

Improving Reading Comprehension of Iranian High School Students via Graphic Organizers

Mahmood Hashemian^{1*}, Bashir Jam², Sahar Naraki³

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1. Shahrekord University, Shahrekord, Iran; m72h@hotmail.com
 2. Shahrekord University, Shahrekord, Iran; b_jam47@yahoo.com
 3. Shahrekord University, Shahrekord, Iran; hasti_6735@yahoo.com

*Corresponding Author: Mahmood Hashemian

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Abstract

Among the different strategies for teaching reading comprehension, graphic organizers have received much attention by many researchers and practitioners. This study investigated the effects of graphic organizers on Iranian EFL learners' reading comprehension. Fifty female 3rd-year high school EFL learners were selected by means of the NELSON test (200A). They were divided into 2 groups of 25 homogeneous students: 1 experimental group and 1 control group. Participants were given a reading comprehension test before the treatment. Later, the experimental group—Group A—received the graphic organizers intervention, and the control group—Group B— received a traditional reading instruction (translation-based). After an 8-week treatment, both groups were given the reading comprehension test again as an immediate posttest. Finally, after a 6-week delay, participants were given the delayed posttest. Statistical analysis showed a significant difference in the reading comprehension of the groups in favor of the experimental one. Conclusions are that the use of graphic organizers had positive effects on the L2 learners' reading comprehension. Findings have implications for L2 pedagogy, suggesting the incorporation of graphic organizers into L2 teachers' class curriculums and involvement of L2 learners in the learning process.

Keywords: graphic organizers, reading comprehension, EFL learners

I. INTRODUCTION

Spatial learning strategies are considered to be kinds of promising strategies used by L2 learners that pave the way for efficiently extracting, remembering, and retrieving information from an

expository or academic textbook—one of the most difficult reading situations which learners come across in schools (Holley & Dansereau, 1984). The use of graphic organizers is one of such spatial learning strategies that most researchers/practitioners have confirmed its effectiveness (Griffin, Malone, & Kameenui, 1995). According to the cognitive learning theory, the learning process is managed through short- and long-term sorting and encoding factors existing in the system of memory. Moreover, in the environment of presenting information in a systematic manner and also classifying it in an organized, meaningful, and workable way, in the learners' mind, learning can be considerably achieved (McElroy & Coughlin, 2009). Zaini, Mokhtar, and Nawawi (2010) claim that graphic organizers can be very effective in helping L2 learners to achieve meaningful learning. To put it simply, graphic organizers are graphical or spatial representations of the different concepts embedded in texts. Researchers also add that graphic organizers assist L2 learners to organize the new information and concepts and make clear the relationships between them and the other existing concepts in L2 learners' minds.

The purpose of this study was to examine the effects of using graphic organizers, as during reading activities, on EFL learners' reading comprehension and also to have a comparison between this strategy and a traditional strategy for instructing reading comprehension. In view of the stated objectives, three research questions of the study are:

1. Does instruction on graphic organizers affect L2 learners' reading comprehension?
2. Is there a significant difference between the reading comprehension scores of Group B (those receiving the traditional method for reading comprehension—translation) and Group A (those receiving the graphic organizers intervention for reading comprehension)?
3. Do the instructional effects remain after a 6-week delay?

II. LITERATURE REVIEW

Graphic organizers are visual, and spatial displays designed to facilitate the teaching and learning of textual materials through the “use of lines, arrows, and a spatial arrangement that describe text content, structure, and key conceptual relationship” (Darch & Eaves, 1986, p. 310). Gill (2007) defined graphic organizers as visual and spatial illustrations which show the relationships existing between concepts of a text and their effectiveness covers almost all kinds of subject areas. Graphic organizers are “visual displays teachers use to organize information in a manner that makes the

information easier to understand and learn” (Meyen, Vergason, & Whellan, 1996, p. 132). Also, Jones, Pierce, and Hunter (1988/1989) stated that “a good graphic organizer can show the key parts of a whole and their relations, thereby allowing a holistic understanding that words alone can’t convey” (p. 21).

In other studies, “graphic organizers have taken the form of anything from hierarchical listing of vocabulary terms to elaborate visual-spatial displays with accompanying descriptions and phrases” (Griffin & Tulbert, 1995, p. 86). Graphic organizers can come in a number of different forms, from illustration of objects to structures including hierarchical and cyclical ones (Ciascai, 2009). Although it is thought that graphic organizers can be beneficial only to visual learners, as a matter of fact, different learners with different learning styles can considerably benefit from using these organizers (ibid, 2009). Notwithstanding any special names that graphic organizers are labeled (e.g., semantic map, structured overview, web, concept map, semantic organizer story map, etc.), all graphic organizers are visual illustrations of knowledge. They arrange and also single out important concepts and structures of a text (Bromley, Irwin-DeVitis, & Modlo, 1995).

A. Schema Theory

Schemata are dynamic cognitive structures in mind that contain learners’ existing knowledge (Winn & Snyder, 1996). The schema theory is a cognitive theory which indicates that when a person is reading a text, his or her rate of learning depends on two factors: One factor is new information which is received from the text, and another is his or her previously learned knowledge (Anderson & Pearson, 1984). The most significant point related to the schema theory is “information that fits into a (student’s) existing schema is more easily understood, learned, and retained than information that does not fit into an existing schema” (Slavin, 1991, p. 164). Based on the schema theory, learners get new materials and store them in their existing channels, structures, or hierarchies of their mind (Dye, 2000). Dunston (1992), regarding the effectiveness of graphic organizers, states that they “organize information to be learned, connect it to what is known, and allow the reader to interact with the text” (p. 59). Moreover, as Ausubel (1963) mentioned, graphic organizers can be very effective techniques to activate learners’ existing knowledge and then establish connections between their background knowledge and the new information. Dye (2000) also noted that “the graphic organizer has its roots in schema theory” (p. 72).

According to Guastello, Beasley, and Sinatra (2000), a vital task of teachers is to ensure that L2 learners have enough background knowledge related to the new information and also provide L2 learners with special tools or techniques to link up the new information to their previously learned knowledge. They justified their claims by this reason that if students do not have enough background knowledge to connect it with the new information, they may not be able to comprehend the new materials. Thus, “our ability to understand and remember new information is critically depends upon what we already know and how our knowledge is organized” (Clifton & Slowiaczek, 1981, p. 142). Through applying graphic organizers, L2 learners can make linkage between new materials and their prior knowledge and also creating appropriate schema for anchoring new concepts to them (Guastello *et al.*, 2000).

B. Dual Coding Theory

According to the dual coding theory (Paivio, 1986), there are two highly interconnected, but separate, systems of information processing in our memory. One system is the verbal system that deals with linguistic codes—language—and the other is the visual system which deals with visual codes—images. In the case of presenting information both visually and verbally to the memory, we can witness considerable memory enhancements (Anderson & Bower, 1973; Denis & Mellet, 2002; Just, Newman, Keller, McEleney, & Carpenter, 2004). Retrieving and internalizing this kind of information is very easy for L2 learners because instead of one mental representation—visual or mental—two simultaneous mental representations—visual and verbal—are available for them (Paivio, 1986).

Considering what is mentioned by the researchers in the above statements, graphic organizers are directly applicable to the dual coding theory because almost all types of graphic organizers involve both verbal and visual displays (Anderson & Bower, 1973; Denis & Mellet, 2002; Just *et al.*, 2004). Moreover, the findings of several studies (e.g., Alverman & Boothby, 1986; Ritchie & Volkl, 2000; Robinson & Schraw, 1994) confirm this point that graphic organizers really enhance our memory of a text because these organizers do separate processing in the brain, which belong to different channels, simultaneously.

C. Cognitive Load Theory

“Cognitive load is a term used to describe the amount of information processing expected of the learner. Intuitively, it makes sense that the less cognitive load a learner has to carry, the easier learning should be” (Chalmers, 2003, p. 598). The cognitive load theory states that if we can reduce the amount of variables (e.g., unnecessary or extraneous cognitive learning load) that put obstacles in the way of converting working memory to long-term memory, we can consequently optimize learners’ comprehension in a significant way (Sweller, 1988). Due to the fact that the working memory’s capacity is low, based upon what Sweller mentioned, the usefulness of different learning techniques depends on their capability to decrease the amount of excessive and unessential cognitive load on this memory. Kintsch and van Dijk (1978) noted that through eliminating unimportant and extraneous details, graphic organizers emphasize more important points, structures, and relationships of content and facilitate learning process. Moreover, what has changed the various viewpoints of a number of instructional designers towards graphic organizers was the point that in the light of graphic organizers, L2 learners did not have to spend much time to get the intended message and to put the information in appropriate locations (Robinson & Schraw, 1994).

III. METHODOLOGY

A. Participants and Materials

Sixty Iranian third-grade high school students participated in the study. They were all female and aged between 17 and 18. They were studying in the high schools of Gachsaran—a city in South West of Iran. Initially, they were divided into two homogenous groups of 25, based on their performance on a Nelson English Language Proficiency Test (NELPT; Fowler & Coe, 1976). From the 60 students who were tested through the Nelson test, 10 students whose scores were 1 or 2 standard deviation up or under the mean were excluded from the study (see Table 1):

Table 1: High School L2 Learners’ Demographic Information

Groups	Age	Gender	
		Male	Female
Experimental	17-18	0	25
Control	17-18	0	25
Total	17-18	0	50

The Nelson test—section 200A (*Nelson English Tests, Book 2*, intermediate)—consisted of three sections: cloze tests, structure, and vocabulary in the form of multiple-choice questions. The allotted time was 45 min for 50 items. It was used in order to homogenize the two groups in terms of their average general English proficiency.

A reading comprehension pretest, whose texts were adapted from a book named *Select Reading*, was used to examine the participants' reading comprehension ability before the experiment. The pretest which comprised 29 questions was developed by the researchers and also edited under the supervision of some professional teachers of different schools in the city. To standardize the test, it was administered to a pilot group of 100 students, who were studying in third-grade of high school, but they were not selected for the study and they were students of other schools. The language proficiency of the pilot group was roughly the same as the participants of the study. Having analyzed the 100 students' answers to the test, the researchers modified some of the items and a few items were tossed out. The internal consistencies for the reading comprehension items were substantial with Cronbach's alpha coefficient of .84. This indicated that the reliability of this test was quite acceptable.

B. Procedure

The experiment took an 8-week schedule to complete. Before the experiment, the Nelson test was administered to ensure the homogeneity of the two classes in terms of average language proficiency, and the participants were divided into two classes of 25. Then, the pretest with 29 items was given to make sure that the participants were also homogeneous in terms of their reading comprehension ability and as a base to measure their improvement during the term. The time given for this test was 90 minutes. The correct answer for each item received 1 point, and there was no penalty for false responses.

In the first session of the experiment, the teacher explained the facilitative impact of graphic organizers and continued to teach reading comprehension via these organizers during the following sessions. She instructed the students to consider the following points in order to come up with appropriate graphic organizers: "Read each test carefully, and then, find the important concepts embedded in each paragraph and finally, according to the relationship between those concepts, draw the appropriate graphic organizer." Next, the participants were given a text to read because they were not that much able to create the suitable graphic organizer they were paired up. Meanwhile,

the teacher was walking around the participants to see how they developed the graphics. Finally, the appropriate graphic organizers were provided by the teacher on the board. The teacher asked the participants to discuss the text in order to check their comprehension. In the other sessions of the experiment, the same work was done.

In Group B (i.e., the control group), traditional/mainstream methods of instruction like using the translation technique were employed. In the final session of the experiment, the immediate posttest was administered, and the reading comprehension ability of the participants in the two groups was tested.

Six weeks later, a delayed posttest was administered to both groups to see whether using graphic organizers had a long-term effect or not.

IV. RESULTS

The reading comprehension ability of the participants, as measured by the immediate posttest and delayed posttest, was compared across the two groups. The analyses were done using Statistical Package for Social Science (SPSS Inc., 2009).

Prior to the analysis of the results, the participants' scores on the Nelson test were compared across the two groups to make sure that the two groups were homogeneous. To achieve this goal, an independent samples *t* test was conducted. The descriptive data are shown in Table 2. Additionally, the results from the independent samples *t* test are reported in Table 3:

Table 2: *Descriptive Statistics for the Nelson Proficiency Test Scores*

	Group	<i>N</i>	Mean	Std. Deviation	Std. Error Mean
Nelson Proficiency Test	Group A	27	22.11	6.947	1.337
	Group B	26	21.23	7.090	1.390

Table 2 shows that the mean of the Nelson proficiency test scores was slightly higher in Group A ($M = 22.11$) than the mean in Group B ($M = 21.23$). To ensure that the difference was not significant and the groups were homogeneous before the experiment, the results of the independent samples *t* test should be considered (see Table 3):

Table 3: Independent Samples *t* Test for Nelson Proficiency Test Scores

		Levene's Test for Equality of Variances		<i>t</i> Test for Equality of Means						
		<i>F</i>	<i>Sig.</i>	<i>t</i>	<i>df</i>	<i>Sig.</i> (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Nelson Proficiency Test	Equal Variances Assumed	.140	.710	.457	51	.650	.880	1.92	-2.99	4.75
	Equal Variances Not Assumed			.456	50.82	.650	.880	1.92	-2.99	4.75

The results of the independent samples *t* test, reported in Table 3, revealed that the difference between the proficiency scores of the two groups was not statistically significant, $t(51) = .457$, $p = .650$ (2-tailed). Therefore, there was not any significant difference between the participants in Groups A and B with respect to their performance on the Nelson proficiency test. This suggested that participants of the two groups were homogeneous at the beginning of the experiment.

In order to investigate the first research question regarding the effect of graphic organizers on the L2 learners' reading comprehension, paired samples *t* tests were run on the pretest and immediate posttest scores for both the experimental and control groups. The minimum alpha for confirmation of the research hypothesis was set at .05. At first, the descriptive data for both Groups A and B are displayed in Table 4. Similarly, the results from the paired samples *t* tests are reported in Table 5:

Table 4: Descriptive Statistics for the Pretest and Immediate Posttest Scores

Groups			Mean	<i>N</i>	Std. Deviation	Std. Error Mean
Group A	Pair 1	Pretest	12.28	25	1.792	.358
		Immediate Posttest	15.08	25	2.216	.443
Group B	Pair 1	Pretest	12.80	25	2.021	.404
		Immediate Posttest	12.96	25	2.071	.414

Considering the reading comprehension scores of Group B illustrated in Table 4, the mean scores of the immediate posttest ($M = 12.96$), and the pretest ($M = 12.80$) were roughly the same. But, with respect to Group A, Table 4 shows that the reading scores were not equivalent for the two tests, and the mean score of posttest ($M = 15.08$) was higher than the mean score of pretest ($M = 12.28$) in this group. Although the mean score of the two tests were different, it was not clear whether this difference was significant or not. Therefore, paired samples t tests were carried out on the pretest and immediate posttest scores (see Table 5):

Table 5: Paired Samples t Tests for the Pretest and Immediate Posttest Scores

Groups			Paired Differences				T	df	Sig. (2-tailed)	
			Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
						Lower				Upper
Group A	Pair 1	Pretest - Immediate Posttest	-2.800	1.73	.346	-3.515	-2.085	-8.08	24	.000
Group B	Pair 1	Pretest - Immediate Posttest	-.160	1.14	.229	-.632	.312	-.700	24	.491

The results of the t test in Table 5 revealed that there was a statistically significant difference between the participants' performance on the reading comprehension pretests and immediate posttests in Group A, $t(24) = -8.08$, $p = .000$ (2-tailed). Therefore, the participants' reading comprehension improved significantly after receiving instruction using the graphic organizers.

To deal with the second research question considering the difference between the mean scores of the two groups on the immediate posttest and comparing these means with the participants' mean scores on the pretest, an independent samples t test was used to analyze the data. The descriptive data for the immediate posttests are shown in Table 6. In addition, the results from the independent samples t test are displayed in Table 7.

Table 6: Descriptive Statistics for the Immediate Posttests Scores

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Immediate Posttest	Group A	25	15.08	2.216	.443
	Group B	25	12.96	2.071	.414

Table 6 shows that immediate posttest scores were not equivalent for the two groups: The mean score of the immediate posttest in Group A ($M = 15.08$) was higher than the mean score of Group B ($M = 12.96$). But the significance of these differences in the immediate posttest scores needs to be checked in the independent samples t test in Table 7:

Table 7: Independent Samples t Test for the Immediate Posttests Scores

		Levene's Test for Equality of Variances		t Test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Immediate Posttest	Equal Variances Assumed	.052	.821	3.49	48	.001	2.12	.607	.900	3.34
	Equal Variances Not Assumed			3.49	47.78	.001	2.12	.607	.900	3.34

The results of the independent samples t test, presented in Table 7, revealed that the difference between the immediate posttest scores of Groups A and B was statistically significant, $t(48) = 3.49$, $p = .001$ (2-tailed). This suggested that, with respect to the immediate posttest scores, the participants in Group A outperformed those who were in Group B:

Finally, to find whether the instructional effect of graphic organizers would remain after a 6-week delay (i.e., the third research question), paired samples t tests were conducted. The descriptive data of the L2 learners' reading comprehension scores with respect to Groups A and B are demonstrated in Table 8, and the results of the paired samples t tests are presented in Table 9.

Table 8: Descriptive Statistics for the Pretest and Delayed Posttest Scores

Groups			Mean	N	Std. Deviation	Std. Error Mean
Group A	Pair 1	Pretest	12.28	25	1.792	.358
		Delayed Posttest	14.16	25	1.993	.399
Group B	Pair 1	Pretest	12.80	25	2.021	.404
		Delayed Posttest	12.32	25	2.688	.538

The mean scores and standard deviations of the pretests and delayed posttests with respect to Groups A and B are presented in Table 8. As shown in Table 8, mean score for the delayed posttest was greater than the mean score of the pretest in Group A (pretest $M = 12.28$, delayed posttest $M = 14.16$) and in Group B (pretest $M = 12.80$, delayed posttest $M = 12.32$) mean score for the delayed posttest was smaller than the mean score of the pretest. Although the two sets of scores were different, it was not clear whether these differences were statistically significant or not. Therefore, paired samples t tests were run (see Table 9):

Table 9: Paired Samples t Tests for the Pretest and Delayed Posttest Scores

Group			Paired Differences					t	df	Sig. (2-tailed)
			Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
						Lower	Upper			
Group A	Pair 1	Pretest - Delayed Posttest	-1.880	1.26	.254	-2.404	-1.35	-7.40	24	.000
Group B	Pair 1	Pretest - Delayed Posttest	.480	1.68	.337	-.216	1.17	1.42	24	.168

The results of the paired samples tests shown in Table 9 indicated that the difference was statistically significant between the pretest and delayed posttest scores for Group A, $t(24) = -7.40$, $p = .000$. On the contrary, Table 9 shows that there was not any statistically significant difference ($p > .05$) between the two sets of scores in Group B, $t(24) = 1.42$, $p = .168$. Accordingly, the positive effect of instruction using the graphic organizers on the participants' reading comprehension remained after a 6-week delay.

In addition, to examine the difference between the delayed posttest scores in Groups A and B, an independent samples *t* test was run. The descriptive data for the delayed posttest scores are shown in Table 10. Additionally, the results from the independent samples *t* test are reported in Table 11:

Table 10: Descriptive Statistics for the Delayed Posttest Scores

	Groups	<i>N</i>	Mean	Std. Deviation	Std. Error Mean
Delayed Posttest	Group A	25	14.16	1.993	.399
	Group B	25	12.32	2.688	.538

Table 10 shows that the mean of delayed posttest scores were greater in Group A ($M = 14.16$) than in Group B ($M = 12.32$). To determine if this difference was significant, an independent samples *t* test was computed (see Table 11):

Table 11: Independent Samples *t* Test for the Delayed Posttest Scores

	Levene's Test for Equality of Variances		<i>t</i> Test for Equality of Means							
	<i>F</i>	<i>Sig.</i>	<i>t</i>	<i>df</i>	<i>Sig.</i> (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
								Lower	Upper	
Delayed Posttest	Equal variances assumed	3.33	.074	2.74	48	.008	1.84	.669	.494	3.18
	Equal variances not assumed			2.74	44.26	.009	1.84	.669	.491	3.18

Table 11 which illustrates the results of the independent samples *t* test revealed that there was a statistically significant difference ($p < .05$) between the delayed posttest scores of Groups A and B, $t(48) = 2.74, p = .008$.

Based on the observed results, deductions could be made that there was still a significant difference between the reading comprehension ability of the participants who were instructed using the graphic organizers and those who were taught using the traditional translation techniques after a 6-week delay.

V. DISCUSSION/CONCLUSION

This study reaffirmed the findings of Hawk (1986) that life science students who received training in graphic organizers got higher scores on the pretest in comparison to the control group. The results of this study are in tune with Tang's (1992) who noted that the dual coding functions of graphic organizers opened up this opportunity for the learners to have both visual and verbal representations of the information. Consequently, in this way, the L2 learners were able to recall a considerable amount of the information. Additionally, the findings of this study are consistent with those of Öztürk's (2012) who found that a 12-week treatment in the experimental group—those who received training in graphic organizers—had positively affected their reading comprehension achievement. Finally, the findings here are similar to the findings of Jiang (2012) who found that the discourse the structure graphic organizer group significantly outperformed the traditional instruction group on the delayed posttest, even seven weeks after instruction.

It should be mentioned that the results of some other studies (Bean, Singer, Sorter, & Frazee, 1986; Griffin, Malone, & Kameenui, 1995; Simmons, Griffin, & Kameenui, 1998) are at odds with the results of the present study because they failed to demonstrate an improvement in the learners' comprehension, and they found graphic organizers training no more effective than instruction via other strategies.

There are a host of reasons that may justify the findings of this study: First, because of the dual coding functions of graphic organizers, L2 learners should be provided with two simultaneous mental representations—visual and verbal—of the information and, as a consequence, information will be more easily learned and comprehended by the learners (Paivio, 1986).

Second, while employing graphic organizers, L2 learners are not forced to learn all the components of the texts. They will gradually learn to have important points and concepts of the texts in their minds and eliminate the unimportant parts. By doing so, the amount of the cognitive load on their memory will be decreased, and the learning process will be facilitated (Kintsch & van Dijk, 1978). This point is related to the cognitive load theory which lends support to the use of graphic organizers.

Third, according to Ausubel (1968), schemas are existing framework of categories in the mind and the places where the information is filled in. Additionally, Dye (2000) mentions that “schema theory states that a person takes new information and stores it in preexisting hierarchies or channels” (p. 74). Graphic organizers help L2 learners to build appropriate schemas through making linkages between the new information and the existing information in the minds of students that, consequently, in this environment, meaningful learning occurs.

Forth, considering this issue that the practice effect must have been somewhat neutralized after this long period of delay and also through changing the order of items, it is reasonable to conclude that the superior performance of Group A was more likely because of the permanent effect of graphic organizers treatment which had resulted in their improvement in the knowledge of text structure.

The possible reason for the permanency of the effect of graphic organizers treatment can be the active involvement of L2 learners in constructing graphic organizers. L2 learners’ participation in creating appropriate graphic organizers not only motivates them to do the work but, as Smith (2010) has noted, also deepens their understanding of the important structures and concepts embedded in reading texts.

Even though the present study did not include any kind of questionnaires to ask the L2 learners for their opinions about the use of graphic organizers, the instructor noticed that the attitude of Group A towards reading in English had positively changed. Group A participants expressed that the employment of this strategy had boosted their confidence for reading—even complicated English texts. These observations are consistent with the findings of Mede (2010) and Carrell (1985).

Reading comprehension, as Öztürk (2012) mentions, has proved to be a complicated skill for many learners, in particular those who read in an L2. We noted that vocabulary, culture difference, and text structure are among those difficulties which may hinder the way of comprehending the texts for L2 learners. Graphic organizers can be very effective tools to assist L2 learners in overcoming some of those difficulties. For example, they can be so influential in enhancing their comprehension of reading texts with different text structures (ibid, 2012).

By using graphic organizers, readers will be able to extract the necessary information from the materials and put them in suitable templates that are built by the readers themselves. Moreover, graphic organizers will give the readers the ability to transfer this skill to other different contexts (Rajan & Sam, 2013).

As a whole, as the data analysis revealed, graphic organizers are effective tools to improve L2 learners' understanding in reading comprehension and also encourage them to read even intricate English texts. Additionally, utilizing graphic organizers as a strategy for reading instruction has proved to be more efficient than other strategies such as translation.

A number of limitations should be stated related to this study. First of all, this sample study was formed by the English language learners at preintermediate level—there is a need for more studies to be formed by other learners from different levels. Second, because of the rigid laws existing in schools, the time allocation for the experiment was not that much satisfactory. Third, some questioners regarding the attitudes of L2 learners and instructors towards graphic organizers are needed. Forth, the number of the participants included in the study was small, and the findings may not be generalized to other situations. In order to make a somehow reasonable generalization regarding the findings of this study, further research on the effect of graphic organizers on L2 learners' reading comprehension can recruit a large number of participants with different English proficiency levels and various backgrounds.

The time of the experiment should be increased in future studies to achieve more reliable results. To have well-made graphic organizers and to find efficient ways for their instruction, future researchers can include some questioners which examine the attitudes of L2 learners and instructors towards employing this strategy. This study focused on the relationship between graphic organizers and reading comprehension; other studies can be done on the relationship between graphic organizers and other language skills and components. Moreover, a replication of this study may examine the effects of student-generated graphic organizers in comparison to teacher-generated ones on L2 learners' reading comprehension achievements.

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