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The effectiveness of an intervention program -barton intervention program- on reading fluency of Iranian students with dyslexia

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Abstract:

BACKGROUND: Difficulty with reading fluency has been increasingly acknowledged as a significant aspect of reading disabilities which is called dyslexia. To investigate this important issue, this research aims to examine the impact of an intervention program on reading fluency of dyslexic students.

MATERIALS AND METHODS: The research is an experimental one. The population of the study included all the second- and third-grade male and female students in the city of Ilam, Iran, among whom 68 students were recognized to be dyslexic using a screening inventory reading test (IRT) developed by Shafiei *et al.*, in 2009, they were selected using purposeful sampling method. The students were equally divided and assigned into a control and an experimental group. The experimental group received the Barton intervention program for 10 weeks. The reading fluency test was administered for the measurement of reading fluency in pre- and post-tests. Data were analyzed using descriptive statistics (mean and standard deviation) and paired *t*-test.

RESULTS: The analysis of the finding through *t*-test found a statistically significant difference between the control and experimental groups after the intervention program at $P < 0.01$.

CONCLUSIONS: The results revealed that the students who received the intervention program of the experimental group were improved in terms of their reading fluency.

Keywords:

Intervention, reading disability, reading fluency

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Introduction

Dyslexia as a type of learning disability was identified >100 years ago and before the term dyslexia came to prominence, this learning disability used to be known as word blindness.[1] Dyslexia can affect any part of the reading process, including difficulty with accurate or fluent word recognition, or both, word decoding, reading rate, prosody (oral reading with expression), and reading comprehension.[2]

According to Rose "Dyslexia is a learning difficulty that primarily affects the skills involved in accurate and fluent word reading and spelling. Characteristic features of dyslexia are difficulties in phonological awareness, verbal memory, and verbal processing speed".[3]

It is believed that "Children and adults with dyslexia simply have a neurological disorder that causes their brains to process and interpret information differently."[4] Dyslexic students read at a level well below the expected level for the age of the student,

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they have difficulty in the comprehension of rapid instructions and in following more than one command at a time and also in seeing and sometimes in hearing similarities and differences in letters and words, and they show inability to sound out the pronunciation of an unfamiliar word, of course, these are common in young children but may be more pronounced in children with dyslexia.[5]

Some experts believed that dyslexia arises from a phonological deficit affecting the processing of speech sounds in words.[6] Based on Snowling *et al*., early manifestations are difficulties with the development of phonological awareness and perhaps more so problems of phonological learning.[7] Van den Broeck and Geudens believed that problems with word recognition ensue together with phonological decoding deficits, seen most clearly when attempting to read novel words.[8] It is recognized that dyslexia co-occurs with other disorders; in particular, many children with dyslexia have language impairments,[9] symptoms of inattention,[10] attention deficit hyperactivity disorder,[11] and problems of motor coordination.[12]

According to Norton and Wolf, students with learning disability are most at risk in presenting difficulty in fluency.[13] Stevens *et al*. claimed that some students with learning disability can be characterized as having a specific deficit in naming speed, and this distinguishes them from students with learning disability that stem from phonological processing deficits.[14]

Reading fluency is most often defined as the ability to read text quickly, accurately, and with appropriate expression.[15] Children who read less because of their dysfluency may not improve their skills at the same rate as their more fluent peers.[16] Difficulty with reading fluency has been increasingly acknowledged as a significant aspect of reading disabilities. Recent conceptualizations by the International Dyslexia Association[17] also include reading fluency as an area of difficulty for individuals with dyslexia. One of the most important changes to the definition of dyslexia is the recognition that "what characterizes dyslexic individuals, particularly dyslexic adolescents and adults, is the inability to read fluently."[17] Lopes believed that this definition refers to the fact that many adult dyslexics experience difficulties with reading fluency even after becoming accurate word readers.[18]

The prevalence of dyslexia in Iranian context is an important issue deserves to be scientifically investigated and since dyslexia seems to be underestimated in Iranian schools while we have a prevalence of dyslexia, no systematic study to date characterized the clinical presentation of dyslexia in Persian-speaking children. For this reason, we designed a study using a method to detect dyslexia among primary school students.

Materials and Methods

This is an experimental research. The population of the study included all the second- and third-grade male and female students in the city of Ilam among whom 68 students were recognized to be dyslexic using a screening inventory reading test (IRT) developed by Shafiei *et al*. in 2009, they were selected using purposeful sampling method. Their age ranged from 8 to 9 years. The students were equally divided and assigned into a control and an experimental group. The experimental group received the Barton intervention program for 10 weeks. The reading fluency test was administered for the measurement of reading fluency in pre- and post-tests. The reliability of the reading fluency test was found to be satisfactory. The validity of the test was investigated using the judgment of six psychology experts.

A reading fluency test was conducted in both groups as pretests. The intervention was applied in the experimental group, whereas the traditional method was applied in the control group. The reading fluency test was conducted in both groups as posttests.

In this study, a screening IRT developed by Shafiei *et al*., in 2009, was used to identify the second- and third-grade students with dyslexia. Two 120-word passages with 10 comprehension questions from the students' book were selected and were assigned to the students to read. By examining the students score on reading, the researcher found that students with dyslexia were lower than that of students without dyslexia. To examine their IQ, Raven's test was performed, and the students with an average IQ higher than 90 made up the population of this research. "Reading fluency" tests were conducted on both groups. The children were given verbal instructions on how to complete the reading fluency scale.[19] The researcher read the items aloud and was observing the students' understanding of the instrument.

For the collection of the data, a reading fluency test and a dyslexia screening instrument (DSI) were used.

Reading fluency test

The reading fluency test measures a person's ability to read simple sentences quickly, decide whether the statement is true or false, and then circle yes or no in the subject response booklet. The difficulty of the sentences gradually increases to a moderate level. The individual attempts to complete as many items as possible within a 3-min time limit. In the study of Joshi, Tao, Aaron, and Quiroz, the reading fluency test has median reliability of 0.90 in the age range of 6–19 and 0.90 in the adult

age range. This test is a measure of reading speed, rate, and fluency. The test necessitates the ability to read and comprehend simple sentences quickly. Low performance on the reading fluency test may be a function of limited basic reading skills, comprehension difficulties, and or an inability to sustain concentration.[19] For this study, Cronbach's alpha reliability of the scale is 0.85 and the test–retest reliability for the reading fluency scale is 0.84. The validity of the test was investigated using the judgment of six psychology experts.

Dyslexia Screening Instrument

DSI consists of checklists of basic neuropsychological skills designed by Lemasters in 2004. This instrument is a rating scale designed to describe the cluster characteristics associated with dyslexia and to discriminate between students who display the cluster characteristics and students who do not. It is designed to measure "entire populations of students who exhibit reading, spelling, writing, or language-processing difficulties."[20] The DSI is designed to be used with students in Grade 1 through 12 (age 6–21). The internal consistency reliability coefficient is 0.99 for elementary students, which was determined by Cronbach's coefficient alpha; and inter-rater reliability of the DSI for elementary students is 0.86 that was assessed by determining the homogeneity of the statements and the consistency of ratings across examiners. The teacher needs to complete the DSI form based on the questionnaire's five-point scale: never exhibits, seldom exhibits, sometimes exhibits, often exhibits, and always exhibits. In this study, Cronbach's alpha reliability for the DSI scale is 0.86.

Reading test

The reading tests were developed based on the content of second- and third-grade texts. The developed test was based on the amount of the content taught in the treatment. The tests were evaluated by the second- and third-grade teachers and they evaluated it as convenient. The test included a story of 120 related words followed by 10 questions to check the students' level of understanding. The students were required to read out the tests aloud and answer the questions. To determine the reliability, Cronbach's coefficient was employed. The reliability coefficients for the second- and third-grade reading tests are 0.85 and 0.87, respectively.

The Barton Intervention Program

The Barton intervention program[21] was used in this study. The Barton reading and spelling system includes 10 levels. Each level is broken into lessons and each lesson into procedures.[21] In this study, levels one and two were taught with some adjustments. The treatment lasted for 10 weeks 2 times a week.

Statistical analysis

Data were analyzed using descriptive statistics (mean and standard deviation [SD]) and paired *t*-test and SPSS Inc. version 22, Chicago, III., USA.

Results

The purpose of this study was to investigate the effectiveness of an intervention program – Barton Intervention Program – on reading fluency of Iranian students with dyslexia. Quantitative data were analyzed using SPSS version 19.0. The pre-test and posttest results using reading fluency standardized tests are presented in Tables 1 and 2. The research question investigated whether Barton's intervention program improves the dyslexic children's reading fluency.

The participants' mean and SD scores in both experimental and control groups are shown in Table 1. This table is an indication of the students' performance on both pre- and post-test. As shown in table, there is no statistically significant difference between the two groups in the pretest, but on posttest, there is a statistically significant difference between the two groups ($P < 0.001$).

Table 2 shows the mean and SD score of each group before and after the treatment. As shown in table, there is a statistically significant difference between the participants' mean (SD) score on pre- and post-test in the experimental group ($P < 0.001$), but in the control group, no difference is seen.

Tables show that after the intervention program, the mean for the experimental group is higher than that of the control group. The result from the *t*-test shows that there is a statistically significant difference between the experimental and the control group in reading fluency. This difference indicated that using intervention

Table 1: Mean (standard deviation) difference of participants' scores in both experimental and control groups

Group	Mean (SD)	
	Pretest	Posttest
Experimental	50.94 (9.22)	59.76 (8.75)
Control	51.09 (9.81)	52.87 (13.11)
P	0.953	<0.001

SD=Standard deviation

Table 2: Mean (standard deviation) difference of participants' scores in each of experimental and control groups

Group	Mean (SD)		*P*
	Pretest	Posttest	
Experimental	50.94 (9.22)	59.76 (8.75)	<0.001
Control	51.09 (9.81)	52.87 (13.11)	0.941

SD=Standard deviation

programs – here Barton intervention program – may have a positive effect on reading fluency of Iranian students with dyslexia.

To determine if there was a statistically significant difference between pre- and post-tests of reading fluency for the experimental group, tables show that there was a statistically significant difference between pre- and post-tests of reading fluency.

Discussion

Dyslexia is a language processing disability that is to say those who have dyslexia have a weakness in one or more area of languages such as decoding, encoding, phonological awareness, word retrieval, and syntax. The problems of students with dyslexia in reading fluency were of the present study focus.

Research has not been able to identify one type of intervention as better than another for teaching at risk or dyslexic readers, although all methods seem to work for some learners. However, it has been found that early intervention, designed to improve the specific needs of the individual, reduces the prevalence of dyslexia compared to individuals who did not receive intervention or support. Students who had early intervention show better performance in reading fluency. It is also easier for them to catch up with their peers.[22,23]

The results of the research show that the Barton intervention program has a positive effect on the reading fluency of students with dyslexia. Students who received the intervention program–the experimental group were improved in terms of their reading fluency, but for the control group, the results revealed that they had problems with reading fluency. There is a statistically significant difference in reading fluency between the control and experimental groups of students with dyslexia. It is statistically significant at $P < 0.023$.

The findings of this study showed that standardized intervention programs can improve the reading speed and also the fluency of the experimental group who received an intervention program – here Barton intervention program – as their treatment. Many researchers have argued that fluency is enhanced when reading addresses the meaning of the text.[24] In any case, for struggling readers and students with dyslexia, a fluency intervention and a comprehension intervention were both associated with gains in fluency and comprehension.[25] Intervention research on fluency development for students with dyslexia has been dominated by research on repeated reading. Reading fluency occurs phase by phase. After systematic learning of words and their sounds, the children employ it for the analysis of words.[18]

Conclusions

The better performance of the experimental group shows the importance of reading fluency in dyslexic students reading. It can be suggested that the Barton intervention program is a good alternative for the traditional methods. Since the result of this study has been based on limited sample care should be taken in overgeneralizing these results. For future research, it is suggested that this study be carried out on a wider scope and applied to students with other disabilities.

There are some limitations in this study. First, the scope of the study is limited to the city of Ilam only, and hence, the findings of this study cannot be generalized to the Iranian context safely so it is good to be done with a larger context which includes all the provinces of Iran. The study is limited just to the second- and third-grade students, it is suggested that first- and fourth-grade students be included.

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Conflicts of interest

There are no conflicts of interest.

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