

Effectiveness of Working Memory Training on the Reading Performance of Elementary Students with Learning Disabilities in Reading

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Abstract: The present study examined the efficacy of working memory training on reading performance of students with Reading learning Disability at primary school. The study statistical population consisted of elementary boys students in the third grade with Reading learning Disability in the 2013 – 2014 academic years in Esfahan. To conduct this study, 30 male students with Reading learning Disability with multistage cluster sampling method selected and randomly assigned to experimental and control groups. Research methods were experimental design with pre-test - post-test. Instruments used were the fourth edition of the children Wechsler intelligence test and a list of symptoms of dyslexia. Data were analyzed statistically using analysis of covariance. The results showed that working memory training on reading performance of students with Reading learning Disability at primary school was effective. Given that working memory is one of the basic skills of reading, the approach may be effective in the treatment of Reading learning Disability.

Keywords: Reading learning Disability, working memory, reading performance

1. Introduction

Dare to be learning the most fundamental process that results in being unable and helpless at the time of the interaction and physical growth of a person evolved cognitive abilities and the power of ideas that he has no limit. Immense variety of human learning and development when the extent of his lifetime, the cause is that despite large differences in learning together, some people are having difficulty in the regular teaching and learning (Kargar Shureki, Malekpour and Ahmadi, 2010). Learning disabilities major cause of poor academic performance in school age are every year many students because the learning materials are difficult. The students of average intelligence but typically have higher education than other students in the same show more educational performance of poor Despite being in a good learning environment and the lack of

obvious biological waste acute psychological and social problems, with an average intelligence capable of learning in specific areas (reading, writing, calculation) are not. Children with learning disabilities feel different from others. And harassment by his classmates and teachers are likely to neglect (Karande, S, Mahajan, V, & Kulkarni, M, 2009). When children talk with the teacher and other students do not make eye contact with them and they often face difficulty in understanding the social value and misinterpret the emotions of others (Hallahan, DB. Kafman, JM, 2007). Learning disabilities are a heterogeneous group of disorders that is characteristic such as difficulty in learning and functions of listening, speaking, reading, and writing and calculating. The baseline neurological disorders and processes begin before school age and continue until

adulthood (Asli Azad and Yarmohammadian, 2012).

Learning from failure is the most common cause of dyslexia. According to the revised fourth edition of the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders Dyslexia is characterized by a drop in reading achievement according to chronological age, measured intelligence, and age-appropriate education, much lower than the expected amount dyslexia and the other on academic achievement and daily life activities that require reading significantly affect and if there is a sensory impairment, problems with reading difficulties beyond that normally associated with this disorder (Sadock and Sadock, 2000) Some researchers believe that learning deficits of 89 to 90 percent of children with dyslexia and learning deficits (Lerner, 2003). Much research has been conducted by cognitive psychologists in the process of reading researchers now believe that reading involves interaction between cognitive processes, the knowledge and cognitive skills (Lerner, 2003). Cognitive psychologists believe that children who are poor at reading comprehension, of knowledge about the objectives, strategies and task characteristics are not more importantly if you have some knowledge and are able to monitor their application. Teachers and psychologists working with students with learning disabilities in reading, recognize that these children are deficient in one or more cognitive processes (Masoura, 2006). The children's cognitive processes such as cognitive processes, noise, auditory processing, long-term retrieval, attention, short-term memory and working memory are weak (Smith- Spark and Fisk, 2007). Meanwhile, research in neuroscience, cognitive psychology and neuroscience confirm the hypothesis regarding coding and working memory processes have a significant role in dyslexia in children with learning disabilities can be read (Maehler Schuchardt, and the, 2009). In general, working memory is a system that operates under a long-term and short-term memory system unites (Dehn, 2008). Working memory is used to describe a long-term memory in which to store and manipulate information for a short period of

time is used. Memory types which include: verbal working memory, spatial working memory - visual and executable code. Several studies on the role of executive functioning, learning deficiencies noted in this connection that most studies on the role of working memory (which is one of the executive functions) are given in the learning deficits (Locascio, Mahone, Eason, Cutting, 2010). Executive functions, cognitive functions are excellent devices to a set of cognitive abilities, including self-regulation and inhibition, strategic planning, cognitive flexibility, impulse control refers (Alizadeh, 2008). In fact it can be much more comprehensive list of functions added to: organizing, planning - decision-making, working memory, retention and conversion motor control, perception of time and predict the future, reconstruction, inner language and problem solving (Barkley; 1998). Executive functions is a term generally all the complex cognitive processes that are aimed at doing homework - difficult or new circuits are required, in their place, while working memory, the ability to store and process information simultaneously (Locascio, Mahone, Eason, Cutting; 2010).

The truth is, most of the studies in this area indicate working memory performance in children with learning disorders is poorer than other children (Everatt and Jeffries, 2004). Swanson and Brnyngr (1996) stated that children with specific learning disorders or types of verbal working memory and executive severely. Empirical evidence suggests that the low performance of working memory in children with learning disorders can be reliably and late high school students with specific learning disorders are distinct from (Swanson, Kuhran and Evers, 1990). Studies reveal that verbal working memory deficits in children with reading deficits in learning and phonemic processing (Maehler and Schuchardt, 2009, Gathercole, Alloway, Willis and Adams, 200), the central implementation and enforcement are also active in memory (Swanson, Howard and Saez, 2006). Jeffrey and Everatt (2004) in a study titled "Working memory and its role Reading and other specific learning disabilities, however, found that children with dyslexia and other specific learning disabilities (such as

inability to spell) in performance on working memory phonetics and evaluation of control are lower. It plays a critical role in learning and memory in children with poor reading. Smith - Park and Fiske (2007) Research as working memory and its role in reading failure and other specific learning deficits found in children with reading disorders and other specific disorders (such as inability to spell) lower than the control group in performance on working memory function. In another study with a control group of 22 students with reading deficits in visual memory tasks - spatial and verbal were compared. Results showed that the group with reading disability in visual working memory - spatial and verbal performance is lower than the control group (k Van der sluis, and Van der Leij Jong, 2003). Various studies confirmed that working memory capacity can be increased with proper training (Gathercole and Pickering, 2004, Bayliss, Bayliss, Baddeley, Gunn and Leigh, 2005; Anderson and Lyxell, 2007).

The results of these studies suggest that there are differences in working memory in children with learning disabilities in reading and normal

children is regarding the study of learning and memory in order to influence the improvement of academic performance in reading read children with learning disabilities were no, the main objective of this study was to determine the effect of active memory training on reading performance of students with learning disabilities in reading them.

The objective of this study

Effectiveness of Working Memory Training on improving the academic performance of male students with reading disabilities learn to read in elementary school.

The hypothesis

Training of Working Memory in Children with learning disabilities in reading leads to improved academic performance in children's reading this is the post-test.

Research Project

An experimental study with pretest - posttest control group is used. They are independent variable and the dependent variable of active memory, reading and academic performance of students with disabilities learning to read.

Table 1: Diagram of the control group pretest-posttest design

Group	Selection of subjects	Pretest	Independent variable	Posttest	Psychological interventions
Experiment	R	₁ T	X	₂ T	Working Memory
Control	R	₁ T	-	₂ T	Control

The population

The study population consisted of the third grade of elementary school students with learning disabilities in reading Isfahan constitute academic year 93-92. The selection of classes for individuals with disabilities is educated in learning to read, the cluster sampling method was used. Namely, the education city with a visit to the 6th District, the district was randomly selected. Then go to the selected area, 10 school boys randomly selected from two districts and each district elementary school boys, two classes were randomly selected (total of 10 schools and 20 classes). Entry or exit of the 20 students in the class into groups and random assignment to experimental and control groups in the process is followed.

Data collection methods and tools

Third grade teacher was asking students who are weak in reading, introduce them. The 67 students who have learning disabilities in reading and dyslexia symptoms listed by the Wechsler Intelligence Scale Fourth Edition were diagnosed children with normal intelligence, were selected. The entry criteria, a third grade classroom with boys having normal intelligence and normal senses of sight and hearing, a failure to learn to read the list of symptoms of dyslexia, and had no problems. Exclusion criteria consisted of well below average intelligence (down 85%), problems with vision and hearing senses and are associated with impairment. The 30 students were randomly selected and were assigned randomly into two groups of 15 each (15 students in the experimental group and 15 students in the control group). Experimental group, independent variable (memory training)

according to the curriculum expected to be received as follows:

Table 2: Summary of training sessions

Meeting	Topic	Brief description
1	Presentation method	Pretest and the important role of working memory in the reading assignments
2	Auditory memory	Training activities include commands, follow the instructions, or remembering a few simple words, memorizing short poems for children
3	Visual memory	Education hide an object, removed object detection, face NOTE NOTE seen objects, repeating patterns, and models
4	Auditory and visual memory exercises	The auditory and visual memory training and repeated practice performed additional child
5	Playing with pictures	The child is shown pictures and photos and then colors them and asked them to tell after 15 seconds.
6	Doing Orders	The child must meet multiple orders and commands him to do.
7	Films	After completion of the video broadcast short films for children, children with recall and reproduce the same patterns of behavior would do.
8	Recognition Memory	The children pictures of children, animals, fruits and objects displayed in a few seconds he should be recognizing them.
9	Memory recall	Stories for children or short story in a few minutes (maximum 3 minutes) was called, then the child should tell the tale.
10	Long-term memory	In this session, the children were asked to detail the events of 24 hours prior to the instructor tell them.
11	List of Learning	The children were asked to learn a list of words that had already been prepared and submitted along with the statement by the teacher in class, remember.
12	Exercise	Reviewing the contents of the session before the game with the cards of words and word recognition proposed by the expression of total card (This step reinforces the absence of stored information model assignment).
13	Rehearsal Technique	Rehearsal techniques (frequently repeated reading and writing)
14	Rehearsal Technique	More rehearsal techniques (repeated reading and frequent writing) of reading practice
15	Exercise	Following a review of the content and techniques of rehearsal sessions before and after the test run.

Group tests of working memory training intervention during 15 one-hour sessions 3 sessions per week by trained researchers and colleagues were taught in groups of 5 people, received, while the control group received no intervention. 3 months training for the experimental group. The end of each training session for parents will be given assignments to do some exercises.

Research Tools

Wechsler Intelligence Scale for Children Fourth Edition (WISC-IV) the Test Revised Wechsler intelligence test for children three (1991) by Wechsler (2003) has been prepared for the children 16-6. Wechsler Intelligence Scale for Children Fourth Edition measurement of general intelligence and four index scores, including verbal comprehension, perceptual reasoning, working memory and processing speed provides. The test by Abedi (2009) on a sample of Iranian children's adaptation and

standardization is done. The test-retest reliability of the subscales ranged from 0.71 to 0.86 to 0.65 to 0.95 reliability coefficients has been reported. In this study, the Wechsler Intelligence Scale for Children Fourth Edition to measure intelligence, the IQ of the students participating in the study was normal.

The reading disorder test

This test Shafie et al (2008) in a study titled Design Construction and screening tests to detect disorders in reading in grades one to five elementary schools in the city have made. The main body of the test compound on the basis of a text word hundred and four comprehension questions MS in Speech-Language Pathology by experts and carefully controlled.

The test on 200 male and female students in all elementary grades one to five and a total of 1,000 students randomly selected areas of five districts of the city is standard. In addition, this test was conducted on two groups of dyslexic and normal. The findings showed that the correlation between accuracy and speed reading test scores, high. 0.77 Criterion validity Cronbach's alpha is reported as the mean difference between groups with and without reading disorder was significant (p <0/0001). Identify dyslexia screening test in the third grade was used.

Third grade reading test performance of elementary school

Table 3: Mean and standard deviation between experimental and control groups in the third grade reading test prep

Groups	Pretest		Posttest	
	Mean	Standard deviation	Mean	Standard deviation
Experimental group	9.33	1.23	14.40	1.40
Control Group	9.13	1.12	9.20	1.14

As shown in Table 3 as compared to the average pre-test and post-test mean, after the independent variable (memory) increased, whereas in the control group, so the eye does not change. After adjusting for differences between the studies variables (pretest) of the dependent variable (posttest) analysis of covariance

This test is used to measure performance in reading by the third grade of primary school education in Isfahan was prepared. Validity of this test was validated by five experts. The test-retest reliability and Cronbach's alpha test, respectively 0.89 and 0.82 respectively. In this study, the test as pre-test and post-test was used to assess the effects on the dependent variable.

Clinical Interview

This tool was used for the diagnosis of learning disabilities in reading. So again using the diagnostic test students in reading, reading, learning disability diagnosed by a clinical psychologist to ensure the absence of an effective disorder were interviewed together. The tool consensus diagnostic criteria in this study, respectively.

Statistical analysis of data

The analysis of data from the mean, variance and covariance analysis to determine the efficacy of working memory training was used. It should be noted that the presuppositions ANCOVA, data normality and homogeneity of variances condition is experimental and control groups. Shapiro-Wilks test and Levine's test for normality and homogeneity of variance indicated that the condition was established.

Findings

The mean and standard deviation of the experimental and control groups and ANCOVA for group differences are presented.

(ANCOVA) was used. Before running the test, were examined to establish whether some of its presuppositions. Kolmogorov-Smirnov test showed normal distribution is established that the condition (p = 0.16).

Table 4: Test results of the Kolmogorov - Smirnov

Groups	Kolmogorov - Smirnov		
	Statistics	Degrees of freedom	Significance level
Experimental group	0.18	15	0.16

Control Group	0.16	15	0.20
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On the other hand, Levine test result indicated that there is also a condition of equality of variances. $P = 0.31$

Table (5): Levine's test results to assess the equality of variances

Significance level	F	Df2	Df1	Scale
0.31	1.04	28	1	Group

Table 6: Summary of ANCOVA

Index Sources	Sum of squares	Degrees of freedom	Mean square	F	Significance level	Index Cohen
Control	2.62	1	2.62	1.39	0.25	0.04
Group	204.99	1	204.99	126.54	0.0001	0.82
Error	43.73	27	1.62			

With regard to the second row of Table 6, variable grouping (independent) has made a significant difference in the groups explain 82% of variability.

Conclusions:

The study aimed to investigate the effect of active memory on improving the academic performance of boys with reading disability was learning to read in primary school. Analysis of covariance showed that, by taking the pre-test, as variable (auxiliary), working memory training interventions on reading performance of students with learning disabilities affect reading at posttest. The findings are in line with findings Masoura (2006), Maehler and Sachart (2009) and Swanson and Brnyngz (1996). These studies have also shown using the tutorial, enhanced memory capacity. The memory-related brain activity after training of working memory increases. Interventions for memory-based active learning strategies for the memory are shown. Jeffrey and Ewart (2004), Smith-Spark and Fisk (2007) in their study found that children with learning disabilities in reading related to working memory performance was lower than the control group act.

In explaining these findings, it can be said to dominate the practice of reading that children should have mastered the skills of a series. These skills, neuropsychological aspects are such as working memory and attention. The skills, experience, education and learning are obtained. Most children these skills automatically do however, children with

learning disabilities in reading skills while learning difficulty and have taught them. Therefore, teachers should teach reading to elementary school children, especially children with specific learning disorders such as reading the memory read their individual learning the other explanation could be said, due to the fact that children with dyslexia have difficulty in working memory, education component of the memory and the memory can be enhanced by which in turn could enhance and increase the child's level of reading performance. The training commensurate with components ranging from verbal working memory, visual-spatial, using forms, letters given to children, which activates the part of the brain that are active in memory, it is. This training enhances working memory, visual-spatial, verbal and to improve and enhance the student's reading performance. The working memory training can improve reading problems, especially phonological awareness and reading speed is improved. In other words, strengthen working memory as a prerequisite for psychosocial nerve leads to improved reading comprehension students with specific learning disorders in children. In other words, the identification of students with specific learning deficits in children with reading difficulties in working memory education can be set, or the difficulty in understanding how to design and develop suitable training programs. In this regard, it is recommended that school administrators and teachers in collaboration with specialists, rich learning environments and educational games

designed to make maximum use of children in order to strengthen and improve their working memory as prerequisites for learning to read. Therefore, according to the working memory training as learning basic reading skills can be an effective approach in the treatment of children with specific reading failure is according to the above stated, it is recommended that in-service training for primary school teachers, training of working memory structure, its components, this is especially important for memory deficits in children with specific learning deficits in children with reading and ways to strengthen and train the memory to be given. The limitations of this study could be due to the fact that students with reading problems in children with specific reading disorders associated with defects in other aspects of nerves - psychosocial including due process - is a visual-spatial and executive functions. Because of memory problems in these children may be a secondary issue. The careful attention to the problem of children in these processes has not this is most Peugeot hash made in memory of children with specific failure is not considered. Another limitation was that the study was conducted in conjunction with the boys with learning disabilities in reading; therefore, caution should be extended.

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