

Exploring Multisensory in Enhancing Literacy of Dyslexic Students

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Abstract

This study focuses on the multisensory learning approach in the literacy mastery of dyslexic students. The objective of this study is to identify reading problems according to the LINUS literacy construct and explain reading errors according to Levinson's Theory (1994) among dyslexic students. Next, the researcher will apply the multisensory learning approach to overcome the problem and analyze the effectiveness of the multisensory learning approach in the reading literacy aspect of dyslexic students. The researcher used the A-B-A research design to determine the effectiveness of multisensory learning in literacy mastery of dyslexic students through three phases, namely baseline (A), intervention (B), and maintenance (C). In explaining reading errors among dyslexic students, the researcher used the Levinson Theory of Dyslexia (1994). The Orton-Gillingham approach (1948) and the Structured Literacy approach (2004) are used in the application of multisensory learning. The Phonological Theory of Dyslexia Deficit (1999) is used in analyzing the effectiveness of multisensory in dyslexic students' mastery of literacy. The researcher chose the Malaysian Dyslexia Center (Ampang) as the study location. This study involved a total of 10 dyslexic students as study subjects and 15 dyslexic teachers as study respondents. The researcher has used observation, interview, and survey methods. The researcher used the LINUS Literacy Reading Diagnostic Test, Malay language Level 1 reading texts, Multisensory Dys-Literacy Kit and questionnaires as research tools. The findings of this study prove that the study subjects have reading problems according to the LINUS construct which evaluates 12 reading skills. The researcher found that dyslexic students have not mastered the language's phonemic, phonetic, and phonological aspects. The researcher also found some research findings beyond the expectations of Levinson's Theory (1994). The results of this study found that the influence of English phonics reading also affects dyslexic students' reading skills in Malay. In the final phase of this study, the researcher analyzed the effectiveness of the multisensory learning approach and has proven a significant improvement in the literacy skills of dyslexic students.

Keywords: Dyslexia, Learning Disability, Language Learning, Literacy, Multi-Sensory.

Introduction

From the educational context, children with special needs are portrayed as exceptional compared to normal children. Among them are children with dyslexia, a specific learning problem (Lyon, Shaywitz, Bennett, 2003). This learning disorder consists of dyslexia, dysgraphia, and dyscalculia. However, dyslexia is the most common learning disorder among

children in Malaysia compared to dysgraphia or dyscalculia (Special Education Department, 2022). Dyslexic children have different types of challenges and obstacles in their learning process. In general, these learning disabilities are associated with neurological development that affects an individual's ability to process information (Ugwu, 2015). Because of this, learning disorders impact the cognitive process of dyslexic children.

Teachers play an important role in the lives of dyslexic children. Dyslexic students have low self-confidence and this directly affects their learning process at school. Most of them are not focused and prefer to play rather than study. Teachers play a role in and out of class, especially in helping dyslexic students. Through proper observation and guidance, they can be given appropriate early intervention. Dyslexic teachers can study the suitability of teaching approaches and techniques to be used in the learning process of dyslexic students. The effectiveness of an intervention can be seen if teachers take steps to help dyslexic students. Teachers can share their observations and views with parents so that they can help children as soon as possible. In Malaysia, The Special Education Division of the Ministry of Education is a government body that plays an important role in ensuring that dyslexic children do not fall behind in their academic fields. Therefore, the Special Education Division can practice the use of new approaches and learning techniques suited to these dyslexics. Not only that, the government body needs to give priority in training teachers to diversify teaching methods for dyslexic students. This process is crucial as dyslexics require special interventions in learning for long term improvement.

Literature Review

A number of studies have been carried out in examining the reading difficulties among dyslexics. Studies conducted by Alexandra Reis, Susana Araujo, Ines Salome Morais, & Luis Faisca (2020); Walda et al (2021); and Romero (2020), also examined reading difficulties among dyslexics but these researchers did not focus on the letter discrimination problem that contributes to dyslexic children's difficulties in mastering letters and sounds in reading. Research on multisensory methods have studied various aspects on this approach. A study conducted by Subramaniam and Nasir (2020), have studied letter reversal problem from the aspect of reading among dyslexic students, such as / b /, / d /, / p /, / q /, / m /, / w /, / n / and / u /. This study is also based on Levinson Syndrome Theory of Dyslexia (1994). The findings of this study show that the reversal letter problem faced by them has been improved after each study subject went through 10 multisensory method therapies. Each study subject is able to write letters that have a similar shape without reversing. In addition, the teachers acting as observers also gave positive feedback on the method. This shows that multisensory therapy is very effective in solving the problem of reversing letters among dyslexic students.

Problem Statement

All over the world, the population rate of dyslexics is increasing. However, most teachers and parents are still practicing the conventional approach of teaching dyslexic children. Most parents especially are not aware of new approaches and learning techniques that are most suited to these special need children. The researcher has noted a few gaps in previous studies and therefore, the researcher has aimed to examine the research gaps in the current study. Dyslexics generally have a weak grasp of literacy due to their learning disability and thus, spelling, reading and writing becomes a challenge. (Vijayaletchumy, Kavenia, & Senthil (2023). The outcome of this research will identify literacy mastery level, determine the reading errors

according to the Levinson Theory and discuss the effectiveness of multisensory learning of dyslexic children.

Methodology

This study is qualitative and emerged mostly on observations among the study subjects. The researcher selected 10 dyslexics from one dyslexia centre of Malaysia Dyslexia Association. The aim of this study is to identify literacy mastery level, determine the reading errors according to the Levinson Theory and discuss the effectiveness of multisensory learning. This study is organized into 3 phases according to the objectives and each phase applies a research instrument to obtain the data. The research instruments are Malay language literacy construct test, Level 1 Malay language reading texts and multisensory activities. These instruments have been checked and verified for its reliability and relevance so that it suited to the dyslexic children.

Results and Discussion

The results of this study were interpreted and analyzed in 3 phases:

- a) Identifying literacy mastery level
- b) Determining the reading errors according to the Levinson Theory
- c) Discussing the effectiveness of multisensory learning

Phase 1: Identifying literacy mastery level

From the results of this study, the researcher proves that the literacy mastery level of dyslexic children is not up to par and does not meet a satisfactory standard. In this phase, the dyslexic children were given 5 words each according to the 12 LINUS reading skills (Ministry of Education Malaysia).

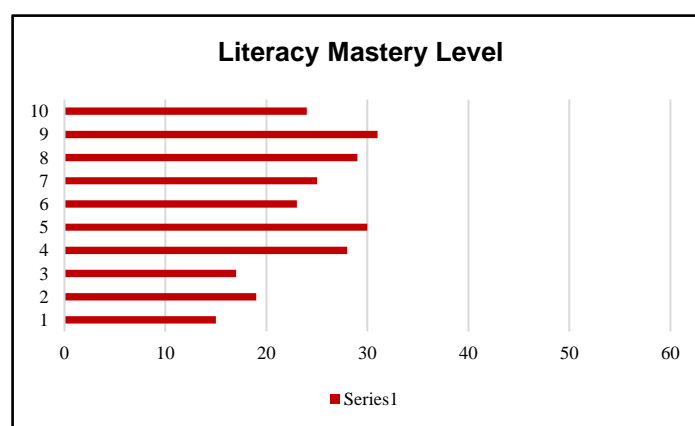


Fig. 1. Literacy mastery level

Figure 1 shows the literacy mastery level of the dyslexic students of this study. All 10 subjects only scored half or less than the full score of the reading test conducted. From the researcher's observation, most of the dyslexic students found it difficult to read basic words as they showed difficulty in basic sound blending. All the Malay language words tested were basic and normalized words in the educative settings. The students have already been exposed to these

words in their academics at school. However, the researcher proved that all the dyslexic students possess weak mastery of their literacy, especially in reading.

Phase 2: Determining the reading errors according to the Levinson Theory

Levinson (2004), underlines 7 basic reading errors that dyslexics make, which are removal, transfer, insertion, replacement, reversal, condensation, addition or wild guesses. In this phase, the researcher tested the dyslexic students to determine which reading errors were made according to this Levinson Theory. Below is the summarized results of phase 2 according to the reading level and reading errors made by dyslexic students.

Table 2.

Reading errors according to learning level

Level:	Reading Errors:
Beginner	removal, reversal
Intermediate	replacement, removal
Advanced	insertion, wild guesses

Table 2

Example of word errors

Reading Errors:	Words:
Removal	<i>kera – kea, ini – ni, saya – say, madu - mad</i>
Reversal	<i>Beri – deri, tebu, bute, madu – mabu, bela - dela</i>
Replacement	<i>Sekolah – sakolah, tepi – tipi, cantik – kantik, dicat – dikat</i>
Insertion	<i>Pulang – pulalang, tidak – tiadak, bunga - bungga</i>
Wild guesses	<i>Dan – di, yang – saying, lengan – dengan</i>

From the study outcome of phase 2, the researcher has determined several reading issues among dyslexic children based on Levinson's Theory (1994). The results prove that the subjects from beginner, intermediate and advanced levels have shown reading errors of various types- removal, reversal, replacement, insertion, and wild guesses. These results support the findings of Levinson (1994), however, the researcher also noted several key results that are not underlined by Levinson (1994). Also, addition and condensation errors does not occur in reading Malay language texts. One of the major reading errors in the Malay language is the influence of English language phonics. Most of the study subjects showed confusion in these words when the sounds are similar.

Phase 2: Discussing the Effectiveness of Multisensory Learning

In phase 3, each study subject was analyzed before and after the researcher applied multisensory learning. The researcher compared the results before and after the application of the intervention. Below are 5 significant improvements of the dyslexic students in their literacy mastery after the exposure of multisensory learning:

i) Letter Formation

In the beginning of this study, subject A showed difficulty in identifying letters. Because this subject was unable to discriminate the letters, he was unable to sound and therefore, blend the sounds to read fluently. For example, subject A showed difficulty differentiating the letters that looked the same or had similar shapes and forms. The researcher conducted a few activities using the multisensory approach to solve this problem. In achieving the tactile and kinesthetic element in learning, the researcher used plasticine in enforcing the understanding of letters. Subject A was given colourful plastic to form letters on his own and then was asked to trace the letter while pronouncing the letter out loud. This activity helped him in remembering the shape and form of the letter. After this activity, subject A did not show difficulty in differentiating similar shape letters.



Fig. 2. Letter formation activity

ii) Sound Discrimination

The researchers noted that subject B showed difficulty in sound discrimination. Subject B was diagnosed with dyslexia auditory and for these dyslexics, processing basic sounds become a challenge. Their human brain is unable to process human sounds and language efficiently. Dyslexia symptoms is different for every individual. From the researcher's observation, subject B does not show extreme difficulty in processing sounds since there are only selected letters that confuse him. The researcher conducted a few activities using the multisensory approach to solve this problem. In achieving the tactile and kinesthetic elements in learning, the researcher used magnetic letter cubes and worksheet activities in enforcing the understanding of sounds. This multisensory activity stems on systematic approach as underlined in the Orton Gillingham approach (1948). The subject was taught every individual sound of the letters before proceeding with combined sound blending. The researcher used magnetic cubes to show and sound the letters. After these activities, subject B was more confident in blending and reading short words.

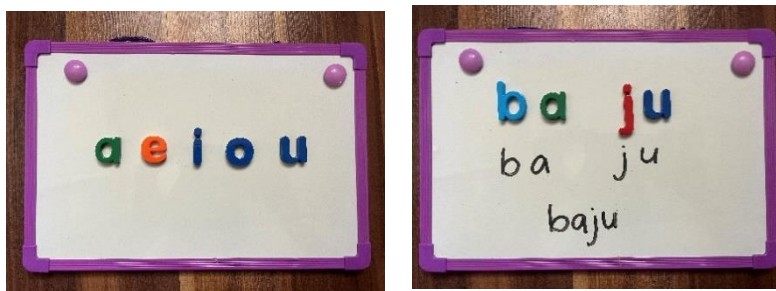


Fig. 3. Sound discrimination activity

iii) Blending Sounds in Diagraphs and Diphthongs

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Fig. 4. Blending sounds in diagraphs and diphthongs activity

iv) Word Vocabulary

Due to their learning difficulties in reading, spelling and writing, dyslexics have a weak grasp of vocabulary. When compared to children with no learning difficulties, dyslexics take a longer time to remember words. This is also due to their weak memory span. In this research, the students were tested on a few basic Malay language words. They used the magnetic board, letter cubes and worksheets for this activity. After 3 sessions of running these language activities, the students could spell basic words in Malay language without any help or guidance. They were confident to select the letters and blend the sounds to form the words.



Fig. 5. Word vocabulary activity

v) Lowercase and Uppercase Letters

In any language, lowercase and uppercase letters play an important role in achieving early literacy. In previous studies, it has been proven that dyslexics show difficulty in recognizing and matching lowercase and uppercase letters. This is one of the most basic reading skills in literacy. Before the researcher implemented the multisensory method among dyslexic students, the researcher first tested the level of mastery of lowercase and uppercase letters. The results showed that the dyslexic children were confused with similar shape letters, like [b, d, p, q], [c, e, o], [m, w, n] and many more sets. When asked to match these lowercase letters with uppercase, they show anxiousness and confusion. In this study, the researcher used the sequential and systematic approach as underlined in the Orton Gillingham approach (1948). First, students were taught the individual lowercase letters, to discriminate and differentiate the similar shape letters. Once the students have mastered the lowercase letters, only then the researcher proceeded to teach the uppercase letters. This activity helped the dyslexics in matching lowercase and uppercase letters.



Fig. 6. Lowercase and uppercase letters activity

Comparative Studies

The overall results of this study revealed that multisensory approach (MSL) is an effective intervention in solving reading difficulties. This study differs from many previous studies in this field. Studies by Rijthoven et al (2022), Raihan and Tan (2020), Sule and Cigdem (2018), examined the phonological awareness that is the root problem of graphic-phoneme correspondence. However, graphic-phoneme correspondence is linked to the literacy mastery of an individual. The basic grasp of spelling is required for an individual to be able to read. This current study examines the relation between literacy and reading errors of dyslexic students.

Conclusion

As a whole, the study findings clearly prove reading problems according to the LINUS literacy construct and reading errors according to Levinson's Theory (1994) among dyslexic students in both phase 1 and phase 2. However, in phase 3 the researcher discussed the effectiveness of the multisensory learning approach in the reading literacy aspect of dyslexic students. The intervention implemented proved a significant improvement in 5 literacy skills, that are letter formation, sound discrimination, blending sounds in diphthongs and diagraphs, word vocabulary and lowercase and uppercase letters. From this outcome of this study, dyslexia teachers can be more aware about the effectiveness of the multisensory learning approach in the literacy mastery among the dyslexic students.

Recommendations and further works

This study can be expanded to study in a bigger scope in this field. Further studies can investigate the phonological awareness on specific reading skills among dyslexic children. Also, there is more room for dyslexia field experts to study on newer approaches in teaching dyslexic children.

Limitations

In this study, the researcher selected the subjects from only one dyslexia centre in Malaysia. Thus, further research can broaden this scope and have a more comprehensive study on the reading errors and how multisensory learning solves reading difficulties.

Author Declaration

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Declaration of Competing Interest

No conflict of interest exists.

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