

Effective Strategies That Improve the Reading Abilities of Children with Dyslexia

Beixi Chen^{1,a,*}

¹Suzhou Foreign Language School, Suzhou, China

a. 1910841121@mail.sit.edu.cn

**corresponding author*

Abstract: Dyslexia is prevalent in learning disabilities and children diagnosed with this disease demonstrate unexpected poor reading abilities with normal intelligence and neurological functions. The struggling process has caught reading disabled children into negative educational experiences. Thus, the investigation of a range of strategies that enhance their reading abilities is essential. This review paper categorized the strategies into repetitive reading strategy, mind-map strategy and neural impression strategy. The repetitive reading strategy involves reading the same material multiple times until the desired level of fluency and comprehension is achieved. Studies employing this approach have shown promising results in improving reading abilities in dyslexic children. The mind-map strategy, using an organizational thinking tool, has also proven effective in enhancing reading abilities among dyslexic children. By mapping out subtopics and central themes, this strategy aids in comprehension and organization of ideas. The neural impression strategy relies on following a model while reading and receiving corrective feedback. This approach has shown significant enhancement in reading fluency and accuracy for children with dyslexia. To sum up, all these three strategies offer promising prospects for improving the reading abilities of children with dyslexia.

Keywords: reading strategies, dyslexia, repetitive reading strategy, mind-map strategy, neural impression strategy

1. Introduction

Learning to read is a crucial component of children's development and a major factor in their success in elementary school. Dyslexia, also known as a specific reading disability, is characterized by an unexpected reading problem in children and people who would otherwise be intelligent, motivated, and educated enough to read accurately and fluently [1]. Dyslexia is one of the most common classifications of learning disabilities, influencing over 80% of those who were identified as learning-disabled [2]. In addition, approximately 3% to 12.6% of school-age children in China are negatively affected by reading disabilities [3]. Children with reading disabilities often have difficulties in spelling, decoding, and word identification but no problem with intelligence or other neurological deficits, which makes reading a frustrating and struggling process for them [4]. As a result, dyslexia brings tremendous disadvantages to children. So, investigating strategies that enhance the reading abilities of children with dyslexia is essential and meaningful.

A wide range of papers have discussed strategies that enhance the reading abilities of general group. Those strategies can be generally classified into three aspects: repetitive reading strategy, mind-map strategy, and neural impression strategy. For example, a research study investigated the impact of repeated reading strategy on 1214 children with normal reading abilities and found that it significantly increased their reading speed and accuracy [5]. Many studies also showed the effectiveness of the mind-map strategy and neural impression strategy for improving normal children's reading skills [6,7]. In conclusion, all three strategies are effective in improving children's reading abilities.

However, in the group of children with reading disabilities, the investigations of the impact of these three strategies are relatively few. As a result, this review article aims to comprehensively state strategies that enhance the reading abilities of children with dyslexia.

2. Reading Strategies

2.1. Repetitive Reading Strategy

Repetitive reading strategy refers to reading the same article more than once until the proposed level of reading fluency and comprehension are achieved [8].

Authors Wang and Zhang had implemented a comprehensive strategy based on repetitive reading on a single case [9]. T, as a pseudonym, was born in January 2010 and was 9 years old as a participant in the experiment. According to the statements from his teacher and parents, T seldom concentrated on his studies and always got distracted. In addition, T made a range of errors when reading articles and writing Chinese characters. T had completed Webster's Child Intelligence Scale IV, and the results showed that he had no significant deficit in intelligence. However, in the test of the Reading Disability Assessment Tool, T was assessed as having relatively weak reading abilities. There was also a control participant named N, chosen from the same class as T, taking part in the experiment. All test content was from the 2nd grade volume two Chinese book published by People's Education, and questions in the test were randomly arranged by computer. The test material aimed to examine participants' reading fluency. The picture book T chose by himself from several prepared by the teacher was the intervention material for this experiment. In the first week, both T and N would complete 5 reading fluency tests, and in the next 6 weeks, which was called the intervention period, T received 12 intervention classes. After each intervention class, both T and N had to complete the reading test. 20 days after the intervention period, participants T and N would complete five reading fluency tests continuously. The main intervention method was practicing reading aloud repeatedly, combined with sharing reading, teaching literacy, and training cognitive ability. The authors measured participants' reading fluency by calculating the number of correct words read aloud per minute (CWPM). The results showed that the CWPM of T increased from 56.6 to 113 to 130.2 in the three periods, respectively. In addition, the difference in CWPM between N and T dwindled continuously. As a conclusion, the strategy based on repetitive reading is effective in enhancing the reading influence of children with dyslexia. The authors conducted an experiment based on compositive strategies, which were more beneficial for children with dyslexia because they have deficits in multiple cognitive components. The majority of studies used comprehensive intervention strategies [10].

Another similar case showed a consistent result [11]. A third-grade student who had been diagnosed with a reading disability using DCCC took part in the study. From his teachers and parents, he was described as distractible and weak in reading. He also showed relatively poor interest in reading and studying. The researcher picked several modern poems as reading materials and a 5-point reading fluency chart as a measure of reading ability. After certain periods of

intervention, which was based on the method of repetitive reading combined with self-monitoring, the participant's reading accuracy and fluency obviously improved.

Apart from case studies, there were also scholars investigating the relationship between reading abilities and repetitive reading strategy in a relatively large sample. In another study, the author investigated the impact of repetitive reading strategies on 24 third-grade primary school students [12]. The participants were chosen for their recent performances in two Chinese tests in the bottom 15% of the average level. However, after checking with their parents, their level of intelligence, emotions, and other factors were all normal. The test materials were randomly chosen from 30 sentences from Chinese books from grades 1 to 3, and these materials were for the purpose of testing reading fluency. In addition, there were two articles from grade 2 and grade 3 Chinese books, with six multiple-choice choices for each. The intervention materials for this study were eight articles that matched the reading abilities of children with reading disabilities. Eight third-grade students with normal reading ability also participated in the experiment as a control group. The 24 participants were equally distributed into 3 experimental groups and received 2 intervention classes each week. Experimental Group 1 applied a repetitive reading strategy combined with demonstration and repetitive practice. The teacher demonstrated in person first and then asked participants to repetitively practice paragraph by paragraph until they achieved the proposed accuracy and speed. Experimental Group 2 applied a repetitive strategy combined with correlative feedback and reinforcement. Participants in this group read aloud independently and were corrected by the teacher after reading. Then the teacher would give oral praise to students in order to encourage them to make efforts to achieve the speed and accuracy goal. In addition, participants received heartwarming objects such as stationery as rewards. This procedure would be repeated until the proposed goal was reached. Experimental Group 3 applied the combination strategy of the first two groups, which consisted of all four intervention tools. The teacher demonstrated the correct pronunciation first and then encouraged students to approach the goals through oral and object praise. The students practiced repetitively until the speed and accuracy goals were accomplished. The control group did not take part in the intervention session. All groups had to complete the reading test after the intervention teaching class. Number of correct words read aloud per second multiply by 60 is taken as the calculation of reading fluency and for the calculation of reading comprehension ability, it is measured by scores participants acquired in the comprehension test. The results of this experiment had shown that the mean scores of reading fluency and reading comprehension of the 3 experimental groups were higher than those of control group. Moreover, the average reading fluency and comprehension score in the experimental group 3 improved significantly higher than those of the other 2 groups. So, as a conclusion, the 3 comprehensive strategies based on repetitive strategy were all effective in enhancing reading abilities of children with dyslexia. In addition, repetitive reading strategy combines with all four intervention tools was the most beneficial. Corrective feedback had made children pay more attention on the accuracy of the answer and reinforcement had offered a study goal for students in order to encourage them to integrate in the activities.

Another study also verified the effectiveness of repetitive reading strategies [13]. The author utilized the case study method and also used tapes to assist with repetitive reading practice. Five 8-year-old boys, along with two boys and three girls who demonstrated profound aversion to reading, participated in the experiment. During the intervention period, participants chose the intervention material by themselves, with flexible teaching time and duration. As a result, reading fluency and comprehensive ability increased significantly.

To sum up, after applying repetitive reading strategy, the reading fluency and comprehension skills of children with dyslexia improved significantly. So the strategy is effective for strengthening the reading skills of dyslexia group under 12.

2.2. Mind-Map Strategy

Mind-map, an organizational thinking tool, focuses on “mapping” the radioactive thinking. A mind-map has a central topic, then several sub-themes scatter around the central theme. In addition, any sub-theme can be a central theme and spread more subtopics around [3].

Another strategy called the mind-map strategy can also aid children with reading disabilities to read better. In one particular study, the author recruited three fourth-grade boys who had completed Chinese Wechsler Intelligence Scale for Children and Dyslexia Checklist for Chinese Children [3]. All participants had normal intelligence but a deficit in reading skills. According to the evaluation from their parents and teachers, they had similar Chinese test scores, which were usually at the bottom of the class. In addition, they were always distracted in class and had difficulties reading articles. The researcher picked 33 electronic picture books suitable for primary school students as reading materials. The researcher also compiled comprehension tests by themselves in order to test participants’ reading comprehension. The tests consisted of 9–11 multiple choice questions, and participants’ level of comprehension was measured by calculating the percentage of correct answers. The process of the study is composed of three periods. In period 1, all participants completed three reading comprehension tests every week with no intervention tool. When participants’ scores tended to be stable, the research moved to period 2. In this period, researchers first read the materials together with the participants and guided them to finish the mind map. After this, participants complete the reading test. After six times of teaching, the researcher withdrew and the participant completed the mind map independently. Then finish the reading comprehension test. During the third period, which is one week after period 2, participants finished a mind map by themselves without any intervention and then completed the comprehension test. There is one thing to mention: when the comprehension score of the first participant tended to be stable after intervention, the researchers started to intervene with the second participant while the third one was still in period one. The results showed that all three participants’ reading comprehension scores increased significantly after intervention, and their reading abilities had a sustaining effect. In conclusion, the mind-map strategy is an effective strategy for positively affecting the reading abilities of children with dyslexia.

Another psychological study also showed a similar result [14]. The researcher utilized the case study method in this research. Two grade 3 students in China accepted the intervention class, which aimed to first guide participants to draw a mind map according to a particular reading material and then ask them to complete it independently. After the intervention, both of them showed a significant increase in reading comprehension as well as fluency. However, only one of the participants was diagnosed with dyslexia, and another had poor performance in Chinese. The results showed that the one with a reading disability improved more profoundly than the other one.

In conclusion, mind-map strategy has a positive impact on children with reading disabilities.

2.3. Neural Impression Strategy

The neural impression strategy is the third strategy, which is also beneficial for children with dyslexia. It applies the method of following reading after a particular model. The researcher then correct the errors the subject makes during the reading until the participant can correctly read the whole article completely. During the procedure, oral praise is given to the subject [15].

Author Zhao implemented an experiment to study the impact of this strategy on the reading fluency of children with reading disorders [16]. A 9-year-old boy was chosen to be the participant, and he was diagnosed with dyslexia without intelligence impairment. The researcher chose six articles from primary school Chinese books in grade 3 as reading materials. In addition, tapes were provided for the participant to follow. The judgment of the students’ reading fluency was made by

the Chinese grade group leader. The rhythm assessment chart was used for evaluating the participant's fluency. Moreover, reading accuracy (total characters read aloud correctly/total characters of the article) and reading speed (characters read aloud per minute) were calculated for data analysis. In the first period of the experiment, the participant randomly chose one of the articles and read it out loud independently without any intervention. The teacher evaluated the participant's reading fluency after the participant read the material. After this week, researchers apply the neural impression strategy to the participant. The participant first read the article independently and then followed the tape. The researcher would correct their pronunciation and demonstrate reading, and then the student would follow the researcher. Then, after two times following the tape with corrective feedback from the teacher, the student independently read the article. Then the participant's performance would be assessed. The intervention was maintained for 6 weeks, and after this period, the participant needed to receive 6 articles and read them out loud without any help for a week. The teacher evaluated the participant's performance through a written assessment chart. Results showed that the reading accuracy, reading speed, and reading rhythm of the participants increased significantly after intervention and all had the ability to maintain them in the third period of the experiment, which indicated that neural impression strategies could aid children with reading disabilities to improve their reading abilities. In the rhythm assessment section, considering the subjectivity of the assessment, the researcher and the teacher evaluated the participants reading rhythm together. Researchers also performed a consistency check among the graders, and the calculated consistency was 93%.

In another particular study, the researchers compared the effectiveness of neural impression strategy and visual cue strategy in one single case [15]. The results showed that neural impression increased participants reading accuracy and speed more profoundly than that of visual cue strategy. In addition, in the research of Hanway [17], the researchers intervened with one child with dyslexia through a neural impression strategy and found out that it could significantly enhance the participant's reading fluency.

To sum up, it is effective to apply neural impression strategy to children with reading disabilities in order to enhance their reading abilities.

3. Discussion

In all, this present study found that based on previous studies, after applying the repetitive reading strategy, the mind-map strategy, and the neural impression strategy, the reading fluency, accuracy, and speed of children with dyslexia increased significantly. Some similarities are found in the procedures in these studies that they all applied test-retest method. First, participants receive several tests without any intervention to test their initial reading abilities. After this, researchers apply different intervention methods to participants individually, usually in the form of classes. Then, after each class, a reading ability test is given to each participant for the purpose of tracking the improvement of their reading abilities. In the third period of the procedure, which is after the intervention one, participants are provided reading tests again, but without intervention classes, to test whether their reading abilities can be maintained. For future studies, various alternative methods can be used. Comparing the neurological index of the individual before and after the intervention is feasible. For example, fMRI can be utilized for detecting the change of blood oxygen level of a particular brain area in children with reading disabilities.

However, a range of common limitations emerged in the investigations into the impact of these three strategies on the reading skills of children with dyslexia. First, since only a small number of children are diagnosed with dyslexia in society, which means that the group of children with dyslexia is relatively rare, the sample in each study was limited. So, the generalizability of the results is low [18]. In addition, the conditions of each individual participant in each study are

different, such as their intelligence level, so the effect of each strategy may be different. Thus, validity decreases. Secondly, the reading materials for each study were chosen for their difficulty, which matched the reading abilities of normal children, but for more difficult articles, the improvement of the reading abilities of children with dyslexia would be unknown. Thirdly, in each study, the intervention period was relatively short, not exceeding 6 weeks. Whether the intervention duration applied in each study was the most effective still needed to be verified.

For suggestions, in later studies related to reading abilities, researchers can no longer be confined to children with reading disabilities but also focus on children with other learning disabilities, such as hearing disorders or writing disorders. Moreover, more flexible reading materials could be utilized, and the duration of the intervention could be increased appropriately. An environment close to the real learning of children is also necessary.

Overall, the review of strategies that enhance the reading abilities of children with dyslexia is educationally meaningful. These strategies can be widely applied to children with reading disabilities for building better learning and educational experiences as well as helping them keep up with their studies. Additionally, these strategies can build a solid reading foundation and help them achieve greater learning achievements and life standards in the future.

4. Conclusions

This review article investigated the effect of reading strategies on reading abilities of children with dyslexia. The three strategies consist of repetitive reading strategy, mind-map strategy and neural impression strategy. Based on the literature reviewed, the three strategies all presented profound enhancement of reading speed, accuracy and fluency of dyslexic children. Despite the positive outcomes observed in the studies, there are some common limitations, including small sample sizes, variations in participant conditions, and short intervention periods. For future research, the inclusion of other learning disabilities, flexible reading materials, and longer intervention durations is recommended.

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