in 2019 to (39.4 %) in 2021. Such a rise can be attributed to having many developments in the world in the field of ICTs. The Ministry of Education has exerted much effort to address this problem. Effective programs that aim at improving the reading comprehension skills of students were started, suitable for all ages and academic levels.

Despite making several efforts ad government and institutional levels, there exists a gap between the students of good and poor reading skills. This research stemmed from the idea that teachers must use a variety of instructional strategies and upgrade their own teaching skills. They should add such strategies that must make students serve as the basic pillar of the teaching-learning process. Teachers must emphasize the significance of using modern teaching strategies that raise students' motivation to learn and acquire reading comprehension skills and improve their overall academic achievement in all courses. Improving students' reading skills is also essential to improve their knowledge of the content of the entire curricula and raise their satisfaction with the teaching methods being used. The present study aimed to explore the impact of using mind maps, as a novel instructional strategy in the teaching-learning process to develop reading comprehension skills of the 8th grade students. To achieve this objective, the study examined the research question: Are there significant differences between the control and experimental groups in terms of the means on the reading comprehension test which can be attributed to the teaching method (teaching through using the mind maps or the conventional method)?

Literature Review

Reading comprehension, in this study, is defined as one's ability to recognize, understand, analyze and criticize written words, and sentences, measurable based on the score attained by each student in the reading comprehension test. The meaning of the term reading has evolved through the past few years. Al-Jubouri & Al-Sultan (2013), for instance, defined reading as a cognitive process, an intellectual process that aims to let one understand and conclude things. Reading is also defined as a cognitive-audio process, an enjoyable activity that involves reading as well as listening to an audio/written text. It has also come to be defined as the interaction of the reader with the written text and analyzing and criticizing it and investing time in it to solve problems and crucial situations and amending the reader's behaviour and ideas. During the recent period, several modern teaching strategies, tools and methods have emerged to teach reading. These tools were developed based on educational theories, and they effectively contributed to the development of teaching-learning process, in general and reading, in particular (Zaytoon, 2003). One of such strategies is mind mapping strategy.

Likewise, in this study, mind maps are defined as a method used for organizing pieces of information and improving one's thinking. It contributes to organizing one's ideas and collecting information in a visual and enjoyable manner. In mind maps, students may use various shapes, colors, and drawings that represent the relationships between the pieces of information in the text. Mind map aims to facilitate the processes of comprehending and organizing pieces of information. Buzan (2006) developed the mind mapping strategy. Initially, he developed it to use it as a scheme for organizing and categorizing ideas and tasks. The motive of Buzan's behind developing the mind mapping strategy is represented in acknowledging the fact that educational systems focus mainly on one side of the brain. This side is the left side used for logic, language, math, identifying a sequence and examining details. Buzan & Buzan (2010) acknowledged that educational systems overlook the right side of the brain and do not utilize the potentials of both sides. Such potentials are represented in using images, imagination, emotions, colors and holistic views for issues (Murley, 2007).

The idea of creating a mind map was inspired from the shape of a nerve cell (Abdelbari, 2010; Shawareh, 2020). Mind maps thus aim at letting people use the two sides of their brains (i.e. the right and left sides). They aim to meet this goal through using words, images, and colors that represent ideas, information and connects them with each other, often through keywords as an organizational scheme (Al-Jarf, 2009; Buzan, 2006; Siriphanich & Laohawiriyanon, 2010). It enables learners to have a better understanding for things and learn new things. It allows learners to store knowledge in their minds for a long time. It facilitates the retrieval of information. It combines images with words. It connects various meanings with each other through using arrows.

The main title is placed in the center of the mind map. As for the sub-ideas, they are placed in the form of branches that are grown in all the areas (Peng, 2011). To be specific, such links get weaker when they get farther from the center. They represent the transition from the main idea to the sub-ideas (Buzan, 2006). The center of mind maps may include keywords representing the main topic. It involves choosing the main concept or topic. Students are engaged in an activity that's based on such main concept. The mind maps are characterized by enabling students to arrange their ideas fast. They enable students to learn and retrieve information fast. The main idea is usually placed at the top of the mind map. The pieces of information are arranged from the top to the bottom to present the sub-ideas. However, the main idea may be placed in the middle and have sub-ideas derived on the sides (Khalaf, 2011).

Mind maps are considered amongst the most effective means for improving the learners' reading comprehension skills. Mind maps also assist students in reading texts, solving problems and making decisions (Sylvan & Christodoulou, 2010). They allow learners to detect the relationships and connections between the main ideas, figures, examples and embedded details in a reading text. Such details may be overlooked while the reader is using the conventional note taking means, but it is not possible when mind maps are used as an important mean. Mind mapping is effective in improving teaching-learning process as it contributes effectively to developing the students' higher thinking skills (Benavides, Rivera, & Rubio, 2010; Chaichompoo, 2017; Samonlux & Yimwilai, 2020). It serves as a mean used by students to organize and express their ideas in a manner that allows having a flow of ideas. Those ideas are connected with each other through using links that do not make the teacher feel bored. The strength of such links with the center varies.

The use of mind maps amongst students in the aim of developing the reading comprehension skills has been increasing, because mind maps serve as an effective means for organization information and improving students' understanding for information and reading comprehension skills. Mind map is a visual technique and a graphic organizer that includes pieces of information to be memorized. It organizes ideas, concepts and relationships graphically in the form of a pyramid or tree (Al-Awidi & Jaradat, 2015). Mind maps contribute to stimulating students' memories. They facilitate the retrieval of information from one's mind. Drawing a mind map and using keywords, and symbols in it shall stimulate the students' memories and strengthen the neural connections between various concepts in students' minds. Thus, using a mind map shall make it easier for students to retrieve information and concepts from their memories when needed (Abdel Razek, 2023).

Al-Zubaidi (2012) recommends using mind map in the teaching process as it serves as an interactive instrument that encourages students to collaborate and interact with information. As a useful strategy in teaching-learning process, mind mapping strategy can be used for taking notes and writing down pieces of information and organizing them in a manner that is more effective. This facilitates the processes of storing and retrieving pieces of information (Siriphanich & Laohawiriyanon, 2010; Taha & Dizaye, 2022). Additionally, creating a mind map shall oblige students to make decisions, identify relationships, and organize information in a manner that suits them. Thus, it transforms students from receptors of information into active learners who are engaged in the comprehension and learning processes (Al-Awidi & Jaradat, 2015). It will facilitate teaching students writing skills and organizing teachers' practices (Dorota, 2020).

Amer (2015) recommended following a few steps and suggestions to develop a mind map: (1) Right at the outset, it is suggested that while reading a text, the main ideas and sub-ideas must be written down on a piece of paper. Then, one must identify the ideas deemed as important and the ideas deemed as unimportant. That should be done in order to arrange them correctly in the branches and avoid having them mixed up together. (2) It is preferred to place the main title in the center of the paper. That shall provide the developer of the mind map with more freedom and smoothness in drawing the branches in all directions. Later, the developer must avoid placing the title at the top or bottom of the page to ensure having flexibility and ease during the process of arranging ideas. (3) When placing the main title, the developer of the mind map must avoid using a conventional figure. He/she must use a special figure, because it stimulates the human mind in a better manner. (4) The developer of the mind map must use curved lines when drawing branches derived from the main topic. Using curved lines shall provide the figure of the mind map with an interesting aesthetic aspect. It shall provide the figure of the mind map with an appealing and aesthetic element. It should contribute to promoting creativity among learners and stimulating their thinking. (5) It is preferred to use different colors for each branch in the mind map.

It is because colors are considered as important tools that stimulate one's mind and improve the process of retrieving information. Using a variety of colors shall enable learners to distinguish between ideas. It will make the map more attractive and easier to understand. (6) When drawing the mind map, one must use one keyword for each branch. He/she must color this keyword with a special color that is different from the other colors. He/she must choose one word as a title for each branch. That shall facilitate the process of memorizing ideas. It shall make information easy to understand and comprehend. (7)-The developer of the mind map must draw sub-branches deriving from each main branch. He/she must use special colors to distinguish between each set of branches from other sets. That shall contribute to making the mind map more organized. It shall facilitate the processes of tracking branches and identifying the relationships between them. It will make the information clearer and more comprehendible. (8) One must shed light on the important ideas and support students during the process of memorizing them. That can be done through drawing a circle or a square around important ideas. This step shall enable learners to distinguish between important and unimportant ideas. It shall facilitate the processes of remembering and understanding important ideas. (9) One must use drawings for representing the branches in the mind map. That shall facilitate the process of remembering the ideas and increase the extent of understanding them. Using figures and symbols serves as an effective means for boosting the processes of remembering and retrieving the information embedded in the mind map. (10) one must use arrows to connect each two similar ideas or several ones with each other. It serves as an excellent means for representing relationships, and connections between ideas. It facilitates the process of understanding the connections and interconnections between concepts. (11) Finally, there is no need to restrict the developer of the mind map to using one specific shape. In fact, the latter developer must be allowed to use his/her own creativity to come up with unique and suitable shapes. He/she must be allowed to add his/her own touches to the mind map.

Contrary to the aforementioned studies, the present study aimed to explore the impact of using mind maps on the reading comprehension skills of eighth grade students. Reviewing the previous studies enabled the researchers to choose the suitable statistical methods, and methodology. It also enabled us to develop the theoretical framework related to the study's variables, develop the study's instrument which targets several areas and includes several items, and discuss and interpret the results and offer recommendations and suggestions.

Methodology

Research Design

A quantitative, semi-experimental research design was adopted for this study. This methodology was suitable to explore the impact of using mind maps on the reading comprehension skills of eighth grade students, as the study explored the attitudes of students towards using mind maps. The study comprised one experimental group and another control group. The experimental group was taught using mind maps while the control group was taught through traditional methods. The study used two variables: reading comprehension level as the dependent variable; and the independent variable was represented in teaching the experimental group through using the mind maps and teaching the control group through using the conventional teaching method.

Sampling

The sample of the study comprised 60 8th grade students chosen from Salah Adeen Alayoobi School in Arsayfeh through a purposive sampling technique. The sample was divided into ly into two groups (i.e. the control and experimental groups). Such allocation was carried out through drawing lots involving several sections of eighth grades. Section (C) represents the control group. It consists of 30 students who were taught through using the conventional teaching method. Section (A) represents the experimental group. It consists of 30 students who were taught through using mind maps. Thus, the overall sample consists of (60) students.

Research Instrument

The data was collected through a reading comprehension test developed for this study, based on several past studies on reading comprehension. The goal identified for the reading comprehension represented measuring the reading comprehension skills. This test was based on the fourth unit entitled "Don't lose hope" and the fifth unit entitled "The river of fresh water" in the Arabic language curriculum of 8th grade. The test comprised two parts, each part having 15 questions. Each question was followed by items that assessed the reading comprehension skills of various skills. These items assessed students' literal, inferential and critical comprehension skills. These items also addressed skills developed on a set of indexes. The final version of the test had 30items. The test instrument also carried instructions to guide students how to answer questions, and also informed them about the goals and purpose of this experiment.

Data Collection and Research Procedure

The data was collected by administering the reading comprehension test on both groups. The experimental group was taught using mind maps and lessons about two targeted units chosen from the Arabic language curriculum of eighth grade. As for the control group, it was taught through conventional teaching methods, by giving lessons about the targeted units. A pre-test and a post-test were administered to both groups. The data was collected during the first semester of the year (2023-24). The research procedure involved simple steps. Right at the outset, the researchers familiarized themselves with the two targeted units sample used for this study prescribed in the Arabic language curriculum of 8th grade during the academic year 2023-2024. The teacher's guidebook was also analyzed for the sampled curriculum to set the goals of using mind maps clearly. A check list on the reading comprehension skills was developed that identified the targeted behavioral indicators representing such skills.

To facilitate the research procedure, a teacher's guidebook on mind maps was developed based on previous studies (Al-Zubaidi, 2012). The targeted outcomes were also identified along with the main ideas and sub-ideas on each topic through using the mind maps. The teacher's guidebook also included lesson plans, the manner in which to teach lessons using mind maps, course learning outcomes, the instruments and teaching aids needed for giving the lessons, and the assessment and evaluation activities. A permission letter from the university to facilitate the research was also obtained. After checking the reliability and validity of the test items, a pre-test was administered to both groups, followed by teaching sessions and ending the experiment with a post-test to both groups.

The teaching strategies were different for both the groups. While the control group was taught using conventional method of teaching reading comprehension, the experimental group was taught using mind maps techniques. The researchers engaged with students of both groups to ensure that they comply with the pre-set classroom rules. Each lesson was taught within the framework of these rules. For instance, to teach the fifth unit entitled "The river of fresh water," the teacher asked each student about important sources of fresh water, and showed how rivers were amongst such sources. Students were also informed that rivers were the subject of numerous Arabic poems, and they served as symbols of life and stability.

Based on students' responses, they were divided into small subgroups, and one student was nominated as the leader of each subgroup. Each subgroup was handed out papers and coloring pens for drawing and asked to write down or place their ideas in the designated places of a pre-drawn mind map, e.g., to identify the most important information representing a river. The teacher asked students several questions to stimulate their minds to come up with a variety of interesting ideas. The teacher would also present a mind map based on the text with some part(s) missing, and students were asked to complete the mind map. In the end, the students were also asked to present their ideas in separate mind maps. After finishing this activity, each group was asked to filter out and delete the unsuitable ideas from their maps.

Finally, all the students' mind maps were re-arranged on a large bulletin board on the wall to be used by all subgroups and develop a final version or one common mind map representing all the important ideas in the text. Each group refrained from criticizing the ideas submitted by students in other subgroups. On the bulletin board, while each subgroup suggested its ideas, the teacher asked students to imagine problems derived from the ideas in the text "The river of fresh water". The teacher also administered a reading comprehension quiz to ensure that the intended learning outcomes were met.

Data Analysis

The researchers used a number of statistical analysis methods such as frequencies and percentages were calculated to offer a description of the characteristics of each member of the sample. The internal consistency coefficient (Cronbach alpha coefficient) was calculated to check the reliability of the instrument, mean and standard deviations. A t-test was conducted to identify whether there are significant differences or not, and corrected correlation coefficient and Pearson correlation coefficient values were obtained.

Results

The validity of the test was measured through two methods face validity (validity measured by experts), and internal consistency validity. A group of 11 experts, comprising faculty members at Jordanian universities, Arabic language teachers and supervisors specialized in the Arabic language, assessed the initial version of the test. These experts offered their opinions about the alignment between the items of the test assessing the reading comprehension skills and the intended goals. They also checked the relevance of each item in terms of language and scientific validity and examined whether items fit with the level of 8th grade students. The experts were asked to make additions, deletions and amendments, so they re-drafted some items, and corrected the specimen responses of the items. After

making these changes, the test enjoyed high face validity. To check the internal consistency validity, the test was administered to an exploratory sample comprising (30) eighth grade students, outside the study sample. The values of the correlation coefficient between each skill in the test and the overall score in the test were calculated. Table (1) presents these values.

Table 1*: Correlation Coefficient Value Between Each Skill in The Reading Comprehension Test and The Overall Score.*

Sample size	Levels	Correlation coefficient		
		Literal comprehension.	**Inferential comprehension**	**Critical comprehension**
30	Literal comprehension	1**		
	Inferential comprehension	0.*75	1**	
	Critical comprehension	0.**77	0.**88	1**

** value is significant at the significance level of 0.01
* value is significant at the significance level of 0.05

Table 1 suggests the values of the correlation coefficient between each skill in the reading comprehension test and the overall score in the test are statistically significant at the significance level of (a= 0.05). They range between (0.75 – 0.88). They are all accepted statistically, which suggests that the test enjoys internal consistence validity, and that the test can be administered to the actual sample.

To check the reliability of the reading comprehension test, it was administered to an exploratory sample comprising 30 eighth grade female and male students, outside the actual sample. The values of the reliability coefficient for each reading comprehension skill (i.e. the literal, inferential and critical comprehension skills) and the overall test were calculated using Kuder–Richardson formula (KR 20). Table 2 presents the reliability coefficient values.

Table 2: *Reliability Coefficient Values using Kuder–Richardson Formula-20 (KR 20).*

Levels	Reliability coefficient values (KR-20
Literal comprehension	0.81
Inferential comprehension	0.79
Critical comprehension	0.78
Overall	0.84

Table 2 depicts the overall reliability coefficient value as 0.84. It is excellent value. The values of the correlation coefficient for the skills of the test range between (0.78 – 0.81). They are also accepted statistically, which indicates that the test enjoys reliability and can be administered to the actual sample. Finally, the **difficulty and discrimination coefficients** for each item in the test were calculated. The values of the difficulty coefficient range between (0.25 – 0.78). As for the values of the discrimination coefficient, they range between (0.25-0.85).

To ensure the equivalence of both groups, the means and standard deviations for the respondents' achievement on the pre-test in the dimensions and the overall score were calculated. It measured respondents' reading comprehension level and explored their attitudes. Table 3 presents the significant differences between the means, SD and t-test.

Table 3: *Means, SD and T-Test Results of Respondents' Achievement on Pre-Test in The Dimensions and The Overall Score.*

Levels	Group	Frequency	Mean	Std.	t- value	Df.	Sig.
Literal comprehension (pre-test)	Experimental group	30	3.33	1.688	-.159	58	.875
	Control group	30	3.40	1.567			
Inferential comprehension (pre-test)	Experimental group	30	4.93	2.420	.333	58	.741
	Control group	30	4.70	2.984			
Critical comprehension (pre-test)	Experimental group	30	5.37	1.810	.058	58	.954
	Control group	30	5.33	2.604			
Reading comprehension skills (pre-test)	Experimental group	30	13.63	4.590	.169	58	.866
	Control group	30	13.43	4.576			
Attitudes (pre-test)	Experimental group	30	3.04	.380	.119	58	.906
	Control group	30	3.02	.402			

Table 3 reveals that there is no significant difference - at the significance level of (a=0.05) - which can be attributed to group in any dimension nor in the overall score in the pre-test measuring reading comprehension. This result indicates that both groups are equivalent.

Having completed the validity, reliably and equivalence tests, the research question of the study was examined: Are there significant differences between the control and experimental groups in terms of the means on the reading comprehension test which can be attributed to the teaching method (teaching through using the mind maps or the conventional method)? To answer this question, it was necessary to identify whether there is a significant difference between the means of the respondents' achievements in the reading comprehension skills jointly and separately which can be attributed to the teaching strategy (i.e. teaching through using the mind maps or the conventional method).

Table 4 presents the means and standard deviations of the respondents' achievements in the pre-test, post-test and amended post-test in each reading comprehension skill. The targeted comprehension levels are the literal, inferential and critical comprehension skills. Those means and standard deviations are calculated in accordance with the teaching strategy. The targeted teaching strategies are mind mapping and conventional strategies.

Table 4: *Means and SD of respondents' achievements in pre-test, post-test and amended post-test in each reading comprehension skill and in accordance with the teaching strategy.*

Level	Strategy	Pre-test		Post-test		Corrected post-test	
		Mean	SD	Mean	SD	Mean	SD
Literal comprehension	The mind mapping strategy	3.33	1.688	5.80	1.186	5.782	.233
	The conventional teaching strategy	3.40	1.567	4.67	1.422	4.685	.233
Inferential comprehension	The mind mapping strategy	4.93	2.420	8.40	1.714	8.363	.308
	The conventional teaching strategy	4.70	2.984	7.00	1.857	7.037	.308
Critical comprehension	The mind mapping strategy	5.37	1.810	8.97	1.956	8.960	.323
	The conventional teaching strategy	5.33	2.604	7.23	1.695	7.240	.323

Table 4 gives sufficient evidence that there are differences between the meaning of the experimental group on the pre-test and the meaning of the experimental group on the post-test. The latter group was taught using the mind mapping strategy. It appears that there are differences between the meaning of the experimental group on the post-test and the meaning of the control group on the post-test.

Next, to identify whether those differences are significant or not, the one-way multivariate analysis of variance was conducted, to ensure that there is no significant difference between the two groups in terms of achievement on the pre-test in the three skills (i.e. the literal, inferential and critical comprehension skills). The results of the one-way multivariate analysis of variance are shown in Table 5.

Table 5: *One-way Multivariate Analysis of Variance and Means of Respondents on Post-test in Each Reading Comprehension Skill and in Accordance with the Teaching Strategy.*

Source of variance	Level	Sum of squares	Df	Mean square	F value	Sig.	Size of impact
The teaching strategy / Hotelling's Trace = .463 / Sig = .000*	Literal comprehension	17.973	1	17.973	11.011	.002	.167
	Inferential comprehension	26.321	1	26.321	9.284	.004	.144
	Critical comprehension	44.261	1	44.261	14.207	.000	.205
Intercept (Literal comprehension- pre-test)	Literal comprehension	.236	1	.236	.145	.705	.003
	Inferential comprehension	2.587	1	2.587	.913	.344	.016
	Critical comprehension	.852	1	.852	.273	.603	.005
Intercept (Inferential comprehension- pre-test)	Literal comprehension	9.046	1	9.046	5.542	.022	.092
	Inferential comprehension	26.846	1	26.846	9.470	.003	.147
	Critical comprehension	.014	1	.014	.005	.946	.000
Intercept (Critical comprehension- pre-test)	Literal comprehension	2.942	1	2.942	1.803	.185	.032
	Inferential comprehension	.245	1	.245	.086	.770	.002
	Critical comprehension	18.644	1	18.644	5.985	.018	.098
Error	Literal comprehension	89.778	55	1.632			
	Inferential comprehension	155.925	55	2.835			
	Critical comprehension	171.344	55	3.115			
Corrected total	Literal comprehension	118.733	59				
	Inferential comprehension	214.600	59				
	Critical comprehension	239.400	59				

The results of the analysis of variance in Table 5 show that the significance values of the instructional strategy and all the levels (i.e. literal, inferential and critical comprehension) are less than the significance level of ($a \leq 0.05$). Thus, the hypothesis that there is a significant difference -- at the significance level of ($a \leq 0.05$) -- between the means of the respondents' achievement in each reading comprehension skill. The latter difference is attributed to the teaching strategy. It can also be concluded that the significant difference is in favor of the experimental group, who were taught through using the mind mapping strategy. The corrected arithmetic means of the experimental group are higher than the corrected arithmetic means of the control group. The control group was taught using conventional teaching strategy. The effect size was calculated through Eta square. The Eta square values of the reading comprehension skills (i.e. literal, inferential and critical comprehension) are 0.167, 0.144 and 0.205 respectively. That means that 16.7 %, 14.4% and 20.5 % respectively of the changes (or improvement) in the performance of the respondents on the post-test - in each reading comprehension skill- can be attributed to the use of the mind mapping strategy.

Next, the means and standard deviations of the respondents on the post-test, pre-test and amended post-test in the reading comprehension skills were calculated jointly in accordance with the teaching strategies (the mind mapping and conventional strategies). These values are shown in Table 6.

Table 6: *Means and SD of Respondents on Post-test, Pre-test and Amended Post-test in Reading Comprehension Skills Jointly in Accordance with the Teaching Strategies.*

Teaching strategy	Achievement in the pre-test		Achievement in the post-test		Corrected mean	Standard error
	Mean	SD	Mean	SD		
Mind mapping	13.63	4.590	23.17	3.563	23.145	.606
Conventional	13.43	4.576	18.90	3.315	18.922	.606

Table 6 shows that there is a difference between the meanings of the members of the experimental group in the pre-test and post-test. The group was taught using mind mapping strategy. It appears that there is a difference between the means of the members of the experimental and control groups in the post-test.

To identify whether those differences in the post-test are significant or not, the one-way analysis of variance was conducted in all the reading comprehension skills jointly. It was conducted after ensuring that both groups are equivalent in the pre-test. Table 7 presents the results of this latter test.

Table 7. *Results of the One-way Analysis of Variance for Respondents in Post-test in All the Reading Comprehension Skills Jointly in Accordance With the Teaching Strategy.*

Source of variance	Sum of squares	Df.	Mean square	F value	Sig.	Effect size
Teaching strategy	267.330	1	267.330	24.270	.000	.299
Pre-test (Intercept)	59.011	1	59.011	5.357	.024	.086
Error	627.855	57	11.015			
Overall	959.933	59				

The results of the analysis of variance in Table 7 show that the significance value of the teaching strategy is 0.000. It is less than the significance level of ($a \leq 0.05$). Thus, the alternative hypothesis is accepted. Thus, it is accepted that there is a significant difference - at the significance level of ($a \leq 0.05$) - between the means of the respondents' achievements in all the reading comprehension skills jointly which can be attributed to the teaching strategy.

Additionally, based on the means, it can be concluded that the significant difference is in favor of the experimental group that was taught using the mind mapping teaching strategy. The corrected meaning of the experimental group is higher than that of the control group which was taught using the conventional teaching strategy. The effect size was calculated through using Eta square. It is (0.299). It means that (29.9 %) of the changes (or improvement) in the achievement of the respondents in the reading comprehension skills jointly on the post-test can be attributed to the use of the mind mapping strategy.

The study also yielded the results that there are significant differences - at the significance level of ($a \leq 0.05$)- between the means of the respondents which can be attributed to the teaching strategy. This difference is in favor of the experimental group which was taught using the mind mapping strategy. The corrected mean of the experimental group in the post-test is 23.145, while for the control group, it is 18.922. This means that the use of the mind mapping strategy is effective and positively affects the reading comprehension skills of students. It was found that there are significant differences between the experimental and control groups in the reading comprehension post-test. These differences are in the favor of the experimental group which was taught through using the mind mapping strategy.

Discussion

The study is evidence of the fact that mind mapping strategy makes the process of retrieving information easier. It also enables learners to store information for a long period of time, as it increases the interaction between learners in classrooms when exerting effort to comprehend the texts. It lets each student handle an individual responsibility through engaging him/her in discussions. The result in this regard is in agreement with the result of Al-Zubaidi (2012), who also found that using mind maps contributes to developing the comprehension and communication strategies. Thus, using mind maps contributes to developing the reading strategies used by students. It enables students to identify the links and relationships between the written text and the prior expertise. It also contributes to deepening the students' comprehension of the text and makes them interact effectively and positively.

The differences between the achievement levels of the control and experimental groups may be attributed to the use of the mind mapping strategy. Using this modern strategy encouraged students to examine the targeted written texts. It stimulated the students' memories, as it engaged students in a conversation letting them exchange ideas, facts, and information. It made students engage effectively in the process of comprehending the targeted texts through carrying out enjoyable mind map-based activities. The result in this regard is in agreement with the result reached by Shawareh (2020), who found that using mind maps enables learners to connect the pieces of information with each other to represent one image and one idea.

Such differences may also be attributed to the enjoyable activities that are part of the mind-mapping strategy. When engaged in these activities, students engage in planning, organizing, drawing, and coloring activities. They also engage in discussions and making interacting through questions. This positively affected the higher thinking skills of students and developed their reading comprehension skills. This is consistent with Al-Awidi & Jaradat (2015), who also found several advantages of mind mapping strategy such as it enables students to comprehend things faster, it motivates students to study, and makes learning enjoyable, and raises learners' motivation to learn.

The mind mapping strategy has a positive impact on the reading comprehension skills of the experimental group. This impact may be attributed to the fact that the teacher let the students conduct a logical analysis of the written texts. It may also be attributed to the fact that the teacher let the students organize the main ideas and the sub-ideas. Such an organization process makes ideas easier to comprehend, store and retrieve from one's memory. The latter impact may be attributed to the fact that this strategy enables students to connect the new pieces of information with the previous ones in an organized and planned manner. This made it easier for students to remember and retrieve information from their memories.

These results may be attributed to the fact that the mind mapping strategy is not limited to remembering and retrieving information. In fact, this strategy aimed to encourage students to talk, write and link the recently acquired pieces of information with their previous expertise. It also encouraged students to implement the recently acquired pieces of information in their daily lives. It lets the students learn through engaging them in physical, cognitive and sensory learning processes. This raises the students' self-confidence levels and foster interaction among students in class. It increases the extent of exchanging ideas and holding discussions about opinions in class. It motivates students to express their ideas and opinions in an active classroom environment which is dominated by mutual respect. In this environment, students listen to different opinions. This classroom environment contributes to developing the students' thinking and language development. It contributes to making the students feel happy and excited. It contributes to developing the students' reading comprehension skills (Farrand, Hussain, & Hennessy, 2002; Shawareh, 2020).

Conclusion

To conclude, it is now proven in this study that mind maps have a positive impact on reading comprehension skills of students. Such skills involve carrying out a process of interaction between the reader and the text with the help of mind maps. This process enables the reader to identify the embedded meaning in the text or re-structure the meaning of the text. It enables the reader to come up with the ideas embedded in the text and make judgments about the topic of the text. Mind mapping involves having the reader employing his/her previous knowledge, attitudes, motives and expectations. It involves having the reader examine the text and its content. It involves having the reader organize and present ideas in the text. Learning reading comprehension through mind maps involves having an interaction between the reader and the text.

Using maps has positive impacts on the students' reading skills. It encourages students to acquire information and provides them with the opportunity to learn about the way of connecting concepts with each

other to come up with a new concept. Using mind maps enables students to detect the relationships between the items of the content. It allows students to understand written texts in a better manner. It contributes to developing the students' reading comprehension skills, because it enables the students to focus on the main idea and the sub-ideas of the text. It contributes to fostering such development, because it enables students to come up with their own ideas.

This study provides readers with both theoretical and practical implications. Theoretically, this study yielded new positive results which contribute to improving the teaching methods used and redefining students' teaching strategies of reading comprehension. This study offers such results through shedding a light on mind maps. It is expected that this study shall provide readers with data about the meaning of reading, and mind mapping, and will enable teachers and researchers to identify the characteristics and advantages of the mind mapping method. It should inform them about the way of developing and employing mind maps. Practically, this study findings shall prove beneficial for researchers interested in Arabic language instruction. It is expected that this study shall be beneficial for the decision makers in the Ministry of Education in general and the decision makers in the curricula development department in the latter ministry.

It is expected that this study shall enable those people to come up with new methods that improve the students' reading comprehension skills. Such methods should have high reliability and validity levels. This study shall encourage Arabic language teachers to use mind maps to keep up with the rapid scientific developments related to the teaching-learning process in general and the developments of the students' reading and reading comprehension skills in particular. Thus, it contributes to identifying the significance of using mind maps by the Arabic language teachers. It identifies the significance of using mind maps for meeting goals related to language teaching and reading. The study faced a few limitations such as human limitations as the sample was confined to only the eighth-grade students in Salah Adeen Alayoobi School. The spatial limitations were that the study was conducted only in one school in Arsayfeh, Zarqa. The temporal limits also restricted this study as it focused only on the first semester of the academic year 2023-2024. The study also had thematic limitations as it was limited to two academic units that were chosen from the Arabic language curriculum of eighth grade, namely the fourth and fifth units.

In the light of these results, the study would like to make a few recommendations. First, mind maps should be used in the classrooms as teaching tools to develop the reading comprehension skills of 8th grade students. Second, training courses and workshops for 8th grade teachers about mind maps should be conducted to help them learn and use mind maps effectively. It will also promote knowledge about the meaning, and levels of reading comprehension. Such training workshops should promote knowledge about the teaching strategies used for developing reading comprehension skills and the way of implementing them. Finally, studies should be conducted that aim to explore the impact of using mind maps in Arabic language lessons with targeting other variables and grades. Such variables may include listening, speaking or writing skill.

References

Abdel Jalil, A. A. M. (2022). Using Mind Maps to Develop Inferential Comprehension Skills Among Ninth Grade Students in the State of Kuwait. *Journal of Faculty of Education - Benha University, 33*(131), 453-490. doi: https://doi.org/10.21608/jfeb.2022.285450

Abdel Razek, H. M. R. (2023). The Difference in the Presentation Style of Mind Maps (Static-Constructional) in an Electronic Learning Environment on Modifying Alternative Perceptions of Some Educational Concepts Among Home Economics Students. *Journal of the Faculty of Education, Benha University, 34*(134), 179-230. doi: https://doi.org/10.21608/jfeb.2023.315986

Abdelbari, M. (2010). *Reading Comprehension Strategies, Their Theoretical Foundations and Practical Applications*. Dar Al-Masirah for Publishing, Amman. Retrieved from https://www.massira.jo/sites/default/files/fhras_9.pdf

Al-Awidi, H. M., & Jaradat, Y. (2015). The Effect of Using Electronic Mind Maps on Developing Reading Comprehension Skills in English Language for Ninth Grade Students. *Jordanian Journal of Educational Sciences, 11*(4), 469-480. Retrieved from https://journals.yu.edu.jo/jjes/Issues/2015/Vol11No4/5.pdf

Al-Jarf, R. (2009). Enhancing Freshman Students' Writing Skills with a Mind Mapping Software. In *5th International Scientific Conference, eLearning and Software for Education, Bucharest* (pp. 375-382). Bucharest, Romania. Central and Eastern European Online Library (C.E.E.O.L.). Retrieved from https://files.eric.ed.gov/fulltext/ED633878.pdf

Al-Jubouri, I. J., & Al-Sultan, H. H. (2013). *Curricula and Methods of Teaching Arabic Language*. Dar Al-Radwan, Amman.

Al-Shabool, M. Q. (2012). The School and Its Role in Acquiring Language Skills From the Point of View of Arabic Language Teachers in Jordan. In *Conference on Ways to Advance the Arabic Language-The Thirtieth Cultural Season of the Jordanian Academy of Arabic Language* (pp. 177-213). Jordanian Academy of Arabic Language. Retrieved from https://search.mandumah.com/Record/482708

Al-Zubaidi, A. L. H. (2012). *Knowing the Effect of Using the Mind Map Method in the Achievement of Arabic Grammar Rules Among Fifth-Grade Literary Female Students* (Master's Thesis, University of Babylon). Retrieved from https://search.shamaa.org/fullrecord?ID=63229

Al Qur'an, A. M. (2018). The Reading Skills of Regular Students and Students with Reading Difficulties (Dyslexia) at the Fourth Grade in Primary Public Schools in Irbid Governante: A Comparative Study. *Journal of Al-Quds Open University for Educational & Psychological Research & Studies, 9*(25), 136-149. Retrieved from https://digitalcommons.aaru.edu.jo/jaqou_edpsych/vol9/iss25/9

Alfeky, A. M. (2012). Using Mind Maps Through the Mind Manager Program in Teaching History to Develop Metacognitive Skills Among First-Year Secondary School Students. *Tanta University - Faculty of Education, 48*(2), 189-221. Retrieved from https://search.mandumah.com/Record/522022

Alkhateeb, M. (2009). *Arabic Language Curricula and Methods of Teaching It in the Stages of General Education*. Al-Warraq Foundation for Publishing and Distribution, Amman.

Alslaiti, F., Al-Zaboun, M., Al-Ali, A., & Younis, H. (2023). The Effectiveness of Using Teaching Strategies in Developing Some Levels of Reading Comprehension and the Attitude Towards Them Among First-Year Secondary School Students in Jordan. *Association of Arab Universities Journal for Education and Psychology, 21*(1), 87-137. Retrieved from https://digitalcommons.aaru.edu.jo/aaru_jep/vol21/iss1/3

Amer, T. (2015). *Mind Maps and Learning Skills (Your Way to Build Your Smart Ideas)*. Dar Al-Kutub Al-Masryia, Cairo.

Benavides, S., Rivera, F., & Rubio, M. (2010). *Improving reading comprehension skills by using mind-mapping software with students of bachelor's degree in English attending reading and writing in English II course* [Unpublished doctoral dissertation]. Universidad de Oriente, San Miguel, El Salvador.

Buzan, T. (2006). *Mind Mapping*. Pearson Education.

Buzan, T., & Buzan, B. (2010). *Mind Map Book, 1/e*. Rajpal & Sons.

Chaichompoo, C. (2017). Using e-Mapping to Improve Reading Comprehension and Summary Skills of EFL Students. *NIDA Journal of Language and Communication, 22*(1), 129-138. Retrieved from http://cmruir.cmru.ac.th/bitstream/123456789/1484/2/94738-Article_Chalermchai.pdf

Dorota, Z. (2020). Mapping teachers' personal epistemologies – Phenomenographical approach. *Thinking Skills and Creativity, 38*, 100722. doi: https://doi.org/10.1016/j.tsc.2020.100722

Farrand, P., Hussain, F., & Hennessy, E. (2002). The efficacy of the `mind map' study technique. *Medical Education, 36*(5), 426-431. doi: https://doi.org/10.1046/j.1365-2923.2002.01205.x

Khalaf, A. A.-S. (2011). Mind Maps in Developing Language Skills and Creative Abilities in Preschool Children. *Journal of Educational Sciences, Cairo University, 19*(2), 159-219. Retrieved from https://search.mandumah.com/Record/114907

Lafi, S. (2015). *Teaching Contemporary Arabic*. Cairo, Dar Al-Fikr.

Mathhar, A. (2022). *A Plan to Improve Students' Reading Skills Over the Next Five Years*. Al-Ghad Jordanian Newspaper.

Muassomah, M., Yurisa, P. R., & Yahaya, M. F. b. (2022). Mind Mapping: Reading Comprehension Technique of Arabic Texts for Students in Higher Education. *Jurnal Al Bayan: Jurnal Jurusan Pendidikan Bahasa Arab, 14*(2), 438-455. doi: https://doi.org/10.24042/albayan.v14i2.14350

Murley, D. (2007). Mind Mapping Complex Information. *Law Library Journal, 99*(1), 175-183. Retrieved from https://ssrn.com/abstract=958633

Peng, S. (2011). *The Effect of Combining Mind Map and Electronic Picture-Books on Fourth-graders' Reading Comprehension Ability and Reading Motivation* (Master's thesis, National Pingtung University of Education).

Raslan, M. (2005). *Reading and Writing Skills "Theory and Application"*. Dar Al-Thaqafa for Publishing and Distribution, Amman.

Samonlux, P., & Yimwilai, S. (2020). The Effects of Electronic Mind Mapping on Students' Reading Abilities. *International Journal of Education and Social Science Research, 4*(3), 112-129. Retrieved from https://ijessr.com/uploads2020/ijessr_03_334.pdf

Shawareh, S. M. (2020). *The Effect of the Electronic Mind Map Strategy on Developing Reading Comprehension Skills Among Ninth Grade Female Students and Their Attitudes Towards Reading* (PhD thesis, Yarmouk University). Retrieved from https://search.mandumah.com/Record/1124689

Siriphanich, P., & Laohawiriyanon, C. (2010). Using Mind Mapping Technique to Improve Reading Comprehension Ability of Thai EFL University Students. In *The 2nd International Conference on Humanities and Social Sciences*. Retrieved from http://fs.libarts.psu.ac.th/research/conference/proceedings-2/4pdf/001.pdf

Sylvan, L. J., & Christodoulou, J. A. (2010). Understanding the Role of Neuroscience in Brain Based Products: A Guide for Educators and Consumers. *Mind, Brain, and Education, 4*(1), 1-7. doi: https://doi.org/10.1111/j.1751-228X.2009.01077.x

Taha, N. H., & Dizaye, K. F. (2022). Impact of Zingiber Officinale on Symptoms and Hormonal Changes During the Menopausal Period–A Clinical Trial in Duhok, Iraq. *Journal of Natural Science, Biology and Medicine, 13*(2), 133-141. doi: https://doi.org/10.4103/jnsbm.JNSBM_13_2_7

Zaytoon, K. (2003). *Teaching: Its Models and Skills*. Alam Al-Kutub, Cairo.