Original Article

IEEPJ Vol. 4, No. 3, 2022, 478-491

http://ieepj.hormozgan.ac.ir/

Iranian Evolutionary and Educational Psychology Journal

IEEPJ

Investigating the Efficacy of the Game on Improving Visual Attention and Spelling Performance of Students with Special Learning Disabilities

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Abstract: Specific learning disability leads to weakness in basic areas of learning. Therefore, it is important pay attention to training of these children. The aim of this study was to evaluate the effectiveness of game on enhancing visual attention and improving spelling performance in students with special learning disabilities in the third grade of elementary school. The present study is a single- subject design. The statistical population of this study included all students with special learning disabilities with difficulty in writing who were studying in the third grade of elementary school in 2018-2019 academic year. The research sample included 4 individuals (2 boys and 2 girls) that were selected using a purposeful method. Wechsler Intelligence Test, Toulouse-Pieron Short Form Accuracy Test, Fallahchay's Written Expression Test and Spelling Evaluation Test were used to collect information. The training program was developed by researchers, and the subjects were trained in twelve sessions, two sessions per week, individually. The results showed that the training program had a positive effect on the visual attention and spelling performance of the subjects. In terms of visual attention, the percentage of heterogeneous data was PND= 0.75 for the first, second, and third participants, and in relation to the fourth participant, it was PND=0.100. In relation to spelling performance, the calculated PND for all four participants was 0.75. According to the results of the present study, game is effective in improving visual attention and reducing spelling errors of students with special learning disabilities.

Keywords: Games, Visual attention, Spelling performance, Special Learning Disabilities

Introduction

Special learning disability is one of the largest and perhaps most controversial areas of psychology and special education (El Kah & Lakhouaja, 2018; Fletcher et al., 2018). Based on DSM-5, special learning disabilities are in the category of neurodevelopmental disorders that these people have difficulty in learning and using academic skills despite the help of others and various interventions, and their academic skills are less than their chronological age. This disorder is associated with difficulty in reading, writing, and mathematics (Ganji, 2017).

When the person's writing ability is weaker than his/her chronological age, his/her IQ as well as the academic record in writing is weaker. The difficulty in writing includes misspelling, the difficulty in spelling words correctly and the disability in dictation, in grammar and in correct punctuation and the clarity and organization of the essay. Writing is a complex ability that requires a range of cognitive

Article information: Received: 2021/04/17 | Accepted: 2021/12/10 | Published: 2022/09/1. https://doi.org/10.52547/ieepj.4.3.478

[DOR: 20.1001.1.25884395.2022.4.3.7.1]

[DOI: 10.52547/ieepj.4.3.478]

and linguistic abilities. Learning to write requires gradual training and integration of information about putting words on paper, spoken sounds and their meanings, and memory support for words in dictation. Disability in any of these activities may make the writing difficult (Döhla & Heim, 2016; Singer & Bashir, 2004).

Spelling disorder is one of the topics that have been considered by many experts and psychologists. For some students with special learning disabilities, spelling words is much more difficult than reading them. Dictation is a difficult activity for children because it is abstract. For this reason, written language is taught in the hierarchy of language abilities after listening, speaking and reading. Therefore, any problem in these areas can have a negative impact on learning written language (Saif Naraghi & Naderi, 2015; Steinbrink et al., 2014).

One of the main reasons for spelling disorder is lack of visual attention. Visual attention means accuracy. Accuracy is a prerequisite for education, learning and training and is a key factor in children's learning (Disabilities, 2007; Siadatian et al., 2015). Attention is a basic psychological activity that allows a person to maintain accurate cognitive and behavioral readiness against a stimulus or long-term activity and to obtain the necessary information and to provide the necessary response. The amount of attention depends on the clarity, novelty and appropriateness of the stimulus, as well as the level of motivation of the person (Rapcsak et al., 2009). In terms of acquiring academic skills such as reading and writing, accuracy and attention have a special place. Attention and accuracy in different stages of learning, is the entry of information from sensory memory to short-term memory, meaningfulness, encryption and storage of information entered in to short-term memory plays an essential role (Christmann et al., 2015; Shariatmadari, 2004). Inattention and impaired attention and concentration lead to disorders in perception, recall, correct diagnosis, learning and shaping concepts, which also leads to poor student performance in school (Ahrami et al., 2011; Karvan & Amiri, 2015).

Special activities can be used to treat children with special learning disabilities. One of the measures used is the application of game method that increases accuracy and attention. A game connects the child’s inner thoughts with the outside world and allows the child to take control of external objects. Playing games allows the child to express his/her experiences, thoughts, feelings, and desires that are threatening to him/her (Anggriawan, 2018; García-Redondo et al., 2019; Tabrizi, 2011). Play is the key to a child's health and a proper way to treat a child. Children often have difficulty expressing their feelings orally, through play, the child's hidden world can be understood. The relationship between playing games and the ability to read, write, and to do mathematical exercises among students, on the one hand, and the ability to identify and eliminate distracting stimulus while learning through playing games, on the other hand, make the game's educational and therapeutic aspects much clearer. Play is a structured approach that bases the child's normal learning and communication processes (Baggerly & Parker, 2005; Bul et al., 2016; Cheng-Lai et al., 2013; Faramarzi & Mehrabi Kooshki, 2018).

Teachers find it helpful to use related games and tools when working with children with special problems. Games provide opportunities for learners to practice. Games is very important for children who are slow to learn or those who are lacking in motivation, and most researchers have stated that

[DOR: 20.1001.1.25884395.2022.4.3.7.1]
[DOI: 10.52547/ieepj.4.3.478]

games are effective in increasing the performance of students with special learning disabilities, because they engage the students more in the learning process (Penkman, 2004; Rapcsak et al., 2009). By playing games, order and accuracy in paying attention to the surroundings, order and accuracy in hearing, in listening, in watching, in speech and behavior are strengthened (Dovis et al., 2012; Mobini, 2001).

Numerous studies have been conducted on the effect of play on specific learning disorders. The results of these researches showed that the game significantly improves learning disabilities. Baggerly and Parker (2005) in their study of child-centered group play therapy with African-American boys found that play therapy significantly reduces dictation errors in students with special learning disabilities. Ray et al. (2007), Cheng-Lai et al. (2013), and Bul et al. (2016), in their studies of the effect of play on children with lack of attention (Hyperactive children), realized that the amount of attention of those children participated in play therapy sessions is significantly increased. Also, the result of the study of Anggriawan (2018) on crossword puzzles in the ability to read and write in dyslexic and illiterate students in primary schools showed that the crossword puzzles has made a significant change in the students' scores and they enjoyed the learning process more than before.

The results of the study by El Kah and Lakhouaja (2018) showed the positive effect of play in improving the problem of dyslexia. The results of research by Siadatian et al. (2015) revealed that auditory attention is improved through play therapy in students with the problem of dictation learning. Therefore, play therapy can be used as a treatment to improve the academic performance of students with spelling learning problems. Also, the researches of Karvan and Amiri (2015) and Faramarzi and Mehrabi Kooshki (2018) indicated that computer games have been effective in reducing the misspelling of students with learning disabilities.

Students with specific learning disabilities experience failure because they cannot meet the expectations of parents and teachers, resulting in feelings of inferiority, self-doubt, and lack of self-confidence. if educational and therapeutic strategies are not considered to address this disorder, these students will take the social and emotional problems caused by learning disabilities into adulthood (Döhla & Heim, 2016). Play is the key to a child's health and a proper way to treat a child. The relationship between play and the ability to read and math among students on the one hand and the ability to identify and eliminate annoying stimuli while learning through play on the other hand determines the educational and therapeutic aspect of play (Baggerly & Parker, 2005). Researchers point out that visual and auditory attention in students with learning disabilities is impaired, which is better improved by involving students in daily activities and games with therapeutic and rehabilitation aspects (Tang & Posner, 2009; Tsai, 2013). Due to the effective role of play in educational and psychological processes, the aim of this study was to evaluate the effectiveness of game on enhancing visual attention and improving spelling performance in students with special learning disabilities in the third grade of elementary school.

According to the results of researches which show that children with special learning disabilities that have writing difficulties are at a lower level than other normal peers in terms of accuracy and

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[DOI: 10.52547/ieepj.4.3.478]

performance, and due to the importance of the subject and the lack of adequate studies in this regard the following hypotheses have been examined in the current study:

1. First Hypothesis: The game has a positive effect on strengthening students' visual attention with a special learning disability.

2. Second Hypothesis: Play has a positive effect on improving the spelling performance of students with special learning disabilities.

Material and Methods

Participants and Setting: This study was approved by the University of Yazd. The Ethics Committee approved the protocols of the study. Informed consent was obtained from each participant. The present study is a single- subject study and the design A-B has been used. In these types of designs, subjects can be from 1 to 20 people, but mostly work with each of the subjects individually takes. Plan A-B includes two experimental situations. The first position is called (A) and the second position is called (B). By the way the general position of the first line is the base. In the second position one therapeutic intervention is performed and then the dependent variable will be evaluated (Farahani HL et al., 2013). The statistical population consisted of all students with special learning disabilities with difficulties in writing who were studying in the third grade of elementary school in Yazd in 2019 academic year. The research sample included 4 individuals (2 boys and 2 girls) that were selected using a purposeful method. It should be noted that the participants were studying in public schools and visited the Learning Disability Center twice a week. Inclusion criteria incorporated moderate or above average IQ, spelling problems, lack of visual and auditory impairments, lack of environmental and educational poverty and the exclusion criteria included lack of cooperation with the researchers, lack of regular participation in educational sessions, not performing the homework and parents' satisfaction. The following are some of the characteristics of the subjects separately:

The first participant was 10 year old boy. His father held elementary school diploma and his mother held high school diploma and they were middle class socially and economically. With regard to the report of the parents, the participant wasn't careful enough in performing his homework, but he was responsible. In the first grade, he had many problems in Persian and math lessons, and in the second year of primary school, despite having a private tutor for math and dictation lessons, his performance didn't improve much. In general, according to the interviews and reports presented to the researcher, the participant didn't have any problem in terms of educational environment and his five senses. He is healthy physically and there is no problem in her family environment. Based on the results of Wechsler intelligence test, verbal IQ was 85, non-verbal was 95 and his total IQ Score was 89.

The second participant was also 10 year old boy that like the first participant didn't have problem with educational environment, his five senses and family conditions. Based on the results of Wechsler intelligence test, verbal IQ was 96, non-verbal was 113 and his total IQ Score was 105.

The third participant was 11 years old girl. Her father held elementary school diploma and her mother was illiterate and they were middle class socially and economically. Based on the reports of the

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parents, she was very stressful and according to the reports and interviews presented to the researcher, the participant didn't have any problem with the educational method, her physical status and her five senses. Based on the results of Wechsler intelligence test, the verbal IQ was 104, the non-verbal was 87 and her total IQ was 94.

The fourth participant was 11 year old girl. His father held high school and her mother held elementary school diploma. She didn't have any problem with her educational and family environment, her physical status and her senses. Based on the results of Wechsler intelligence test, her verbal IQ was calculated to be 112, her non-verbal was 92 and her total IQ was calculated to be 101.

Procedures and Materials

The following tools were used to collect data for the study:

Revised Wechsler's Intelligence Scale for Children

The Wechsler Intelligence Test (2000) was developed for children aged 6 to 16 years. In this test, five intelligence subscales are calculated, which are: verbal comprehension, perceptual reasoning, active memory, processing speed and general intelligence. The reliability of the test was calculated through the test-retest method in relation to subscales from 0.65 to 0.95 and through the two-half method from 0.71 to 0.86 (Sharifi & Rabiei, 2012).

Toulouse-Pieron Short Form Accuracy Test

The main principle of this test is line drawing that the participant must identify a number of symptoms quickly and draw a line on them. At the top of the page, there are three symbols that are considered as template. The subject should cross out all the signs similar to the three symbols at the top of the page quickly and the test lasts for 10 minutes. The two main criteria are the number of correctly marked marks (speed) and the percentage of incorrectly marked or forgotten marks (accuracy). The scoring method is such that for every correctly marked square, a positive score is considered and for each of the wrongly marked and forgotten squares, a negative score is considered. Algebraic sum of positive and negative scores shows the overall efficiency of the subject (Ganji, 1994). The reliability of the test was 0.75 using Cronbach's alpha test and it was 0.81 using split-half testing (internal consistency) and its validity was obtained through simultaneous performance with Wechsler memory test on the same sample and it was calculated to be 0.81 (Pasha et al., 2010). In the present study, the score of each person was measured against the score of people without disorder and people who had a very low score were selected.

Written Expression Test

This test is designed to detect and measure the level of writing ability of subjects with writing disorders by Fallahchay (1995). Examination of the results of dictation tests in the sample group indicates that this test has a very high diagnostic power in measuring the level of dictation. The results of the evaluation of the significance of the correlation coefficients of these tests showed a high reliability for this test. In addition, tests are transformational in the sense that each test is easier than the next level and more difficult than the previous level. Cronbach alpha for this test was calculated to be 0.80 (Fallahchay, 1995).

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Spelling Evaluation Test

This test is prepared by the researchers of the present study. Thus, by surveying a number of specialists and teachers who had the experience of educating children with learning disabilities, important and related words were extracted from the text of the third-grade Persian book and a sample of 65 words was selected from them. The test was reviewed and approved by a number of professors, teachers and specialists.

Intervention Program

According to the literature, the results of various studies and previous studies, a survey of experts and professors in the field of special learning disabilities, an educational program was set up and the program was applied after reviewing the validity of its content by a number of experts. First, the subjects were evaluated, and after determining the baseline, they were trained in twelve sessions, two sessions per week, individually. The duration of each training session was 60 minutes and during the process of receiving the intervention, the subjects were repeatedly evaluated. Table 1 presents the content of the training sessions.

Table 1. Course content of educational sessions

Sessions	Activities
First	• Familiarity with students and establishing intimate relationships with them. • Talking about meetings to motivate participants to attend. • Playing with threads and flash cards
Second	• Playing with marbles and finding hidden shapes • Playing with alphabet letters and making letters with soft colored wires and play dough. • Words were selected from the lesson and they were written on CM 5×7 cards and the dots of some of the letters were not placed and they were asked to punctuate the words. • Homework • A few words were written in their notebooks and the punctuation marks were not placed and they were asked to punctuate the words at home. • Subjects were asked to find 10 words with one dot, 10 words with two dots, and 10 words with three dots in a magazine or newspaper, and cut them with scissors in their office and to Stick them in their notebook and bring them to the class.
Third	• Playing ball with rackets and maze games and reviewing dotted words and checking the number of dots. • Words were selected in the lesson and they were written on 5×7 CM cards and additional dots were placed and they were asked to specify the extra dots. • As Homework: 1-They were given a number of words with extra dots and they were asked to detect the extra dots. 2- They were asked to find 5 words with one dot, 5 words with two dots, and 5 words with three dots in the newspaper and pick them up with scissors and bring them to the class.
Fourth	• Playing marbles and completing incomplete images. • A researcher-made dictation test was held to review the work process. • As a task, another text was selected and some words without a dot and some words with an extra dot were written and they were asked to correct the text.
Fifth	• Bowling and differences in the pictures • In this session, two texts were selected from the textbook. In the first text words without dots and in the second text words with extra dots were written and they were asked to correct the text. • In this session, the story was told to the students and then the story book was given to the children to draw 1 red line around the letters with one dot, 2 blue lines around the letters with 2 dots and 3 green lines around the letters with 3 dots.
Sixth	• Playing dominoes and playing what has changed. • Teaching the letters of “K” and “Gh” with colored wires and playing with dough.

Seventh	• Mini-basketball and Maze Plays • They made words containing "k" using soft colored wires and dough. • Homework 1-They were given a text which contained words with "K" that didn't have the top of "K" and they were asked to put it. 2-They were asked to find 20 words with K and Gh and to write them down.
Eighth	• Dominoes and making big puzzles were held to check the working process of the researcher-made dictation test.
Ninth	• Neuromata game and what has changed. • In this session, a story was told to the students, and at first they were asked to tell everything they understood about the story, and then the story book was given to the students to draw a red line around the letters that has "K and g".
Tenth	• Fishing Game and picture differences game and teaching words with saw-toothed letters and the number of teeth with colored wires and dough. • A number of them were selected and they were written on 5× 7 CM cards and they were written with less number of teeth and they were asked to put them.
Eleventh	• Playing with dart and making small puzzles. • A few words were selected and they were written on 5× 7 CM cards, and more teeth were placed and they were asked to correct the words.
Twelfth	• In this session, Toulouse-Pyron accuracy test and dictation test number 6 of Fallah Chai (100% of the words of the third-year Persian book) were taken as a post-test.

Following the initial formulation of training program, the training materials along with the number and content of the training sessions were given to experts (n=7). A questionnaire was developed after which the experts were asked to express their views on the materials, content and the number of training sessions. To assess the content validity of the questionnaire, the Lawshe's method was employed via the content validity ratio (CVR) and content validity index (CVI). The CVR and CVI were:

$$CVR = \frac{7 - 3.5}{3.5} = 1 > 0.99$$

$$CVI = \frac{7}{7} = 1$$

Results

The participants of the present study included two 10-year-old boys and two 11-year-old girls. The following tables present the results of repeated measurements before and after training during baseline and intervention sessions for the subjects. The obtained data for all four subjects are the scores related to the two baseline positions and the intervention based on the Toulouse-Pieron accuracy test, the Fallahchay's written expression test and the researcher-made dictation test are presented in Table 2.

[DOR: 20.1001.1.25884395.2022.4.3.7.1]
[DOI: 10.52547/ieepj.4.3.478]

Table 2. Frequent measurements in relation to game effectiveness on improving visual attention and spelling performance of students with special learning disabilities

Participants	Variables	Pre-treatment phase			Post-treatment phase			
		1	2	3	1	2	3	4
First	Visual Attention	84	84	84	84	89	90	95.5
	Spelling Performance	51	51	51	51	39	27	22
Second	Visual Attention	80.5	80.5	80.5	80.5	88	91	97.5
	Spelling Performance	44	44	44	44	37	25	17
Third	Visual Attention	102.5	102.5	102.5	102.5	110	122	124.5
	Spelling Performance	41	41	41	41	20	19	16
Fourth	Visual Attention	125.50	125.5	125.50	129	133	135	137.5
	Spelling Performance	27	27	27	27	11	16	10

As it is illustrated by the results of table 2, the score for the visual attention of the first participant in after the intervention stage, the last stage of reassessment was calculated to be 95.5 that has a raise of 84%. Also, concerning the dictation performance, the total score of the participant in after intervention stage, the last stage of reassessment (22), it was accompanied by a decrease of 29 points comparing with before intervention stage (51).

Concerning the second participant, the visual attention score in after intervention stage, the last stage of reassessment (97.5), had an increase comparing with before intervention stage (80.5). Also, concerning the dictation performance the participant's score in after intervention stage, the last stage of reassessment (17) was accompanied with by a reduction of 27 points, comparing with before intervention stage (44).

Concerning the third participant, the visual attention score in after intervention stage, the last stage of reassessment (124.50), is increased comparing with before intervention stage (102.50). In addition, concerning the dictation performance, the participant's score in after intervention stage, the last stage of reassessment (16), had a reduction of 25 points, comparing with before intervention stage (41). Concerning the fourth participant, the visual attention scores in after intervention stage, the last stage of reassessment (137.5), is changed and increased comparing with before intervention (125.5). Also, concerning the dictation performance, the total score of the participant in after intervention stage, the last stage of reassessment (10), had a reduction of 17 points, comparing with before intervention stage (27). Figure 1 shows the subjects' scores during repeated measurements in visual attention and dictation performance. In Figure 1, based on raw scores, visual analysis is presented to individuals. The grades are on the ascending line, which reflects the effectiveness of training.

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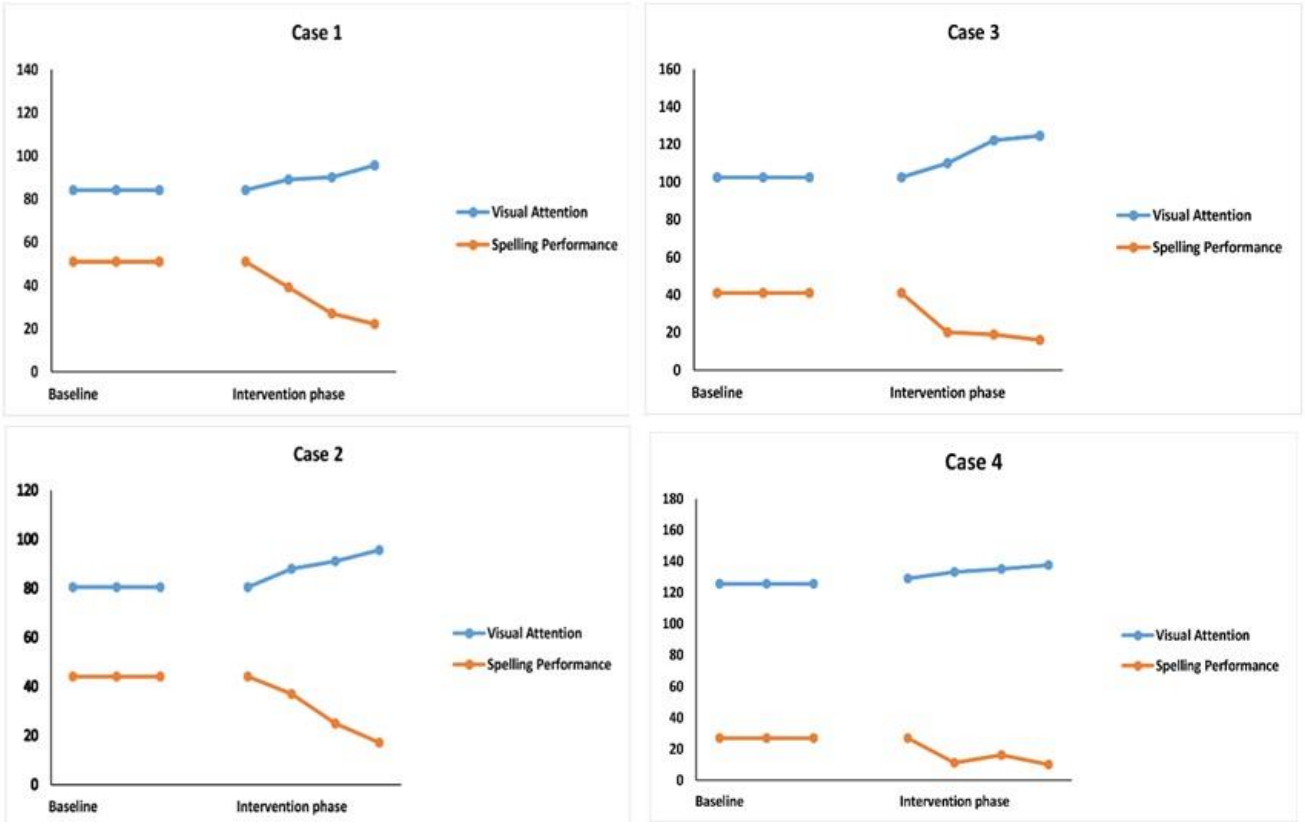

Figure1. Frequency of participants' scores base on Visual Attention and Spelling Performance

Table 3 shows the baseline and intervention mean, as well as the percentages of overlapping and non-overlapping data in terms of visual attention and dictation performance.

Table 3. Average and overlapping of participant's data in terms of visual attention and Spelling Performance

Variable	Participant	Baseline Average	Intervention Average	PND	POD
Visual Attention	1	84.00	89.62	0.75	0.25
	2	80.5	89.25	0.75	025
	3	102.5	114.75	0.75	0.25
	4	125.5	133.62	0.100	0
Spelling Performance	1	51.00	34.75	0.75	0.25
	2	44.00	30.75	0.75	0.25
	3	41.00	24.00	0.75	0.25
	4	27.00	16.00	0.75	0.25

As the results of Table 3 show, in relation to the visual attention for the first, second and third participants, the percentage of overlapping data is PND=0.75 and the percentage of data overlap equals to POD = 0.25 and in relation to the fourth participant, the percentage of overlapping data is PND = 0.100 and the percentage of data overlap is equal to POD = 0. In relation to dictation performance, the calculated PND for all four subjects is 0.75 and the data overlap percentage equals to POD = 0.25. In general, results confirmed the higher PND, the greater effectiveness of the intervention on target behavior. In relation to all four subjects, the mean of reassessment after the intervention has

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increased compared with before intervention in the visual attention and dictation performance variables.

Discussion

The aim of this study was to evaluate the effectiveness of game on improving visual attention and spelling performance in students with special learning disabilities. The results showed that the game was effective in improving visual attention and spelling performance of all four subjects. These findings are in line with the previous studies (Anggriawan, 2018; Baggerly & Parker, 2005; Bul et al., 2016; Faramarzi & Mehrabi Kooshki, 2018; Karvan & Amiri, 2015; Ray et al., 2007; Siadatian et al., 2015).

In examining the first hypothesis and explaining the research finding that play has been effective in improving visual attention, it should be stated that play is often used to treat incompatible children and children with special learning disabilities (Baggerly & Parker, 2005). Play is a correct way to treat children's learning disorders. During play, the child can find the skills to control stimuli, including visual stimuli. Play can prevent the intrusion of disturbing stimuli during students' learning by providing a regular structure appropriate to the child's age (Golubovic & Milutinovic, 2012). One of the major problems for students with dictation problems is the inability to properly distinguish visual stimuli. According to some researchers, one of the best ways to treat these problems in students is through play. These student's visual and auditory attention is improved by participating in daily activities and games (Wang & Huang, 2012). Studies have shown that there is a positive relationship between play and student's learning and play can improve visual and auditory attention, strengthen planning skills, creativity, divergent thinking, emotional and language development and there is a positive relationship between playing and learning math, reading, spelling and cognitive functions. Concerning the treatment of students affiliated with special learning disabilities, attention deficit and hyperactivity, play is one of the best ways to treat visual attention problems, both in terms of quality and duration of effectiveness (Bul et al., 2016; Nicolson & Fawcett, 2011). Games improve attention skills and cognitive flexibility, and creating engaging learning environments will have a positive impact on learning (Shaffer et al., 2001). In general, the relationship between play and the ability to reading, writing and doing math among students on the one hand and the ability to identify and eliminate disturbing stimuli while learning through play on the other hand, more and more determine the educational and therapeutic aspect of play. Play is a structured approach that can facilitate the learning processes of students with special learning disabilities (Baggerly & Parker, 2005).

It seems that in the present study, a variety of games such as marbles, checking the differences in images, etc. have led to the strengthening of attention and visual memory, which can help students with special learning disabilities in learning and memorizing words. In fact, game-based learning was used alongside teacher education in the classroom, and through the use of educational games, students' visual attention was enhanced and the students generalized the learning experiences gained in the

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game process to other learning situations, which shows the positive impact of the game-based intervention and the educational program of the present study.

Explaining and examining the second hypothesis of the research that this game has been effective in improving the spelling performance of students with special learning disabilities, it should be stated that the research results showed that the effectiveness of visual memory enhancement through play is effective on reducing students' dictation errors with specific learning disabilities. Play enhances students' self-monitoring skills in the writing process, purposefulness of activities, and ultimately learning the correct writing skills (Abdi et al., 2012; Baggerly & Parker, 2005). The relationship between learning and memory is inevitable. The application of games in educating students with special learning disabilities strengthens memory and increases a person's ability to recognize or recall audio and visual information, and this improves students' performance in dictation process (Ray et al., 2007). Games can be a good tool in education. Through games, in addition to acquiring various skills, the child can also learn many educational concepts. In addition to having a fun and entertaining aspect, many games play a major role in enhancing attention, visual and auditory perception, and visual and auditory memory, which can improve the spelling performance of students with special learning disabilities (Anggriawan, 2018; Moghaddam & Turkman, 2002). The results of the present study showed the positive effect of play on the dictation performance of students with special learning disabilities.

It seems that in the research intervention program, games such as marbles and games for finding hidden shapes, playing with the letters of the alphabet, making letters with soft colored strings, playing with dough, Maze game and reviewing dotted words and checking the number of their dots, bowling and image differences, etc. have been effective in strengthening students' visual attention, perception and visual memory and have reduced dictation problems. In general, research conducted in recent years shows the emphasis of researchers on the game.

Educational games can be an effective way to treat the writing problems as they use students' visual and auditory senses. As the results of the present study showed, enhancing visual attention through play has reduced the dictation errors of students with special learning disabilities and this can lead to improved academic achievement and increased students' self-esteem. The treatment plan proposed in this study can be used by parents, teachers and psychologists specialized in working with children with special learning disabilities. Due to the effectiveness of the game on the writing performance of students with special learning disabilities, it is recommended to use this strategy in the field of education in special centers for special learning disabilities.

Limitations and Future Directions: One of the limitations of the research is the small number of sample because the selection of more samples was associated with limitations for researchers. In addition, because the present study was conducted in the city of Yazd (Iran), its generalization to other cities should be done with caution and further research is necessary. Also, in this study, after presenting the intervention, the follow-up process was not performed.

[DOR: 20.1001.1.25884395.2022.4.3.7.1]

[DOI: 10.52547/ieepj.4.3.478]

It is suggested that the future research evaluates the effect of play on writing problems in other educational levels as well as its effect on dyslexia and dyscalculia in a structured and organized program and also the effect of parental education in using play in reducing knowledge learning problems of students with special learning disabilities should be assessed.

Conflict of interest: The authors state no conflict of interest in the study.

Financial sponsor: The authors acknowledge that they have not received any financial support for all stages of the study, writing and publication of the paper.

Acknowledgements: The researchers wish to thank all the individuals who participated in the study.

References

Abdi, A., , K., M., , & Hatami, J. (2012). The effectiveness of visual memory enhancement through play therapy on reducing spelling errors in students with writing disorders. . *Research in Rehabilitation Sciences, 8*(4), 648-658.

Ahrami, R., Shoushtari, M., Golshani Monze, F., Kamerzrin, H., & (2011). The effectiveness of accuracy training on the reading ability of dyslexic female students in the third grade of elementary school in Isfahan. *Psychology of Exceptional Individuals,, 1*(3), 139-152.

Anggriawan, A. (2018). *The effect of crossword puzzle games in reading and Writing ability toward dyslexia and dysgraphia Students in elementary school* UIN Sunan Ampel Surabaya].

Baggerly, J., & Parker, M. (2005). Child-centered group PLAY therapy with African American boys at the elementary school level. *Journal of Counseling & Development*, *83*(4), 387-396.

Bul, K. C., Kato, P. M., Van der Oord, S., Danckaerts, M., Vreeke, L. J., Willems, A., Van Oers, H. J., Van Den Heuvel, R., Birnie, D., & Van Amelsvoort, T. A. (2016). Behavioral outcome effects of serious gaming as an adjunct to treatment for children with attention-deficit/hyperactivity disorder: a randomized controlled trial. *Journal of medical Internet research*, *18*(2), e5173.

Cheng-Lai, A., Li-Tsang, C. W., Chan, A. H., & Lo, A. G. (2013). Writing to dictation and handwriting performance among Chinese children with dyslexia: Relationships with orthographic knowledge and perceptual-motor skills. *Research in developmental disabilities*, *34*(10), 3372-3383.

Christmann, C. A., Lachmann, T., & Steinbrink, C. (2015). Evidence for a general auditory processing deficit in developmental dyslexia from a discrimination paradigm using speech versus nonspeech sounds matched in complexity. *Journal of Speech, Language, and Hearing Research*, *58*(1), 107-121.

[DOR: 20.1001.1.25884395.2022.4.3.7.1]

[DOI: 10.52547/ieepj.4.3.478]

Disabilities, N. J. C. o. L. (2007). Learning Disabilities and Young Children: Identification and Intervention. A Report from the National Joint Committee on Learning Disabilitie, October, 2006 (pp. 63-72). *Learning Disability Quarterly*, 63-72.

Döhla, D., & Heim, S. (2016). Developmental dyslexia and dysgraphia: What can we learn from the one about the other? *Frontiers in psychology*, *6*, 2045.

Dovis, S., Van der Oord, S., Wiers, R. W., & Prins, P. J. (2012). Can motivation normalize working memory and task persistence in children with attention-deficit/hyperactivity disorder? The effects of money and computer-gaming. *Journal of abnormal child psychology*, *40*(5), 669-681.

El Kah, A., & Lakhouaja, A. (2018). Developing effective educative games for Arabic children primarily dyslexics. *Education and Information Technologies*, *23*(6), 2911-2930.

Fallahchay, R. (1995). *Evaluation of reading and writing disorders in elementary students,*

Farahani HL, Kazemi Z, Abedi A, & S., A. (2013). *Applied fundamentals of case - study designs.* Tehran: Psychology and Art;.

Faramarzi, S., & Mehrabi Kooshki, M. (2018). The effect of multimedia games on spelling of students with learning disabilities. *Third National Conference and First International Conference on Computer Games: Opportunities and Challenges. Isfahan. Iran.*

Fletcher, J. M., Lyon, G. R., Fuchs, L. S., & Barnes, M. A. (2018). *Learning disabilities: From identification to intervention*. Guilford Publications.

Ganji, H. (1994). *Experimental Psychology.* . Payame Noor University.

Ganji, H. (2017). Psychology of Exceptional Children. In (pp. 276-277). Tehran: Savalan:.

García-Redondo, P., García, T., Areces, D., Núñez, J. C., & Rodríguez, C. (2019). Serious games and their effect improving attention in students with learning disabilities. *International journal of environmental research and public health*, *16*(14), 2480.

Golubovic, S., & Milutinovic, J. (2012). Speed of reading and number of errors in children with dysgraphia. *International Journal of Psychophysiology*, *3*(85), 409.

Karvan, M., & Amiri, F. (2015). The effect of computer games on dictation scores of students with symptoms of dictation disorder in Isfahan. *First National Conference on Computer Games: Opportunities and Challenges. Isfahan.Iran.*

Mobini, M. T. (2001). Teaching math before elementary school. . In. Mashhad: Astan Razavi.

Moghaddam, M., & Turkman, M. (2002). *Educational games.* . Tehran: Madrasa Publications.

Nicolson, R. I., & Fawcett, A. J. (2011). Dyslexia, dysgraphia, procedural learning and the cerebellum. *Cortex*, *47*(1), 117-127.

Pasha, G., BAKHTIYAR, P. S., & Akhavan, G. (2010). The effect of active music on memory and the attention of schizophrenia patient.

Penkman, L. (2004). Remediation of attention deficits in children: A focus on childhood cancer, traumatic brain injury and attention deficit disorder. *Pediatric Rehabilitation*, *7*(2), 111-123.

[DOR: 20.1001.1.25884395.2022.4.3.7.1]

[DOI: 10.52547/ieepj.4.3.478]

Rapcsak, S. Z., Beeson, P. M., Henry, M. L., Leyden, A., Kim, E., Rising, K., Andersen, S., & Cho, H. (2009). Phonological dyslexia and dysgraphia: Cognitive mechanisms and neural substrates. *Cortex*, *45*(5), 575-591.

Ray, D. C., Schottelkorb, A., & Tsai, M.-H. (2007). Play therapy with children exhibiting symptoms of attention deficit hyperactivity disorder. *International Journal of Play Therapy*, *16*(2), 95.

Saif Naraghi, M., & Naderi, E. (2015). In *Special learning disabilities.* . Tehran: Arasbaran.

Shaffer, R. J., Jacokes, L. E., Cassily, J. F., Greenspan, S. I., Tuchman, R. F., & Stemmer Jr, P. J. (2001). Effect of Interactive Metronome® training on children with ADHD. *The American Journal of Occupational Therapy*, *55*(2), 155-162.

Shariatmadari, A. (2004). *Educational Psychology*. Isfahan: Mashal Publications.

Sharifi, T., & Rabiei, M. (2012). Using Wechsler Intelligence Scale-4 for diagnosing children with learning disorders (writing and math). *Journal of learning Disabilities*, *2*(2), 59-75. .

Siadatian, S. H., Abedi, A., & Sadeghian, A. (2015). Effect of Play Therapy on Improving Auditory Attention in Students Suffering from Dysgraphia: A Single-Subject Study. *Middle Eastern Journal of Disability Studies,*, *4 (4) :*, 43-54.

Singer, B. D., & Bashir, A. S. (2004). Developmental variations in writing composition skills. *Handbook of language and literacy: Development and disorders*, 559-582.

Steinbrink, C., Klatte, M., & Lachmann, T. (2014). Phonological, temporal and spectral processing in vowel length discrimination is impaired in German primary school children with developmental dyslexia. *Research in developmental disabilities*, *35*(11), 3034-3045.

Tabrizi, M. (2011). *Treatment of Dictation Disorders.* . Tehran: Fararavan Publication.

Tang, Y.-Y., & Posner, M. I. (2009). Attention training and attention state training. *Trends in cognitive sciences*, *13*(5), 222-227.

Tsai, M.-H. (2013). Research in play therapy: A 10-year review in Taiwan. *Children and Youth Services Review*, *35*(1), 25-32.

Wang, T.-Y., & Huang, H.-C. (2012). The performance on a computerized attention assessment system between children with and without learning disabilities. *Procedia-Social and Behavioral Sciences*, *64*, 202-208.

[DOR: 20.1001.1.25884395.2022.4.3.7.1]

[DOI: 10.52547/ieepj.4.3.478]