



ANALYSIS OF MULTISENSORY LEARNING MEDIA NEEDS FOR CHILDREN IDENTIFIED WITH DYSLEXIA DISORDER

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Abstract

Learning in primary school requires proficiency in reading and writing. In practice, there are many students who experience problems in reading and writing, one of the causes is dyslexia. This research aims to analyze the form of problems experienced by students identified as dyslexic and the learning media needed by them, because students identified as dyslexic need different learning media from regular students. The research method used is a qualitative approach. The result of this research is The result of this study is that the reading learning media used by students identified as dyslexic still use the same media as regular students. The result of this study is that the reading learning media used by students identified as dyslexic still use the same media as regular students, while students identified as dyslexic need multisensory-based learning media. Multisensory media is considered appropriate because it can facilitate the needs of children with dyslexia for a richer learning experience.

Keywords: dyslexia, multisensory, learning media, school, student

Article Information

Received : May 15, 2024

Revised : June 9, 2024

Accepted : June 18, 2024

Introduction

The elementary school period is a stage that children of school age must go through. This school age period generally takes place at the age of 6-12 years. One of the important developmental tasks at school age is related to the ability to read and write. School-age children are considered capable of carrying out reading and writing tasks because their intellectual and biological development is mature enough for school, so children of that age are considered capable (Sabani, 2019). Apart from that, the ability to think at this age makes it possible to understand concepts and symbols. At elementary school age, which should be the age when children are able to read, write and count, you can find children with these obstacles. Children who show problems in reading and writing may show learning difficulties. Learning difficulties are obstacles that cause someone to experience failure or at least less success in achieving learning goals (Nurfadhillah, 2021).

One type of difficulty faced regarding reading and writing is learning difficulties specifically dyslexia. Bryan & Mercer, (in Loeziana, 2017) state that dyslexia is a form of difficulty in learning the components of words and sentences, which historically shows slow language development and almost always problems in writing and spelling as well as difficulties in learning representational systems, for example those relating to with time, direction and period. Children who are identified as dyslexic can show problems in reading and writing due to a person's learning disability which refers to the brain as a place to process and process the information being read (Lidwina, 2012). Dyslexia occurs in individuals with normal or average intelligence potential, in fact many findings show

that dyslexia sufferers have an IQ above average and are even gifted, so dyslexia is referred to as a specific learning difficulty, because the learning difficulties they face do not occur in all areas but only occurs in one or several specific areas, including the ability to read and write.

A child who is identified as having dyslexia will show characteristics such as slow reading accuracy, backwards recognition of letters and words, confusion in differentiating words, and not understanding the content of the reading (Nur'aeni, 2017). Forms of reading difficulties for dyslexic students, such as adding syllables, removing and reversing letters in the syllables, reversing words or numbers from left to right (inversion/mirroring) and top to bottom, for example 'papa' becomes 'qaqa', letters are reversed, and changing letters or numbers (substitution), for example, 'lupa' becomes 'luga', the number '3' becomes '8'. This disorder is not caused by a disability in vision, hearing, intelligence or language skills, but rather is caused by a disturbance in the brain's processes when processing the information received (Rofiah, 2015). Children who experience dyslexia will experience quite a disruptive impact on the learning process. Children can experience obstacles in reading and this results in less interest in reading because they find it difficult to read by themselves, which ultimately causes a lack of vocabulary that they understand and then they prefer listening to reading.

Problems related to dyslexia show varying numbers, such as findings from Dewi (2015) that in England there are 5% of children with dyslexia, but in America it reaches 17%. But the average dyslexia in the world is around 15%. Meanwhile, according to data from the Chair of the Indonesian Dyslexia Association (ADI), 10-15% of students in the world are dyslexic, then five million out of fifty million Indonesians are indicated to have dyslexia (Putri, 2018). It is estimated that in a class of 30 students there could be 3 to 5 dyslexic students. This finding is also supported by several studies that identify the presence of dyslexic children in schools, such as findings from Nurfadhilla, et al (2022) showing that 24 first grade students in one of the state schools in Tangerang experienced difficulty learning to read (Dyslexia) and difficulty learning to write. (Dysgraphia). Meanwhile, in research conducted by Ufi, et al (2022) at a school in Kupang City, it was found that out of 68 students, 6 people were identified as having dyslexia. Then, from the findings of Jatipramono, et al (2022), in elementary schools, Polokarto, there were 9 people from grades 1, 2 and 3 who had difficulty reading.

According to Devaraj (2006), the causes of dyslexia can be related to neurobiological factors, namely the occurrence of concentration on the course of connecting nerves or confusing traffic jams of nerve signals where information between nerves takes longer. Apart from these neurological causes, there is also another cause, namely linguistic deficit, namely, a lack of understanding of the language sounds produced by the human speech apparatus. According to Lidwina (2012), the causes of dyslexia can be seen from three factors, namely 1) Biological factors caused by brain development which tends to be slow compared to other normal children, 2) Psychological factors caused by the psychological factors of the child changing schools. , lack of attention from parents, not being cheerful, emotional, often left by parents, stress and having a bad relationship with teachers can make children dyslexic, 3) Educational factors are caused by choosing inappropriate learning methods, where children are taught one word as a whole not a sound that is arranged into a word.

From these causal factors and from the characteristics found in dyslexic children, it appears that the problems experienced are related to sensory abilities and the need to apply learning methods with appropriate media. Reading and writing are tasks that cannot be separated from children's education in Indonesia. Children identified as dyslexic cannot learn in the usual way like other normal children. Some media that have been created include comics, typesetting media, pop up books, and big books (Rofiah, 2018).

There is also a learning method using the syllable method which involves arranging syllables into words (Anwar et al., 2022). Apart from that, there is also a glass analysis method to improve the beginning reading skills of children with learning difficulties (Hidayah & Ainin, 2021). Apart from using literacy media, the application of learning methods that have been developed for dyslexic children is the play therapy method (Hanipah, 2023).

Various methods and media developments have been developed, but several previous findings have not specifically focused on the use of multisensory as a basis for developing learning media, even though sensory is the biggest problem experienced by children identified as dyslexic. Therefore, the researcher intends to conduct a needs analysis on what kind of learning media can be developed according to the needs and characteristics of dyslexic children. The aim of this research is to review what learning media are appropriate to use to increase the desire to learn and literacy skills of children identified with dyslexia. This research is the first step in developing learning media for children identified as having dyslexia. It is hoped that the learning media that will be developed later can be used by children, teachers and parents, in order to optimize the expected learning outcomes. Analysis of learning media for students identified with dyslexia is very important to carry out so that there is a benchmark for designing learning media for students identified with dyslexia.

Method

The population of this study were students who were indicated to have reading and writing problems in Salatiga City, Central Java. Using the purposive sampling method, participants were determined. Participants in this research were 9 elementary school students who were indicated to have dyslexia (reading and writing disorders). The students consisted of 1 class II student, 4 class III students, 2 class 4 students and 2 class 5 students. Apart from that, the researcher also collected data from class teachers and shadow teachers (accompanying teachers for children with special needs) in the participating schools.

Qualitative research methods were used as a data collection method and also in data analysis for this research. As is well known, the qualitative method is a scientific research method which aims to understand a phenomenon by exploring data in natural social contact through a process of in-depth communication interaction between the researcher and the phenomenon as the object or subject of research. In this case, the phenomenon that occurred was a case of dyslexia in elementary school students and the research subjects of the phenomenon that occurred were elementary school students as the research population. This research uses several research instruments, namely;

a. Observation

Observations were made regarding the extent of the ability to recognize letters and numbers in students who were indicated to have dyslexia. Then the observation continued with observations regarding the obstacles experienced by students, especially in reading and writing. Both observations were carried out with the aim of finding out the participants' reading and writing abilities using standard reading and writing ability benchmarks according to age level.

b. Interview

In-depth interviews were conducted with teachers and participant students. Interviews with teachers aim to gain an understanding of student performance while taking lessons as well as finding out more about the learning media that has been used to help students read and write, while interviews with students are conducted to find

out their obstacles and understanding of the material they are studying. through learning media that have been used by teachers.

c. Dyslexia Disorder Screening Test

Researchers developed a screening test containing various tasks with the aim of measuring students' reading and writing abilities objectively. The test is presented individually accompanied by observations of students taking the test. This test contains several tasks such as a test for recognizing letters, numbers, days and months. Next is a test on spelling letters and syllables. Then a text reading test, a reading comprehension test, a writing test and a direction recognition test.

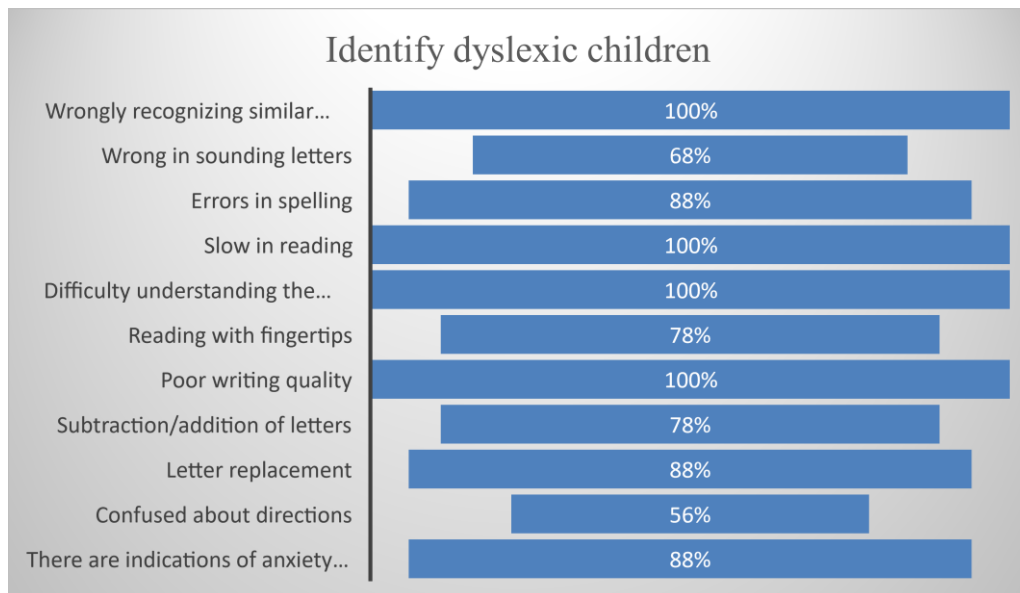
The research was conducted using qualitative research methods. Researchers first sought information from the Education Office in Salatiga City regarding data on students who were indicated to have reading and writing problems, along with the names of their schools. After that, the researcher went to the schools in question and made observations on students and the teaching and learning process in the classroom. Then the research continued by conducting interviews with special supervisors and shadow teachers as well as conducting a screening test for dyslexia disorders to ensure that the students in question really had problems reading and writing.

Data validation uses the triangulation method. According to Norman. K. Denzin (2018) triangulation is a combination or combination of various methods used to study interrelated phenomena from different points of view. There are 3 concepts of data validation with triangulation, namely; 1) Data Triangulation which describes the combination of several different data sources examined at different times, places and sources. 2) Triangulation Investigation means empowering different observers or interviewers to control or examine the subjectivity of the source. 3) Triangulation Theory refers to approaching data from various perspectives and hypotheses. The essence of data triangulation is checking the validity and reliability of data through various different instruments against the sources.

Data validation was carried out using the triangulation method and then continued with data analysis and media analysis using the 5W1H method, to deepen the data study so as to obtain in-depth discussion coverage. This was also carried out in order to obtain benchmark conclusions about multisensory learning media for elementary school students with indications of dyslexia.

Result and Discussion

Based on the results of data collection from 9 students, it was found that these 9 students showed problems in reading and writing. In general, indications of dyslexia symptoms are found in these students. These students also tend to show similar symptoms, although one student can still be differentiated from another. The following is a description of the indicative symptoms found in the 9 students:



Apart from identification carried out through screening techniques, in-depth interviews were also conducted with students who were indicated to be dyslexic, where 6 out of 9 students admitted that they often saw incomplete arrangements of letters in a word and had difficulty finding the correct letters. The 9 students who took part in the screening also felt confused when seeing similar letter shapes such as 'b' and 'd', 'm' and 'n', 'u' and 'v' or 'p' and 'q'. This is caused by the tendency to reverse similar letters and due to the lack of perception ability to understand shapes in children who are indicated to be dyslexic (Pautina, 2016). Apart from that, 7 out of 9 students admitted that they often felt frustrated when they had to do assignments that required them to read and write. Hermijanto & Valentina (2016) explained that there are visual problems in children who are indicated to have dyslexia, where these visual problems are related to problems in recognizing shapes which often make dyslexic sufferers frustrated with letters. The problems experienced by children with dyslexia are related to visual abilities such as not optimally perceiving what they see, making mistakes in reading and spelling what they see, and having deficiencies in visual memory (Abadi, 2021). If they only rely on visual stimuli, children with dyslexia can experience heavy pressure in the reading and writing process.

The main resource person, namely a shadow teacher at an elementary school in Salatiga, explained that students who are indicated to have the learning disorder dyslexia cannot be given regular learning methods like students in general. Students who are indicated to be dyslexic need media that is more visually able to provide explanations of dimensional shapes. Apart from that, learning media is also needed that can explain using a series of multiple stimuli, such as tactile stimuli combined with visual stimuli. From two different sources, namely students with indications of dyslexia and shadow teachers, the results of the analysis that can be concluded are; Students indicated with dyslexia need more personalized treatment using physical learning media, with efforts to use learning media that can combine visual stimuli and tactile stimuli simultaneously, so that dimensional imagination can be formed in the minds of students, and also so that students can remember the dimensions of the shape of an alphabet. With multisensory learning media methods, a deeper understanding will be formed.

Confusion also occurs when students with indications of dyslexia begin to read a series of letters into a word, phrase or sentence. Students need almost 20-25 minutes to read 5 sentences in one paragraph presented. This shows that in dyslexia disorders cognitive processes are tied to the decoding process. What is meant by decoding is the

process of deciphering letter codes, so that the form of sound will be different. This is what ultimately damages reading comprehension and learning (Falth, 2013). Disturbances are also seen in letter replacement activities such as 'p' being replaced by 'q', or 'm' being replaced by 'n'. For students with dyslexia, the two letters look the same, so students have to know and understand the shape of the letters first, but when they already know and understand the letters, another obstacle occurs, namely when the letters are put together in a word, phrase, or sentence. The sounds of letters that they have previously understood have different pronunciation sounds from the pronunciation sounds of letters that stand alone. This obstacle then shows that there is a lack of synchronization between the recognition of letter sounds and shapes. Like the findings from Pautina (2016), children with dyslexia can show difficulties in auditory and perceptual discrimination and thus experience difficulty in analyzing phonetics.

Difficulties in the reading process also appear when students are asked questions to test students' understanding of the content of the reading. All students had difficulty answering questions. This is shown by the difficulty of students answering written questions or questions with the right answers, however, when the questions or questions are read by the teacher, students tend to be able to answer the questions or questions correctly. This shows that the ability to understand through auditory stimuli in students indicated with dyslexia can be utilized to improve their academic results. The auditory learning method is possible for students with indications of dyslexia (Loeziana, 2017). It can be concluded that dyslexia has no effect on low intellectual abilities. The students with indications of dyslexia who were involved in collecting this data had an IQ of 95 – 107, this figure indicator is in the normal category, so dyslexia is not related to low cognitive capacity.

The results of data and analysis regarding how students' learning interactions and understanding indicate dyslexia and also data and analysis regarding the influence of dyslexia on cognitive capacity can be concluded that; Learning methods for students indicated with dyslexia will be more optimal if students are given learning media that also has auditory stimuli. Through the learning method with auditory stimuli, students are also invited to recognize the sounds of the alphabet in solo form (standing alone) and also sounds in combined form. Continuous repetition or repetition of sounds will also have an effect on memory for recognizing the alphabets being studied.

As many as 6 out of 9 students indicated dyslexia used finger tips when reading. They feel the need to 'touch' the letters with their fingers. This supports the finding that children with dyslexia need kinesthetic stimulation when reading (Fanu, 2007). The quality of the writing that emerged from all participants was also considered poor, evident from the inconsistency of letter shapes in the writing, the use of uppercase and lowercase letters being mixed, the shape and size of the letters being disproportionate, and the direction of the writing being uneven. Apart from this problem, there are characteristics that are also visible in the student participants, namely there are indications of anxiety that arise when asked to read or write. Anxiety can be seen from a tense facial expression, a tendency to stammer when speaking, a small voice, expressions of "fear of being wrong", and even a refusal to read. This phenomenon is in line with the findings of Fauzi (2018), who said that the characteristics of reading difficulties will appear in movements full of tension, such as frowning, fidgeting, the rhythm of the voice rising and falling or biting the lip. The phenomenon of rejection and anxiety movements can be analyzed as a form of student self-doubt.

From some of the problems revealed above, several things can be found that are multisensory related, such as visual stimuli, auditory stimuli and tactile stimuli (kinesthetic). These findings indicate that these stimuli must be integrated with each other and cannot be separated, because they need to be stimulated simultaneously to be able to

help the learning process of students with dyslexia in learning to read and write. This is supported by the opinion of (Fonyuyshey & Nsah, 2019), that the most effective learning method for students with dyslexic learning disorders is through multisensory learning or learning using many sensory stimuli simultaneously. This statement is supported by Siregar (2019) who said that multisensory learning allows children to learn well. Teaching methods using multisensory media need to be developed to enable students with dyslexia to connect what they hear, say, read and write through the use of simultaneous stimuli. This is an alternative to the visual sense modalities, the sense of hearing, the sense of touch (kinesthetic and touch).

To find out what learning media have been used by participants with indications of dyslexia, researchers conducted interviews with shadow teachers from one of the elementary schools in Salatiga. From the results of the interviews, it is known that so far students who have been diagnosed as having dyslexia have received intensive assistance. Intensive assistance is provided in the process of learning activities in the classroom, as well as outside learning hours. The mentoring activities carried out during the learning process in the classroom are a form of direct mentoring that is synchronized with the material being provided by the class teacher, while the mentoring activities carried out outside of learning activity hours are by teaching calistung using reading and arithmetic learning application media. This is a good indication because teachers already understand that children who are diagnosed with dyslexia need to receive assistance by setting aside time to teach reading (Lidwina, 2012).

Learning assistance outside learning hours is carried out in groups and also privately, but the use of media and learning methods uses the same methods as regular children. In terms of therapy or learning methods, it is known that learning methods using mobile application media are quite helpful when done privately, but not for group learning. So far, mobile application media as a learning medium only uses the shadow teacher's device, so students have to take turns using the learning application. This makes the intensity of students' understanding not optimal. The type of learning application used as a learning medium for students identified as dyslexic is a regular application which is also used by children or students who are not identified as dyslexic to learn to recognize letters and numbers. Teachers have not found learning media that can be used practically and appropriately according to their learning constraints. This is less than optimal for the development of the abilities of students identified as dyslexic. The media used between dyslexic individuals and regular students needs to be differentiated because there will be differences in their ability to remember knowledge during learning (Hadrameh, et al, 2022).

From the results of data collection, it was found that students who were indicated to have dyslexia had problems with multisensory function, but had not received assistance with multisensory-based learning media. In fact, learning models using multisensory methods can help improve reading skills for dyslexic students (Primasari & Supena, 2021). For this reason, it is necessary to develop appropriate multisensory-based learning media. Multisensory learning media is a learning aid that can involve all the sensory roles that children have and is also assisted by the role of classmates to complete learning activities for dyslexic children (Supena & Dewi, 2021). Learning media needs to be developed in physical form (not applications), and have dimensions large enough, so that it can be used in groups. Another thing to consider is the existence of worksheets, so that students can confirm their understanding of the material they have studied.

Through the problems that have been explained, and in accordance with the limitations of the research carried out, namely this research limits the discussion to finding the media needed as a reading and writing learning medium for students identified with dyslexia, so the learning media needed is an Interactive Book. Interactive books are

a necessary medium for learning reading and writing for students identified as dyslexic because:

1. Interactive books can provide students with a multisensory experience on every page.
2. Interactive books contain various interactive techniques that will stimulate the ability to recognize reading and its meaning
3. Interactive books can contain tactile, visual and auditory based activities, as an effort to deepen understanding for students
4. Interactive books are designed in physical form, so that students can experience sensory experiences directly
5. Interactive books can be used for learning which can also hone the oral communication skills of children identified as having dyslexia.
6. Interactive books can accommodate reading and writing practice for children so that children can adapt more easily to the learning process

The weakness of this research is the limited number of participants. Researchers have difficulty finding more participants, so the existing analysis results are only based on participants who can be found in the process of conducting research.

Conclusion

Students who are indicated to have dyslexia have a need for sensory stimulation. The need for a learning approach for students identified as dyslexic is different from that of regular students, so the development of appropriate learning media is very necessary to support the learning process of students with dyslexia. One of the learning media that is considered appropriate to develop is multisensory learning media in the form of interactive books. Interactive books are considered appropriate for dyslexic children because they can facilitate a richer and more comprehensive reading and writing learning experience for dyslexic children.

Acknowledgments

The author would like to thank Satya Wacana Christian University, SD Noborejo 02 Salatiga and the Gadah Ati Foundation Salatiga for providing assistance to researchers so that this research could be completed.

Author Contributions Statement

Both authors contributed to research planning, data collection, article preparation and planning for continued development of learning media according to the results of the analysis in this research. Specifically, DS carries out the process of identifying and observing students to ensure they have symptoms of dyslexia, then makes an analysis of data collection from a psychological perspective. PP carries out an interview process and observes the learning media currently used in schools, as well as making an analysis of the technical learning media that will be developed.

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Volume 2, Nomor 1, Januari 2022; 114-122 <https://ejournal.yasin-alsys.org/index.php/masaliq>

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