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## ANALYSIS OF A SYSTEMATIC LITERATURE REVIEW (SLR) ON DYSLEXIA IN CHILDREN

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### Abstract

This research aims to find the main themes and research categories on reading difficulties (Dyslexia). For the data taken to fulfill the purpose of this study, the authors searched several relevant sources from Google Scholar and Scopus (SAGE et al. & Francis). Articles were determined using four combinations of keywords; reports were included in the data set, and the researcher applied a systematic literature review method. Pieces that will become research sources are limited to the last six years. The total number of articles reviewed was 921 from different sources, namely Springer, Elsevier, SAGE, Eric, and Taylor & Francis. Articles were re-selected according to indicators, and then 194 articles were obtained. The dominant research methodology of the articles reviewed is qualitative. The four main themes revealed from the qualitative content analysis are dyslexia, causes of dyslexia, cases of dyslexia, and solutions to overcome dyslexia. Articles are filtered from topic descriptions, eligibility criteria, and search strategies. The cause of dyslexia can be due to developmental errors during pregnancy or other factors such as physical defects or habits that the child has. The solution offered by the teacher is to use several methods and learning media that are appropriate to the child's condition.

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### Keywords

Dyslexia, reading difficulties, causes, solutions



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## INTRODUCTION

There are various types of learning *disabilities*, including dyslexia, dysgraphia, and dyscalculia. Of the three types of learning difficulties that we often encounter is dyslexia. According to the Indonesian dyslexia association, 10 to 15 percent of school-children worldwide have dyslexia, and of the 50 million school-children in Indonesia, 5 million of them are dyslexic (Latief, 2020).

Education is the right of every community without exception. The government has proclaimed compulsory education for nine years. Therefore, there is no reason for parents not to provide education to their children. It is just that there are still people who lack proper education. We can see this from the many reports of children who struggle for tens of kilometers to get to school; some even risk their lives by crossing rivers and going up and down mountains. Of course, this must be a special concern for the government to fix. In addition to these problems, many children have learning difficulties. This is due to cognitive development disorders in children. In 2019, the Ministry of Research, Technology, and Higher Education recorded that around 3 million children experienced difficulties in learning (Suartini, 2022). The data continues to change every year.

Learning difficulties include being selective when children cannot understand reading or distinguishing letters. Martini Jamaris (Jamaris; Martini, 2014) defines dyslexia as a condition related to highly unsatisfactory reading ability. Individuals with dyslexia have a normal IQ, even above normal, but can read one or one and a half levels below their IQ (Al-Barhamtoshy; Hassanin et al.; Diao M., 2017; Snowling et al., 2020). The medical encyclopedia explains dyslexia as a disorder in literacy development generally occurring in children aged 7 to 8 (J. et al., 2018). Children with dyslexia tend to have difficulty in reading because they are unable to distinguish the same letters, such as between "a" and "d," the letters "l" and "j," and the letters "w" and "v" because at first glance the letters have the same model. In addition, other characteristics that can be seen from selected children do not have difficulty speaking. However, it is not easy to find the right words to answer other people's questions and choose the right terminology or word expression incorrectly (Knoop-van Campen et al., 2018; J. Stein, 2018, 2019). When given tasks or instructions, children tend to be slow to process them (*slow processing speed*) (Livingston et al., 2018; Snowling et al., 2020; Vanderauwera et al., 2017).

Dyslexia significantly impacts a child's education and development, affecting the reading, writing, and spelling skills essential for academic achievement. Children with dyslexia often have difficulty understanding texts, which can slow the learning process and result in lower academic achievement than their classmates. They often require additional support, such as special education

programs or assistive technology. These difficulties can lower a child's confidence and self-esteem, causing them to feel inadequate and frustrated. Their motivation to learn can decrease due to frequent failures or difficulties, creating a negative attitude toward school. In addition, these academic challenges can also affect social interactions, making them feel shy or reluctant to participate in class activities, potentially damaging relationships with peers. However, children with dyslexia often show talent in other areas, such as the arts or sports, which can be a source of confidence if well-supported. Early intervention, tailored teaching methods, and assistive technology can help address many of these challenges, allowing dyslexic children to reach their full potential in a supportive learning environment.

### **Literatur Review**

Learning difficulties, often referred to as *learning disabilities*, are symptoms of children being unable to participate in learning. Researchers have classified and identified different types of learning disabilities (*learning disabilities*), how they are caused, and how they are solved. The researcher cited several relevant sources related to the discussion related to dyslexia. A literature review is important in research on dyslexia or reading disorders. A literature review involves collecting, analyzing, and synthesizing various literature sources relevant to the research topic.

Dyslexia-related review literature helps researchers understand key issues associated with dyslexia, including its definition, characteristics, symptoms, risk factors, and impact on individuals with this disorder. In-depth knowledge of this topic allows researchers to design more relevant and focused research. By analyzing the existing literature, researchers can identify areas of knowledge that are still not adequately covered. This helps direct further research to fill in those knowledge gaps.

Researchers are very interested in discussing the difficulties of learning to read (disk. sia) that have been stated above. From the explanation above, in this study, the author provides several research questions:

RQ 1: How is the distribution of articles related to learning difficulties discussed?

RQ2: What are the widely used methods to overcome dyslexic learning difficulties?

RQ3: What are the main causes of dyslexic learning difficulties?

Several studies have examined dyslexia disorders in children, including: *First*, research conducted by Shaywitz, S. E., et al.. "*Development of left occipitotemporal systems for skilled reading in children after a phonologically-based intervention*" (Shaywitz et al., 2004). This study explores the effectiveness of phonology-based interventions in developing the left occipitotemporal system related to reading

ability in dyslexic children. Vellutino, F. R. also conducted a second, other research on dyslexia, "Specific reading disability (dyslexia): What have we learned in the past four decades?" (Vellutino et al., 2004). The study comprehensively reviews dyslexia research over the past four decades. This article highlights the importance of phonological deficits in dyslexia and emphasizes the need for early identification and targeted interventions to address reading difficulties in dyslexic children.

Third, Snowling, M. J., & Melby-Lervåg, M. wrote an article titled "Oral language deficits in familial dyslexia: A meta-analysis and review" (Snowling & Melby-Lervag, 2016). This study is a meta-analysis that investigates the relationship between spoken language deficits and familial dyslexia. Fourth, a study on dyslexia was also written by Norton, E. S., & Wolf, M with the title "Rapid Automatized Naming (RAN) and Reading Fluency: Implications for Understanding and Treatment of Reading Disabilities" (Norton & Wolf, 2012) This study examines the role of Rapid Automatized Naming (RAN) in reading fluency and dyslexia. The study's findings suggest that difficulties in RAN are strong predictors of poor reading fluency and dyslexia and underscore the importance of including RAN exercises in interventions to improve reading fluency in dyslexic children. Fifth, a study titled "Reading Disabilities: The Role of Genetics and the Brain in Understanding Development and Failure," written by Church et al., explains the role of genetics and neurobiology in dyslexia (Church et al., 2023). Church et al. reviewed evidence from brain imaging and genetic studies suggesting that dyslexia is a neurobiological condition with a strong genetic basis. They also discussed how these findings could inform more effective intervention strategies for children with dyslexia.

Previous research has focused on specific aspects of dyslexia, such as phonological interventions, spoken language deficits, RAN, genetics, and neurobiology. Meanwhile, this article integrates these findings to provide a more holistic picture of dyslexia, covering various aspects such as genetics, neurobiology, linguistics, psychology, and educational interventions.

## **METHOD**

### **Research Design**

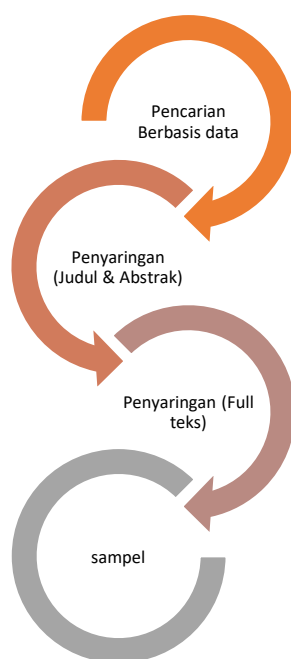
The type of research used in this article is a literature review, in which the author researches articles related to dyslexia, dysgraphia, and dyscalculia and how alternatives are offered. As Uman points out in a systematic literature review, previous research findings were examined to identify consistent and recurring themes (Uman, 2007). A systematic review is a methodological approach to collecting, integrating, and analyzing relevant scientific literature on a particular topic. (Irshad & Yasmin, 2022; Robinson & Lowe, 2015). The main purpose of a systematic review is to present a

thorough and objective overview of the research previously conducted in a particular field. Thus, a systematic review helps identify trends, inconsistencies, and gaps in the literature.

### Population and Sample

To support the main research objectives, the following **three** important databases focus on dyslexia, dysgraphia, and dyscalculia learning difficulties (Elsevier et al.)—the population to be used in all articles related to reading difficulties (dyslexia). The population was taken using the Herzing publish or perish application as many as 868 articles. The sample to be used is articles related to dyslexia, which are taken based on the similarity between the title, abstract, and educational background, totaling 80 articles.

**Figure 1.** Article Selection Process



### Data Collection

The search was conducted in English from April to May 2023, using the title and abstract of each article. We only searched for and collected journal articles and books related to the title. The goal is to identify articles related to dyslexia, dysgraphia, and dyscalculia learning difficulties or topic areas related to the title. To facilitate the search, we use the keywords: "*learning disability*" and "*dyslexia*," making it easier to find articles that suit our goals. Here are three combinations of keywords used in the search: "*dyslexia AND systematic review*."

Sequential systematic searches are carried out in several stages, as described in the previous section. Therefore, from one database to another, duplicate papers are manually deleted gradually to extract unique results and ensure the smooth implementation of the research.

### Data Analysis

Researchers identified all topics related to dyslexia acquired from different sources. Furthermore, the researcher independently analyzed the findings, and the qualitative analysis was carried out manually by calculating the frequency of the main themes in all the articles obtained, where all the data were compared and contrasted (Fraenkel et al.). The researcher made a list of words and then categorized each article obtained. Finally, it is important to remember that the literature review in this article is compiled after the themes have been identified through the results of a qualitative analysis. Therefore, the author structured the literature review based on these themes.

### Screening and Assessment

Screening involves examining titles and abstracts, while assessment involves reading and examining the full text of a paper. The author systematically archives the data in each process stage and structures it on a reference management application to facilitate history tracing. The screening and assessment results are presented in Table 1 according to Tinmaz et al. (Tinmaz et al., 2022).

**Table 1.** Topic Description

| <b>Criteria</b>         | <b>Information</b>  |
|-------------------------|---|
| Population and Problems | Dyslexia in elementary school students  |
| Speakers                | Selective   |
| Comparison              | -   |
| Result                  | The right learning solutions and alternatives for children with selective disorders |
| Context                 | Issues related to selective learning difficulties in primary school students        |

**Table 2.** Eligibility Criteria

| <b>Criteria (C)</b> | <b>Included (IC)</b>  | <b>Exceptions (EC)</b>  |
|---------------------|---|---|
| Study Topics        | A study that discusses learning difficulties in being selected (IC 1)             | Studies that discuss learning difficulties (EC1)  |
| Document Type       | Article published in the scientific journal indexed by Scopus (IC2)               | Articles presented at conferences, dissertation summaries, or theses (EC2)<br>Articles in reviews related to titles (EC3) |
| Language Period     | The online article taken is the article of the last six years (2017 – 2023) (IC3) | Other than English (EC4)  |

Source: (Bhosale & Patnaik, 2022)

**Table 3.** Search Strategy

| <b>Basis Data</b> | <b>Information</b>  |
|-------------------|---|
| Springer          | [All:" learning disabilities"] OR [All:" All learning disabilities"] AND [All:" anak"] AND [All:" Elementary School"] AND [All:" learning alternative"] AND [All:" dyslexia"] AND [Publication Date:01/01/2017 S/D 31/05/2023]  |
| Elsevier          | Access Type: Open Access and Purchase<br>[All:" learning disabilities"] OR [All:" All learning disabilities"] AND [All:" anak"] AND [All:" Elementary School"] AND [All:" learning alternative"] AND [All:" dyslexia"] AND [Publication Date:01/01/2017 S/D 31/05/2023] |
| SAGE              | Access Type: Open Access and Purchase<br>[All:" learning disabilities"] OR [All:" All learning disabilities"] AND [All:" anak"] AND [All:" Elementary School"] AND [All:" learning alternative"] AND [All:" dyslexia"] AND [Publication Date:01/01/2017 S/D 31/05/2023] |
| Taylor & Francis  | [All:" learning disabilities"] OR [All:" All learning disabilities"] AND [All:" anak"] AND [All:" Elementary School"] AND [All:" learning alternative"] AND [All:" dyslexia"] AND [Publication Date:01/01/2017 S/D 31/05/2023]<br>Access Type: Open Access and Purchase |

**Table 4.** Number of Articles searched on publishing and Perish sources

| No. | Publisher        | Initial Search for Related Articles Selected | Selection Based on Title and Abstract | Selection Based on Full Paper |
|-----|------------------|--|---------------------------------------|-------------------------------|
| 1.  | Springer         | 285  | 69                                    | 30                            |
| 2.  | Elsevier         | 270  | 36                                    | 23                            |
| 3.  | Sage             | 116  | 22                                    | 9                             |
| 4.  | Taylor & Francis | 197  | 42                                    | 18                            |
|     | <b>Total</b>     | <b>868</b>                                   | <b>169</b>                            | <b>80</b>                     |

**FINDINGS AND DISCUSSION**

The article can be distributed on the VOSviewer application. Figure 1 explains the distribution and relationship of the article's theme with other themes.

**Figure 2.** Distribution of Articles Related to Dyslexia and the Relationship between Selection and Other Themes Using the VOSviewer Application

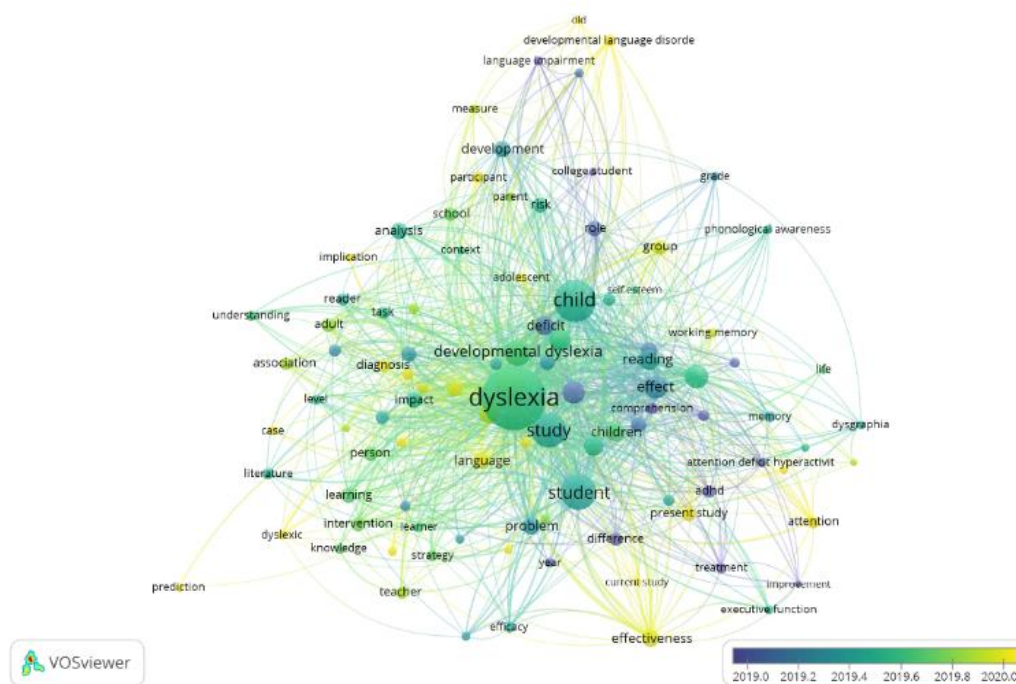


Figure 2 It is explained that the theme related to dyslexia is connected to other themes, for example, *dyslexia* with *children*, *dyslexia* with *study*, etc. This means that dyslexia is a big theme that is widely discussed, along with other themes. The theme of dyslexia is interesting to discuss, and for this reason, several discussions need to be discussed in this study, including.



## Findings

### Description of the Causes of Learning to Read (Dyslexia)

Dyslexia is a learning disorder that primarily affects reading, writing, and spelling skills, and its causes are multifactorial. Research shows that dyslexia has a strong genetic basis, with children who have family members with dyslexia more at risk of developing this disorder. Certain mutations or variations in genes related to language processing can affect the development of the central nervous system involved in reading. In addition to genetic factors, neurobiological research has identified structural and functional differences in several brain areas, including those related to phonological and visual processing. Children with dyslexia often show less activity in areas of the brain involved in word recognition and phonemic decoding. Environmental factors, such as initial exposure to language and reading experience, also play an important role. Lack of exposure to reading and inadequate learning experiences can exacerbate reading difficulties in children who are already genetically predisposed. Therefore, dyslexia is understood as the result of a complex interaction between genetic, neurobiological, and environmental factors.

**Table 5.** Causes of Dyslexia in Children based on Findings

| No. | Cause   | Description  |
|-----|---|--|
| 1.  | Premature Birth   | Premature birth does cause many problems in development; in addition to physical problems, the biggest possibility is the child's cognitive ability, one of which is the child's reading ability.  |
| 2.  | Physical disorders such as vision, hearing impairment, and cerebral palsy | Visual, hearing, and cerebral palsy disorders are very likely to affect the development of children's reading skills because not all schools facilitate facilities and infrastructure that can help these children   |
| 3.  | Surroundings  | The environment also plays an important role in the development of dyslexia. Early exposure to language, reading experience, and the quality of reading instruction in school can affect a child's reading ability. Children who do not get enough exposure to books or supportive learning experiences at home may have difficulty reading. |
| 4.  | Parents who often change tasks  | This problem has little effect as long as the child can still focus on learning and adapt to the environment.  |
| 5.  | Often not logged in   | Children who often skip school will certainly be left behind with other children.  |

Overall, dyslexia is the result of a complex interaction between genetic, neurobiological, and environmental factors. A holistic and multidisciplinary approach is essential in understanding, diagnosing, and intervening with dyslexia in children. Early identification and appropriate intervention can help dyslexic children develop better reading skills and reach their full potential.

### Solutions Used to Overcome Dyslexia from Article Sources

Managing a child with dyslexia requires a holistic and individualized approach. From several journals studied, several solutions can be done by parents and teachers to overcome dyslexia in children.

**Table 6.** Alternatives and Solutions to Improve Children's *Dyslexia*

| <b>Alternative Learning</b>  |  |
|--|--|
| <b>Model/Method</b>  | <b>Media</b>                                   |
| Cara menyajikan teks   | Action video games (Franceschini et al., 2017) |
| Adaptive learning model (Abdul Hamid et al., 2018)                       | Font khusus disleksia (Kuster et al., 2018)    |
| Interactive/interactive system (Buele et al., 2020)                      | Music (Lifshitz-Ben-Basat & Fostick, 2019)     |
| Differentiation methods (Hammill & Allen, 2020)                          | Specially selected platforms (Chanioti, 2017)  |
| Temporal perception learning (Zhang et al., 2018)                        | Android app (Smith & Hattingh, 2020)           |
| Wanke methods (Lipowska et al., 2019)                                    |  |
| Computational models (Ziegler et al., 2020)                              |  |
| Instructional design for Vocabulary Acquisition                          |  |
| Inclusive Class Strategy (Stuart & Yates, 2018; Sumner & Connelly, 2020) |  |
| Cognitive strategies (Thangarajathi & Menaha, 2020)                      |  |
| Brainfeed Intervention Program (Adubasim, 2018)                          |  |
| Investigation methods (Andreassen et al., 2017)                          |  |

### Discussion

Learning difficulties are often a problem. In different countries, the prevalence of dyslexia in children varies between 5 and 15% (Munawaroh & Anggrayni, n.d.). Children who have learning difficulties will be left behind by their students. It is certainly hard work for teachers to find ways for these children to participate in learning.

The causes of day selection include: *First*, children born prematurely with low birth weight can experience brain damage so that they experience learning difficulties or attention deficit disorder

(Vanderauwera et al., 2017). Premature is problematic in children's brain development and physical and mental development. *Second*, children with physical disorders such as visual, hearing, or *cerebral palsy* (c.p.) will have difficulty learning to read (Snowling et al., 2019). *Third*, children do not understand commands because of an environment that uses several languages (bi- or multilingual) (Snowling et al., 2019); this often happens when parents are assigned to regions or countries with a different language, so children have difficulty understanding their mother tongue. *Fourth*, Children often change schools (Raharjo & Ahyani, n.d.); this problem, according to the author, is not too much of a problem as long as the child can focus on learning. *Fifth*, Children who are often absent due to illness or family problems (Munawaroh & Anggrayni, n.d.); this problem is certainly an additional task for parents so that their children can follow other students, and 6) Smart and talented children who are not interested in language learning. Hence, they lack concentration and make many mistakes.

The causes above are based on reviews from previous researchers, so this can be a reference, but not all of them are the main cause of children experiencing dyslexia. Dyslexia can be overcome and cured; there are many examples of a child being selected to be genius and intelligent; the most famous examples are Albert Einstein and Thomas Alfa Edison. Both of them were classified as stupid children when they were young because they could not follow the learning of children their age until finally there was a point where they found their intelligence.

Learning difficulties are often a problem. Children who have learning difficulties will be left behind by their students. It is certainly hard work for teachers to find ways for these children to participate in learning. According to several journals, there are several ways that teachers can improve this.

Table 6 shows that interest in research related to dyslexia is quite large. Researchers assume that the number of children with selective selection is still quite large. Research conducted by Snowling proves that 4 out of 40 students have dyslexia (Snowling et al., 2020). This means that teachers and prospective teachers must understand and overcome these problems or provide solutions. Children with dyslexia sometimes do not show any symptoms until a certain time. Usually, children with selected begin to show that when children begin to learn reading and writing, children with selected will be slower compared to other children.

Children who cannot understand letters and vocabulary make a teacher dizzy, and sometimes the child is considered stupid. This condition often occurs, and not a few children who

have this condition are not treated until adulthood. One of the alternatives offered is using the right media so that this condition does not drag on until adulthood. Kuster said that one of the media that can be used is the use of writing fonts in learning for children with selective disorders (Kuster et al., 2018); claims tested that the B Dyslexie font, designed specifically for people with dyslexia, facilitates the reading performance of children with (and without) dyslexia. Further research was conducted by Franceschini, who claimed that video games can improve the reading ability of dyslexic students. This is shown by the study results, which show that the improvement of visuospatial attention and phonological working memory and the acceleration of the shift of visual attention to hearing can directly translate into better reading in English-speaking children with dyslexia. (Franceschini et al., 2017). Chanioti conducted the next research, the educational application "Evglotton" was designed by the Institute for Language and Speech Processing to improve the reading ability of children with dyslexia aged 8–13 years (Chanioti, 2017). From these findings, the right media can overcome the difficulty of learning to read.

## CONCLUSION

The distribution of articles that discuss dyslexia learning disorders in the last six years is quite in demand compared to articles related to dysgraphia and dyscalculia. Searches using the "DISELEKSIA" clue found 921 articles from internationally reputable sources such as Springer, Elsevier, Sage, Eric, and Taylor & Francis. This shows that disease is more researched in some countries. Parents and teachers need practical solutions to overcome this.

The findings obtained from the study of several articles show that the causes of dyslexia can be influenced by several factors, including fetal development factors, environment, child focus, and physical abnormalities such as vision, hearing, and cerebral palsy. The solution teachers offer is to use several learning methods and media suitable for the child's condition.

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