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Effect of Cognitive Intervention Training on the Elementary School Students' Reading Performance with Dyslexia

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Abstract

This experimental study investigated the effectiveness of Cognitive Intervention Training on Iranian Elementary School Students' Reading Performance with Dyslexia. This study was a pre-test and post-test research with a control group. The participants included male and female elementary school students in the third grade in Koudasht - Iran. Thirty-two dyslexic students with an average IQ between 90 to 110 were the sample in this study. They ranged in age from eight to eleven. They were randomly selected. The participants were equally divided into control and experimental groups. The instruments utilized in this study were Wechsler Intelligence Test for Children (WITC), Reading and Dyslexia Test (NEMA), and Cognitive Intervention Training Program. For ten weeks, this program was provided to the experimental group. The test (NEMA) was administered among students to measure their reading performance in pre-and post-tests. Descriptive statistics and covariance analysis showed a meaningful difference between the two groups after applying for the cognitive training at $p < 0.01$. After receiving cognitive intervention training, experimental students improved their reading performance. The dependent sample t-test also revealed this program was influential in the students' reading performance with Dyslexia, particularly, on reading words, chain words, words, and text comprehension components. The findings propose that teachers consider this program on different learning steps and prepare more effective activities to help students improve their performance on reading difficulties.

Keywords: Cognitive intervention training, Dyslexia, Elementary school students, Reading performance

INTRODUCTION

Dyslexia is a learning disability that influences "processing speed, text and reading comprehension, and other reading components" (Sumner, Connelly & Barnett, 2012, p. 991). More precisely, Dyslexia is a learning disability that influences components of reading skills, involving difficulty with late learning, letters' marks, sounds' elimination, poor phonological awareness, rhyming, naming pictures, word reading, and text comprehension (Sedaghati, Foroughi & Shafiei, 2010).

Dyslexic students suffer from neurological difficulty that affects the brain system of students to manipulate knowledge and new information. These students understand and interpret the knowledge and information appropriately (Lotfabadi, 2013). Students with Dyslexia have some essential characteristics of Dyslexia in different areas associated with reading instruction (Casey, 2012).

Reading is a process influenced by some important factors such as knowledge of readers, text structures, language knowledge, and

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cognitive knowledge (Wajuihian, 2011). On the other hand, "other factors that influence reading are the quality of the reading material and the type of instructions" (Duke, 2013. p. 40). Therefore, to decrease such breakdowns, students with Dyslexia can be presented with some kinds of strategies such as cognitive strategies, instructions, and tasks that are particularly effective in providing the types of information needed to improve reading performance (Duke, 2013).

LITERATURE REVIEW

Dyslexia

Dyslexia is a specific kind of learning difficulty coined in the 20th century for the first time by Rudolf Berlin (Wagner, 2011). Dyslexia is hard of learning that influences different reading components such as fluent word recognition, reading words, reading speed, oral reading, reading comprehension, and spelling (Sumner, Connelly & Barnett, 2012).

Students with Dyslexia commonly read the text and comprehend it lower than the expected level for the student's age (Palfiova, Dankulinocova & Bobakova, 2017). In other words, dyslexic students simply have difficulties comprehending rapid instructions. They also have difficulty seeing and hearing differences and similarities in letters, sounds, and words as significant aspects of reading components (Anderson & Meier-Hedde, 2011). More precisely, the core features of elementary school students with Dyslexia are:

- They are not able to recognize similar sounds, letters, and words
- They are poor at reading, writing, and spelling
- They have time management problems
- They are weak at the oral reading skill
- They have some problems with the pronunciation of words
- They have a lot of problems with word and text comprehension (Moats & Lyon, 2013).

Cognitive Intervention Training(CIT)

Cognitive interventions "perform directly on incoming knowledge and information and fulfill them in different ways, increasing the learning process" (O'Malley & Chamot, 1999 cited in Brown, 2001, p. 93). These strategies such as repetition, grouping, note-taking, recombination, and summarizing deal with learning tasks (O'Malley & Chamot, 1990 cited in Brown, 2001). Therefore, to improve the effectiveness of instruction, an educational methodology is required to be able to involve auditory and visual strategies (Wadlington, 2000). Accordingly, cognitive strategies for students with Dyslexia need to include different components of reading skills such as phonological awareness, oral language, fluency, phonics, vocabulary, reading comprehension, and rhyming (Klingner & Vaughn, 2015). In order to provide a suitable framework for elementary school students, teachers should make the reading process manageable and enjoyable for the student, they must make the language an effective milieu for learning in the classroom (Brown, 2001).

Cognitive Techniques Application (CTA)

To develop a student with Dyslexia into a skilled reader, elementary school teachers need to include a variety of instructional techniques in the classroom. These techniques are:

Explicit Direct Instruction

Elementary school teachers are required to provide"a systematic and manageable instruction in general phonological awareness abilities to students to encourage them to learn the essential alphabetic code-breaking skills" (Moore & Hammond, 2010, p.85). This involves the students' power to introduce recognizable visuals including letters, colors, and sounds which are foundations for reading performance (Waldie, Austin, Hattie & Fairbrass, 2014). Elementary school trainers are also required to pay more attention to "abilities of word decoding, intonation process and fluency showed during oral reading tasks" (Washburn & Mulcahy, 2014, p.329).

Extensive Practice Sessions

Dyslexics need wide practice sessions to improve the learning skills needed to accelerate automaticity that performs reading fluency (Wheldall & Rothwell, 2015). This is an apparent creative way that helps the students learn to read and write sounds, letters, simple

words, and non-words that are the most significant bases in reading performance (Davies, 2014).

Classroom Learning Equipment

Elementary school instructors should be aware of the effect of classroom equipment on the students' reading performance with Dyslexia (Reid & Green, p.220). Therefore, considerations such as lighting, seating near the board, and the teacher can assist this group of students to master the learning process in the classroom to perform it practically (Reid & Green, 2014).

Reducing Student Stress

Reducing the stress of the dyslexic student is an essential issue for elementary school teachers to help students with Dyslexia set realistic goals to reduce the stress associated with doing their homework and their assignments in the classroom which has a considerable effect on reducing student stress levels (Washburn & Mulcahy, 2014).

Providing Skillful Teachers

Dyslexic students must be accommodated with empathic teachers who have sound knowledge of Dyslexia (Firth, Frydenberg, Steeg & Bond, 2013). The teachers should discuss self-evaluation, immediate concerns, and planning (Reid & Green, 2014). Teachers should motivate students to take responsibility for learning. They should help students to cooperate with other teachers and instructors (Long & MacBlain, 2007). Long and MacBlain (2007) claimed that this appropriate technique help students with their school tasks and immediately understand any problems.

To consider the possible effects of the cognitive intervention training program on Iranian elementary school students' reading performance with Dyslexia, Nourbakhsh, Madon & Mansor, (2013), investigated the effectiveness of cognitive skills training on dyslexic students' perceptual performance and reading in Tehran- Iran. The results revealed that the cognitive intervention program significantly improved the reading performance of dyslexic students. This study also indicated that cognitive intervention appears to significantly increase the performance of dyslexic students in the experimental group.

Yarmohammadian, Ghamarani, Seifi, & Arfa (2014), investigated the effectiveness of cognitive intervention training on the elementary school students' reading performance and the speed of information processing with Dyslexia. After receiving the cognitive intervention training, the results of this study revealed that the cognitive intervention training was practical for the reading performance of students with Dyslexia. This study also showed that the cognitive intervention training had the biggest influence on students' reading performance with Dyslexia.

Bargi, Staki & Salehi (2019) considered the effectiveness of teaching cognitive ability on the student's verbal and non-verbal working memory with Dyslexia. This study's findings showed considerable differences between experimental and control group scores after accomplishing this program, and the students with Dyslexia have been practical by teaching cognitive intervention.

In a study, Mcbreen and Savage (2020) considered the effectiveness of cognitive intervention training on the third-grade students' reading performance with Dyslexia. This study indicated that after receiving the cognitive reading intervention, dyslexic students showed higher phonological awareness and reading comprehension. The results also revealed that supplementing cognitive reading intervention can improve the students' reading performance with Dyslexia.

Zafiropoulou and Mati-Zissi (2018), considered the effectiveness of the cognitive-behavioral intervention program for students with particular reading disabilities. This study revealed that the cognitive-behavioral intervention program improved the students' reading fluency with Dyslexia. After providing cognitive-behavioral intervention, Top of From Bottom of Form the results also revealed statistically significant differences between the control and experimental groups. This study indicated that providing the cognitive reading intervention to students made them have high-

er abilities in reading performance, comprehension, and phonology.

In a study, Skeja (2014) evaluated the effectiveness of the cognitive intervention program for children with learning disabilities. This research included 12 participants, 6 -7 years old. After receiving the cognitive intervention program, this study indicated statistically meaningful differences between the control and experimental groups. Based on the study's results, it can be suggested the cognitive intervention program enables students with Dyslexia to be a step ahead in reading different components such as word reading, chain words, text, and reading comprehension.

All the above means that having sufficient knowledge of the effectiveness of intervention programs, more precisely, the cognitive intervention program on the students' reading performance with Dyslexia makes us know that cognitive intervention training affects the students' reading performance.

Purpose of the Study

One of the persistent problems for many elementary school teachers in research on the reading performance of students with Dyslexia is how to help dyslexic students with reading disabilities. In order to solve the problem, elementary school teachers have considered different effective intervention programs for improving the general reading performance of Iranian elementary school students with Dyslexia. However, all these attempts were finally directed toward improving the quality of the end product, they did not focus on innovative pathways to help students with Dyslexia to accelerate their reading abilities. Accordingly, this study aimed at considering the possible effects of cognitive intervention training on Iranian elementary school students' reading performance with Dyslexia to realize whether cognitive intervention training is practical for their reading performance. In addition, this study put more focus on the effectiveness of cognitive intervention training on reading components. Therefore, the research questions were raised:

RQ1. *Is cognitive intervention training practical for the reading performance of Iranian elementary school students with Dyslexia?*

RQ2. *Which components of the reading performance of Iranian elementary school students with Dyslexia are more affected by cognitive intervention training?*

METHOD

Participants

The participants of this experimental study included male and female elementary school students in the third grade in Kouhdasht - Iran. Thirty -Two dyslexic Students including males (N=16) and females (N=16) with IQs between 90 to 110 were the sample in this study. They ranged in age from eight to eleven. They were randomly selected. Then, after familiarizing the students' parents with the aims of this study and signing the consent forms, the students were equally divided into control and experimental groups. The reading and Dyslexia Test **(**NEMA) was administered between both groups of study to measure the students' reading performance. After computing scores of control and experimental groups in the pretest, the experimental group was provided with Cognitive Intervention Training during 10 sessions that lasted 5 weeks. Then, the Reading and Dyslexia Test (NEMA) was distributed to measure the two groups' reading performance in the post-test.

Instruments

Wechsler Intelligence Test for Children (WITC).WITC Test includes eight sub-scales such as vocabulary treasure, similarities, comprehension, calculation, picture adjustment, code-switching, mazes, and designing with cubes that were revised and standardized in 1995. Alpha reliability of the eight sub-scales of the test generally was found 0.88 (Sharifi & Rezaie, 2018).

Reading and Dyslexia Test (NEMA). NEMA is the test that Noori and Moradi first designed in 2008 to evaluate elementary school students' reading disorders. Therefore, a pilot study was conducted on 300 male and female dyslexic students who were in grades one to five to validate the test. Since then,

by making some necessary changes by the designers in its construction over time, this type of test was performed on 1646 elementary school pupils in the cities of Tehran, Sanandaj, and Tabriz (Sharifi & Rezaei, 2018). This instrument utilized consists of 10 sub-tests including Reading Word:120 scores, Words Chain:53 scores, Rhyming:20 scores, Naming:20 scores, Word Comprehension:30 scores, Text Comprehension: 24 scores, Non- or- Quasi- Word: 30 scores, Sound Elimination: 30 scores, Letter Mark: 43 scores, and Category Mark: 10 scores' sub-tests. Individuals who scored lower than 190 were recognized as dyslexic students (Sharifi & Rezaei, 2018). In this study, the Alpha reliability of the test generally was found 0.83.

Cognitive Intervention Training Program(CITP). The Cognitive Intervention Training Program that was provided with some adjustments in the classroom includes:

- Identifying a skillful elementary teacher to be familiar with students in the classroom to establish proper communication with and provide the program and schedule with them
- Practicing reading words, and letters of words and asking the students to apply them to their tasks
- Practicing letter sound and asking the children to find and apply similar letters
- Pronouncing different letters in the classroom for the children to use words starting with those letters in their tasks
- Practicing letters forming the words, chain words, and exact words without points
- Practicing reading words, Non-or-Quasi words, and word cards
- Reading words, names of pictures, and associative chain words
- Practicing reading words and motivating the children to discover words meaning in the text
- Practicing reading the text and finding keywords to understand the exact meanings of words in the text (Meadows & Cashdan, 2017).
- Performing post-test

Data Collection Procedures

This study was conducted in two different sessions. Firstly, the students recognized dyslexic students utilizing the Wechsler Intelligence Test for Children (WITC) by the Intelligence Assessment Center of Education were assigned into control and experimental groups. NEMA test was distributed between the two groups to test the students' reading performance. A skillful elementary school teacher with 25 years of experience in teaching guided the students to answer all questions. The first session continued for 50 minutes. Secondly, after scoring the papers of the two groups in the pre-test, Cognitive Intervention Training during ten sessions was provided to students in the experimental group. The time elapsed to teach the students in each classroom continued for 45 minutes. Then, the Reading and Dyslexia test (NEMA) was distributed to measure the reading performance of the two groups in the post-test. Descriptive statistics were utilized to consider the effectiveness of Cognitive Intervention Training on the students' reading performance with Dyslexia. To consider the differences between students in the two groups in reading performance before and after receiving cognitive intervention training a covariance analysis was used. Then, the dependent sample t-test also was applied to consider the influence of cognitive intervention training on the reading performance of students with Dyslexia, particularly, on reading words, chain words, words, and text comprehension components.

Data Analysis Procedures

After collecting the required data, descriptive statistics were utilized to consider the effectiveness of Cognitive Intervention Training on the students' reading performance with Dyslexia. To consider the differences between students in the two groups in reading performance before and after receiving cognitive intervention training a covariance analysis was used. Then, the dependent

sample t-test also was applied to consider the influence of cognitive intervention training on the reading performance of students with Dyslexia, particularly, on reading words, chain words, words, and text comprehension components.

RESULTS

To consider the possible effects of cognitive intervention training on the students' reading performance with Dyslexia and also evaluate the effectiveness of cognitive intervention training on reading different components which were the aims of this study, descriptive statistics, covariance analysis, and dependent sample *t*-test were used:

> *Is cognitive intervention training practical for the reading performance of Iranian elementary school students with Dyslexia?*

To reply to this question, descriptive statistics and covariance analysis were employed. Table 1 includes the summary of descriptive statistics in the control group. Table 1 also gives some information associated with the mean, standard deviation, and the number of the participants in pre and post-tests.

Table 1
Mean and Standard Deviation in Control Group

		Pre -Test		Post-Test	
Components	**N**	**Mean**	**Std. Deviation**	**Mean**	**Std. Deviation**
Reading words	16	15.75	2.02	15.69	1.92
Reading Non-Words	16	15.94	1.81	16	1.71
Words Chain	16	15.38	1.71	15.06	1.61
Word comprehension	16	15.94	2.14	15.88	1.71
Rhyme	16	15.94	1.48	15.38	1.59
Text comprehension	16	15.69	2.09	15.75	1.81
Sound Elimination	16	15	1.86	14.49	1.48
Letter Mark	16	15.31	2.75	15.19	2.37
Category Mark	16	15.38	2.12	15.63	1.54
Picture Naming	16	15.38	1.99	15.81	1.91
Total Mean	16	155.71	19.97	154.88	17.65

Note: Word *Reading = WR, Reading Non- Words = RNW, Word Chain =WCH, Word Comprehension =WCOM, Rhyme =R, Text Comprehension = TCOM, Sound Elimination =SELI, Letter Mark =LM, Category Mark = CM, Picture Naming =PN*

As is evident in table 1, the three components of reading such as reading non-words (mean =15.94), word comprehension (mean =15.94), and rhyme (mean = 15.94), have the highest means in the pre-test in the control group while the component of sound elimination has the lowest mean (mean =15) in this group. Table 1 also shows that the component of reading non-words has the highest mean (mean = 16) in the control group while the component of chain words has the lowest mean (mean= 15.06) in this group in the post-test. As it is clear, all components' total mean of reading in pre-and post-tests in the control group was found 155.71 and 154.88. Table 1 also reveals no meaningful differences between means before conducting cognitive intervention training.

Table 2

Mean and Standard Deviation in the Experimental group in Pre and Post Tests

		Pre-Test		Post-Test	
Components	**N**	**Mean**	**Std. Deviation**	**Mean**	**Std. Deviation**
WR	16	15.81	2.43	21.81	2.79
RNW	16	15.44	2.45	19.13	2.68
WCH	16	14.25	1.69	20.5	2.25
WCOM	16	15.19	1.72	21.69	1.78
R	16	15.19	2.51	19.31	2.65
TCOM	16	14.63	1.99	20.25	2.44
SEli	16	15.63	1.59	19.81	1.97
LM	16	14.69	1.92	18.13	2.12
CM	16	15.13	2.22	19.19	1.91
PN	16	15.88	1.59	19.94	2.29
Total Mean	16	151.84	20.11	199.76	22.88

Accordingly, table 2 reveals the two components of reading, including picture naming (mean =15.88) and reading words (15.81), have the highest means in the experimental group in the pre-test while the component of chain words has the lowest mean (mean =14.25). Table 2 also shows the component of reading words has the highest mean (mean=21.81) in the experimental group in the post-test and the component of letter marks has the lowest mean (mean = 18.13) in the post-test. As it is seen, all components' total mean in the experimental group in pre-and post-tests was found 151.84 and 199.76. Table 2 also shows after cognitive intervention training, the experimental group's mean is higher than the control group.

Table 3

Normal Distribution of Scores in Control and Experimental Groups

		control group		experimental group	
Components	**Tests**	**Statistic**	**Sig.**	**Statistic**	**Sig.**
RW	Post-test	0.938	0.36	0.909	0.13
RNW	Post-test	0.925	0.56	0.949	0.51
WCH	Post-test	0.944	0.44	0.64	0.38
WCOM	post- test	0.891	0.07	0.974	0.92
R	post- test	0.956	0.63	0.886	0.06
TCOM	post-test	0.924	0.221	0.917	0.17
SEll	post-test	0.954	0.59	0.951	0.54
LM	post-test	0.891	0.07	0.974	0.92
CMP	post-test	0.956	0.63	0.886	0.06
PN	post-test	0.924	0.221	0.917	0.17

According to the result in table 3, the distribution of all variables is normal. It is found at $p < 0.05$.

Table 4

Equality of Variances in Pre- and Post-tests Stages

	Pre-test stage		post-test stage	
Components	**Statistic**	**Sig.**	**Statistic**	**Sig.**
WR	0.764	0.39	3.39	0.08
RNW	2.24	0.14	3.16	0.09
WCH	0.002	0.97	3.05	0.09
WCOM	0.37	0.55	0.22	0.64
R	1.62	0.21	0.212	0.65
TCOM	1.25	0.25	0.073	0.79
SELI	0.159	0.69	0.428	0.52
LM	1.27	0.27	3.07	0.09
CM	0.034	0.86	0.671	0.42
PN	0.671	0.42	0.825	0.37

Table 4 shows the significant level of F value. It is higher than 0.05. Accordingly, the homogeneity assumption of all variances is established perfectly. It means that applying the covariance analysis test is completely acceptable.

Table 5
Results of Homogeneity of Regression Gradient

Results	df	Mean of square	F	Significant
Pretest scores	1	1.78	0.08	0.15
Effectiveness	2	63.36	520.6	0.97
Residual	29	0.22	---	---

According to the F value in table 5 which is 0.08 ($p \geq 0.05$), the assumption of homogeneity regression gradient is completely established.

Table 6
The Effectiveness of Cognitive Intervention Training on Reading Performance along with the Effectiveness of Pre-Test

Results	df	mean of squares	F	Significance	Eta
pretest scores	1	7.18	55.9	0.001	0.66
Effectiveness	1	125.9	981.4	0.001	0.97
Residual	27	0.128	---	---	---

According to table 6, the covariance analysis revealed that the effectiveness of the cognitive intervention training is meaningful. It is effective on the students' reading performance with Dyslexia. Therefore, $\eta 2 = 0.97$, $P = 0.001$ and $F\ 1, 29 = 981.4$.

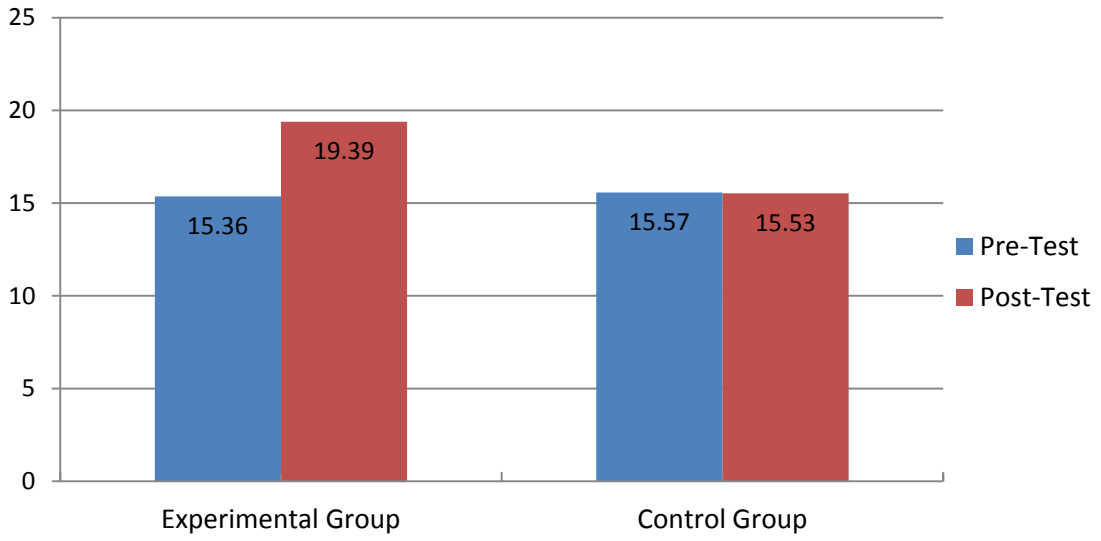

Figure 1
The Effectiveness of Cognitive Intervention Training on Reading Performance in the Experimental and Control Groups

The second research question attempted to see which components of the reading performance of Iranian elementary school students with Dyslexia are more affected by cognitive intervention training.

Table 7
Changes of Reading Components in the Experimental group

Variables	Pre-Test	Post- Test	Changes	Sig.
Reading Words	15.81	21.81	+37.95	0.001
reading Non- Words	15.44	19.13	+23.89	0.001
Words Chain	14.25	20.5	+43.86	0.001
Word Comprehension	15.19	21.69	+42.79	0.001
Rhyme	15.19	19.31	+25.91	0.001
Text Comprehension	14.63	20.25	+38.41	0.001
Sound Elimination	15.63	19.81	+26.78	0.001
Letter Mark	14.69	18.13	+23.42	0.001
Category Mark	15.13	19.19	+26.83	0.001
Picture Naming	15.88	19.94	+25.57	0.001

To reply to this question, the dependent sample t-test showed that the effectiveness of cognitive intervention training was statistically more meaningful in the four components of reading in the experimental group. In other words, the cognitive intervention training was more practical on the four components including Words Chain (43.86), Word Comprehension (42.79), Text Comprehension (38.41) and Reading Words (37.95) respectively.

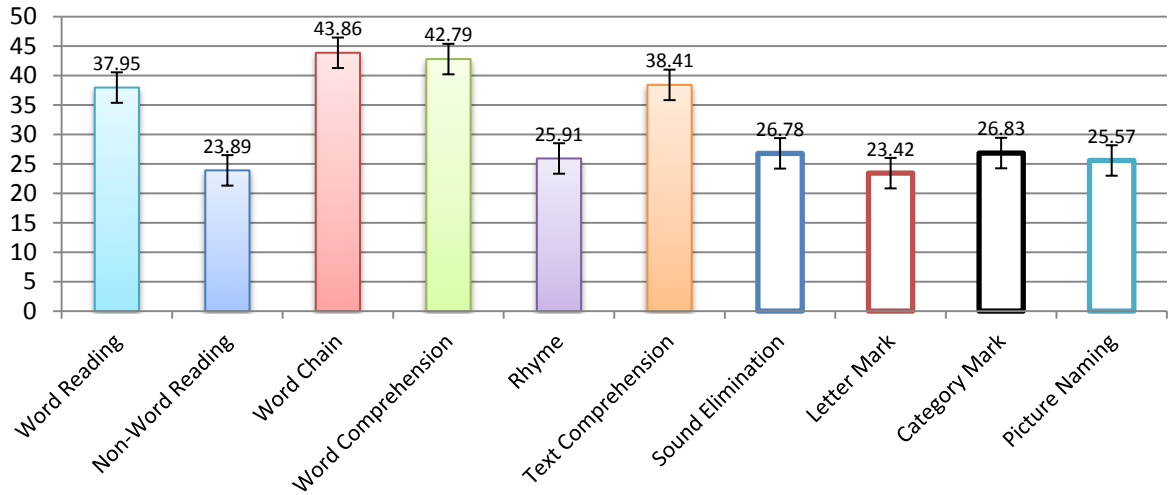

Figure 2
The Results of the Effectiveness of Cognitive Intervention Training of Reading Components in the Experimental Group

DISCUSSIONS

After considering the effectiveness of cognitive intervention training on Iranian elementary school students' reading performance with Dyslexia, the findings of the study revealed that the cognitive intervention training is practical on the students' reading performance with Dyslexia. Therefore, this study's findings support the idea that Dyslexia is hard of learning that affects reading, processing speed, reading comprehension, and other reading components (Summer & Connelly, 2012). On the other hand, the findings of this study approximate previous studies including Nourbakhsh, Madon & Mansor (2013), Yarmohammadian, Ghamarani, Seifi & Arfa (2014), Bargi, Staki & Salehi (2019) who concluded that cognitive intervention training is affective on the students' reading performance with Dyslexia.

This study's findings also revealed that cognitive intervention training directly affects the students' reading performance with Dyslexia. Dyslexia is a learning disability that influences reading components involving late learning, letter marks, sound elimination, and poor phonological awareness (Sedaghati,

Foroughi & Shafiei, 2010). It also influences rhyming, picture naming, reading words, and text comprehension (Sedaghati, Foroughi & Shafiei, 2010). Wajuihian (2011) stated that reading is a process that is affected by the reader's knowledge, knowledge of the language, language structures, text structures, and cognitive strategy. It can be inferred that a cognitive intervention program is effective for reading Dyslexia. In addition, other factors that influence reading skills are the quality of the reading material and the type of instructions (Duke, 2013). Therefore, to decrease such breakdowns, students with Dyslexia can be presented with strategies such as cognitive strategies, instructions, and tasks that are particularly effective on providing the types of information needed to improve reading performance (Duke, 2013).

Students with Dyslexia simply have difficulty comprehending rapid instructions. They also have difficulty understanding differences and similarities in sounds, letters, and words as significant aspects of reading components (Anderson & Meier-Hedde, 2011). Accordingly, the findings indicate that cognitive intervention training is practical for dyslexic students. It can improve the students' reading performance in the experimental group with Dyslexia (tables 1, 2, & 6). After providing the students in the experimental group with cognitive intervention training, the effectiveness value showed a meaningful difference between the two groups at $p < 0.01$.

The findings of this study also approximate previous studies such as Mcbreen and Savage (2020) who considered the effectiveness of the cognitive reading intervention on the third-grade students' reading difficulties. Findings indicated that receiving the cognitive reading intervention on the students' reading difficulties can improve their reading comprehension and phonological awareness of students. This means that the first research question is approved.

In other words, the findings of the covariance analysis indicated that the cognitive intervention training program is effective in the students' reading performance with Dyslexia. The findings also approximate previous studies such as Skeja (2014) and Zafiropoulou & ti-Zissi (2018) who revealed that receiving the cognitive-behavioral intervention program can improve the students' reading fluency. This study indicated that providing the cognitive reading intervention to the students showed extraordinary abilities in reading words, reading comprehension, and sound letters. After providing the cognitive-behavioral intervention, the results also revealed a meaningfully significant difference between the students in the control and experimental groups. Therefore, the second research question is approved (table 7).

In supporting this finding, elementary school teachers are required to provide systematic and explicit direct instruction in general phonological and phonemic awareness, learning letters' marks, sound elimination, rhyming, picture naming, reading words, and text comprehension (Sedaghati, Foroughi & Shafiei, 2010).

Based on the consideration above, this study shows that cognitive intervention training is practical on the students' reading performance with Dyslexia and reading components of Iranian elementary school students with Dyslexia including reading words, chain words, word and text comprehension which are more affected by cognitive intervention training.

CONCLUSION

This study considered the effectiveness of cognitive intervention training on Iranian elementary school students' reading performance with Dyslexia. The study's findings showed that cognitive intervention training is practical for the students' reading performance with Dyslexia. On the other hand, the covariance analysis indicated that the components of reading in Iranian elementary school students with Dyslexia including reading words, chain words, words, and text comprehension are more affected by cognitive intervention training.

The findings of this study approximate previous studies including Nourbakhsh, Madon & Mansor (2013), Yarmohammadian, Ghamarani, Seifi & Arfa (2014), Bargi, Staki & Salehi (2019), Mcbreen and Savage (2020), Zafiropoulou & Mati-Zissi (2018), and Skeja (2014) who all indicated applying cognitive intervention training is effective on the elementary school students ' reading performance with Dyslexia, particularly, on reading words, chain

words, words, and text comprehension. The study's findings also showed statistically significant differences between dyslexic students in the control and experimental group after providing cognitive intervention training in reading performance.

Accordingly, becoming acquainted with cognitive intervention training such as explicit direct instruction, extensive practice sessions, and reducing stressors can help teachers and students with Dyslexia know that reading scores will be affected by the cognitive intervention. In addition, cognitive intervention training is a pedagogical implication that prepares a method of finding out Dyslexia in learning. In addition, it is a creative way that helps the students learn to read and write sounds, letters, simple words, and nonwords which are the most significant bases in reading performance.

Developing cognitive intervention training involves motivating students with Dyslexia to enjoy real communication through reading. This permits students to understand the aim of reading and supports them take an interest in it. Being familiar with the effectiveness of the different cognitive interventions in teaching makes teachers think about how learning happens to students with Dyslexia. In addition, these findings also prepare teachers for the complete perception of their students along with dyslexia difficulties to make more appropriate reading activities to attract their interests in reading.

The study's findings also revealed cognitive intervention training is more effective on the students' reading scores with Dyslexia, and between students in control and experimental groups, there is a significant difference. Thus, this is to say that becoming acquainted with the critical role of cognitive intervention training can be constructive for the students with Dyslexia and teachers who study cognitive training to have more profound findings on the concept of Dyslexia in elementary school students.

The study's findings are restricted to the position in which all students were Iranian elementary dyslexic students in the third grade. Therefore, the present findings cannot be overgeneralized to other Iranian elementary students with Dyslexia in other grades at elementary schools. This study was only restricted to the reading performance of dyslexic students, not to the other types of learning disorders such as writing and calculation. Based on the findings of this study, future elementary school teachers are motivated to consider the effectiveness of cognitive intervention training on other types of Dyslexia. Awareness of the effectiveness of cognitive intervention training and reading scores strategies may represent suitable ways to improve reading. This can contribute to elementary school teachers and students with Dyslexia utilizing some other activities which improve the required skills.

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