The Effect of Concept Maps on Reading Comprehension Skills of Elementary School Students with Reading Disabilities

Waleed Fathi Awad Hendi[1]

[1] Assistant professor of special education, Alexandria University, Egypt.

Abstract
This study investigated the effect of using concept maps on improving reading comprehension of reading disabled students in primary four. A total of 40 students identified with RD participated. The sample was divided into two groups; experimental (n= 20 boys) and control (n= 20 boys). ANCOVA and T .test were employed for data analysis. Findings from this study indicated the effectiveness of concept maps on improving reading comprehension in the target students. On the basis of the findings, the study advocated for the effectiveness of concept maps on improving reading comprehension in reading disabled students.

Keywords :concept maps, reading comprehension, reading disabilities .

Introduction

Reading comprehension is defined as the active process of ‘‘simultaneously extracting and constructing meaning through interaction and involvement with written language’’ (Oliver, 2009: 2). There are too many students who struggle to read and have difficulty completing literacy assignments (Mohammed, M. Fatah Allah,2014). It is recommended that students be taught multiple strategies to improve their reading comprehension, including predicting and summarizing, questioning, and using graphic organizers (Burdumy et al. 2006; Zmach et al. 2007). Research indicates seven categories of text comprehension instruction are effective, including the ‘‘use of graphic and semantic organizers… where readers make graphic representations of the material to assist comprehension’’ (Esam, 2015,24).

Concept maps are graphical tools for organizing and representing knowledge. They are used to categorize information into a graphic form, create a visual representation of the concepts within the text, the relationships among them and the text structure (Sturm & Rankin-Erickson, 2002). They include concepts enclosed in boxes and relationships between concepts through the use of connecting lines and words linking two concepts (Novak & Cañas, 2006). Graphical tools convert a linear isomorphic text into a nonlinear graphic presentation, which makes the macrostructure of the text more salient. Their spatial properties help readers identify, compare and retain information or draw inferences about relations, supporting, in this way, cognitive processing that do not overload students’ working memory. The content within a text becomes conceptually transparent and therefore it becomes easier for the readers, especially the ones with poor language and reading skills, to understand, retain and retrieve it (Esam, 2015; Mourad, 2012; Novak & Cañas, 2006; O’ Donell, Dansereau & Hall; Vekiri, 2002).

Concept mapping and Reading comprehension

Chularut and DeBuker (2004), examined the effect of concept mapping on achievement, self-regulation, and self-efficacy when reading an English text. The major participants of the study were 39 students attending a Center for English as a Second Language located on the campus of a major university in the Midwest, US. According to the scores obtained on Michigan Test of English Language Proficiency, the participants were divided into four language proficiency levels: 19 students for beginner level, 20 for intermediate level, 20 for advanced level, and 20 for expert level of proficiency.

By using stratified random assignment, students were assign to two experimental groups: 40 student in concept mapping group, and 39 students in the individual study plus discussion group. Before starting the intervention, all participants were given the Achievement Test and the Survey of Learning Behaviors as pre-test. Following pre-testing, all students participated in five 60-miniute study sessions. Each session was devoted to reading one English passage. In these study sessions, either concept mapping or individual plus

discussion was employed. All students were encouraged to study each passage in order to understand both stated and implied information in the passage .the findings showed that all students made progress from pre-test to post-test in all variables of self-efficacy, self-monitoring, and achievement. However , the groups which used concept mapping technique showed statically greater gains from pre-test to post-test than individual study group.

Oliver (2009) investigated how well 74 6th-grade science students represented text structures from a 900- word textbook chapter on soil conservation, given a concept map template with four superordinate terms and 24 unsorted concepts. Findings suggest students were more successful at classifying pre-selected terms under given superordinate categories than they were at fully identifying relevant concept sets and articulating three different relationship types between terms. No significant differences were noted in the mapping performance of students at different reading levels. About two-third of students indicated they enjoyed concept mapping and would prefer to both read and map rather than just read without mapping. Students also expressed a strong preference for mapping in pairs or small groups compared to mapping alone. Multiple recommendations are provided for improving the relational thinking of students tasked with concept mapping expository science texts, including bridging to more open-ended maps, embedding mapping in longer-term inquiry projects, and leveraging collaborative and tool-based scaffolds.

Omid Tabatabaei & Soghra Khalili (2014)examined the use of concept maps (a meta cognitive technique) to aid reading comprehension of Iranian pre- intermediate L2 learners in one of the language institutes in Shiraz. The researcher wanted to find appropriate answers to the following research questions 1) does the application of concept mapping technique have any significant effect on Iranian pre-intermediate L2 reading comprehension 2) do Iranian pre-intermediate L2learners have positive attitude toward the application of concept maps in their reading classes? For this, 30 pre-intermediate L2 learners were selected and assigned as experimental group. This experimental group received instruction on how to use concept mapping technique as a pre-reading activity. This group took part in language classes twice a week for one hour and half and reading activities covered thirty minutes of the whole class and also they completed two thirty-minutes reading comprehension tests, one as the pre-test and the other as the post-test. The results of Wilcoxon Sign Rank test showed that the participants in concept mapping group performed better in post-test than in pre-test administration. Moreover, the results of Chi-square revealed that, on the whole, L2 learners had positive attitudes toward using concept mapping technique in reading classes.

Further research is necessary to build on the vast amount of research into concept mapping technique with reading disabled students. This will allow researchers to determine how concept mapping technique can be best used as an intervention with learning disabled students as there is a dearth of research with this population. In order to address this issue with the lack of research on concept mapping technique with reading disabled students . Thus the present study seeks to give answers to the following questions.

1- Are there differences in post-test scores mean between control and experimental groups on Reading Comprehension Test?

2- If the programme is effective in improving reading comprehension of experimental group, is this effect still evident a month later?

Methods

Participants

40 students participated in the present study. Each student participant met the following established criteria to be included in the study: (a) a diagnosis of RD by teacher's referral. Neurological scanning results indicated that those individuals were neurologically deficient (b) an IQ score on the Mental Abilities Test (Mosa, 1989) between 90 and 118 (c) reading performance scores at least 2 years below grade level (d) absence of any other disabling condition. Students were randomly classified into two groups: experimental (n=20 boys) and control (n= 20 boys).

The two groups were matched on age, IQ, and reading comprehension. Table 1. shows means, standard deviations, t- value, and significance level for experimental and control groups on age (by month) ,IQ and reading comprehension (pre-test).

Table 1. *means, standard deviations, t- value , and significance level for experimental and control groups on age (by month),IQ, and reading comprehension (pre-test).*

Variable	Group	N	M	SD	T	Sig.
Age	Experimental	20	118.06	1.96	-1.436	Not sig.
	Control	20	120.01	2.01		
IQ	Experimental	20	98.25	5.65	-1.937	Not sig.
	Control	20	101.95	6.40		
Reading	Experimental	20	17.10	2.65	-.539	Not sig.
comprehension	Control	20	16.20	2.32		

Table 1. shows that all t- values did not reach significance level. This indicated that the two groups did not differ in age, IQ, and reading comprehension (pre-test) .

Instrument

Reading Comprehension Test. The test was developed to assess reading disabled children's skills in reading comprehension. It was based on the features of comprehension skills recognized by Mourad Ali (2005). The test consists of (44) items assessing word recognition, and comprehension with score ranging from 0-1 on each item and a total score of 44. The test has demonstrated high internal consistency with Cronbach's α ranging from 0.79 to 0.84.

Procedure

Screening: Primary five students who participated met the following established criteria to be included in the study: (a) a diagnosis of RD by teacher's referral. Neurological scanning results indicated that those individuals were neurologically deficient (b) an IQ score on the Mental Abilities Test (Mosa, 1989) between 90 and 118 (c) reading performance scores at least 2 years below grade level (d) absence of any other disabling condition.

Pre-intervention testing: All the forty students in grade four completed the reading comprehension test which was developed to assess reading disabled children 's skills in reading comprehension.

General Instructional Procedures: Instruction was delivered after school, in the multipurpose room . Permissions were obtained from students' fathers, and the school principal . Students received 3 training sessions a week , lasting between 40 and 45 min .

Design and Analysis

The effects of implementing concept maps Intervention on students' reading comprehension skills were assessed using a repeated-measures design, pre- post- and follow-up testing.

Results

Table 2. shows data on ANCOVA analysis for the differences in post- test mean scores between experimental and control groups in reading comprehension test. The table shows that the (F) value was (966.160) and it was significant value at the level (0.01).

Table 2. *ANCOVA analysis for the differences in post- test mean scores between experimental and control groups in comprehension test*

Source	Type 111 sum of squares	df	Mean square	F	Sig.
Pre	5.858	1	5.858		
Group	2209.299	1	2209.299	966.160	0.01
Error	84.492	37	2.284		
Total	2325.375	39			

Table 3 shows t-test results for the differences in post- test mean scores between experimental and control groups in reading comprehension test. The table shows that (t) vale was (33.72). This value is significant at the level (0.01) in the favor of experimental group. The table also shows that there are differences in post- test mean scores between experimental and control groups in comprehension test in the favor of experimental group.

Table 3. *T-test results for the differences in post- test mean scores between experimental and control groups in comprehension test*

Group	N	Mean	Std. dev.	t	Sig.
Experimental	20	33.70	1.10	33.72	0.01
Control	20	19.15	3.12		

Table 4. shows data on repeated measures analysis for reading comprehension test. The table shows that there are statistical differences between measures (pre- post- follow–up) at the level (0.01).

Table 4. *Repeated measures analysis for comprehension test*

Source	Type 111 sum of squares	df	Mean square	F	Sig.
Between groups	2511.675	1	2511.675	555.174	0.01
Error 1	171.917	38	4.524		
Between Measures	2663.617	2	1331.808	368.689	0.01
Measures x Groups	1517.850	2	758.925	210.096	0.01
Error 2	274.533	76	3.612		

Table 5. shows data on Scheffe test for multi-comparisons in reading comprehension test.The table shows that there are statistical differences between pre and post measures in favor of post test , and between pre and sequential measures in favor of follow -up test , but no statistical differences between post and follow -up test.

Table 5. *Scheffe test for multi- comparisons in comprehension test*

Measure	Pre M= 16.20	Post M= 33.70	Sequential M= 33.10
Pre	--	--	--
Post	17.50*	--	--
Sequential	16.90*	.600	--

Discussion

The main objective of the present study was to explore the effects of implementing concept maps intervention on students' reading comprehension skills. The results of this study as revealed in tables 3, 5, show that implementing concept maps intervention was effective in improving reading comprehension of students in experimental group, compared to the control group whose individuals were left to be taught in a traditional way.

Participants of this study fall into the minimum IQ of 90, nevertheless, they have learning disability. Thus IQ score cannot account for learning disabilities. The results of the present study support that conclusion with evidence that students who participated in the study do not fall into the low IQ range, however they have learning disabilities. When designing a program based on concept maps intervention, they had statistical increase in reading comprehension.

This goes in line with what Mourad Ali et al (2006) notes that there is one problem " students who are identified as learning disabled often cover any special abilities and talents, so their weakness becomes the focus of their teachers and peers, ignoring their abilities. Mourad Ali (2007), however , notes that "learning disabled, as well as gifted students can master the same contents and school subjects", but they need to do that in a way that is different from that used in our schools.

Experimental group gained better scores in reading comprehension than did control groups in post-tests though there were no statistical differences between the two groups in pre- test. This is due to the program which met the experimental group's needs and interests. On the contrary, the control group was left to be taught in a traditional way.

This goes in line with our adopted perspective which indicates that traditional methods used in our schools do not direct students as individual toward tasks and materials , and do not challenge their abilities. This may lead students to hate all subjects and the school in general. On the contrary, when teachers adopt concept maps intervention that suits students interests and challenge their abilities with its various modalities.

Implications

The results of this study have several important implications. This study adds to the literature on the effectiveness of concept maps intervention with learning disabled students. Results appear to indicate that concept maps intervention is an effective instructional strategy for improving reading comprehension test scores of students with learning disabilities. Concept maps intervention provide students with a visual representation of the content in a text and this may facilitate the learning of content knowledge.

References

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