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What is The Teacher's Attention on Students' Difficulties in Reading? A Neuroscience Perspective

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Abstract

The purpose of the study is to identify the causal factors and solutions that must be done to overcome students' difficulties of learning to read. The research method used is descriptive qualitative by analyzing data from the IRI (Informal Reading Inventory) instrument. The research respondents were 6 4th grade students in Bandung, West Java Indonesia. They were chosen based on the purposive sampling technique. The results showed that the factors causing the difficulty of learning to read were external factors such as the objective condition of their reading ability, which they were able to recognize some letters of the alphabet and did not understand the capital letters and they were only able to read syllables with V-K (Vocals – Consonants). Teaching preliminary reading is one solution that teachers can do to overcome this difficulty. Based on the neuroscience perspective, the performance of the hemisphere in the brain can be optimized by preliminary reading so it supports the fluency of reading activities. The preliminary reading contains short and simple sentences that are easy to be articulated and spoken by students. Those sentences help students a lot to overcome students' difficulties in reading effectively. Teachers are expected to be able to choose a method of learning to read that is adapted to the needs of students to obtain effective and efficient learning outcomes.

Keywords

Reading difficulties; elementary students; IRI; neuroscience

I. Introduction

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At the elementary school level students are introduced to various basic skills such as reading, writing, and arithmetic. This ability will later help them in the learning process at the next levels (junior high school, high school, and university). But in reality, this recognition process does not always run smoothly [1]. Often teachers are faced with obstacles that make it difficult for their students to learn to read, write and count. In the case of difficulty in learning to read, students will experience difficulties in understanding other subjects because the ability to read is the basis and absolute requirement for exploring and gaining further knowledge.

Reading is a complex process that involves skills such as decoding, making predictions, and asking questions. Teaching students to read is also a complex process. Students come to class with a variety of abilities and learning styles. Experiences, family dynamics, also health and nutrition influence how they learn. Mastery of reading skills will determine the success of students in participating in the instructional activities at school [2]–[5]. A student who is not able to read well will have difficulty participating in instructional activities such as capturing and understanding the information presented in various textbooks. The student will be very slow in absorbing lessons so their learning progress is also slow when compared to other students.

Reading difficulties like problems in reading accurately or slowly, poor writing system, poor writing, and language process difficulties area unit normally found by grammar school lecturers [2], [6], [7]. This has been anticipated by providing reading lessons in early grades at the elementary level and even Kindergarten. The teacher provides reading lessons to students according to their grade level and abilities. The first stage is given to students in grades 1-3 of an elementary school in the form of preliminary reading while the second stage is advanced reading which is given to students of grades 4-6 elementary school. Preliminary reading skills are more oriented to basic reading skills, namely literacy skills where students learn to acquire the ability and mastery of reading techniques and capture reading content well [8]. Preliminary reading in this case is intended to be mechanical, such as letter recognition, the ability to read syllables, the ability to read words, and the ability to read simple sentences [9], [10]. Therefore, the purpose of teaching it is to understand receptive language (listening and reading), understand expressive language (expressing language verbally and nonverbally), and recognize early literacy through play.

When students are in grade 4, they are given advanced reading learning that emphasizes the meaning of reading, understanding and concluding the contents of the reading in the form of stories. This is done because the teachers consider the students have mastered the ability to read in the form of the basics of reading techniques. However, the fact reveals that in the classroom, advanced students (grades 4-6) still have difficulties in mastering the preliminary reading ability. This difficulty can be caused by two factors, namely internal factors, and external factors [11]–[13]. Internal factors in the form of brain dysfunction can cause obstacles in children such as ADHD (Attention Deficit Hyperactive Disorder), autism, and learning disabilities. While external factors are in the form of students experiencing depression i.e. having not reached maturity when children learn to read or are not following the method used by teachers in learning to read [14]. This is in line with many researchers realize that kids have reading difficulties might have negative feelings and low vanity.[15], [16].

Several strategies that have been implemented to facilitate elementary school students who have reading delays are reading aloud with guidance and feedback. These activities include repetitive reading, pair reading, group reading, and assisted reading [1]. However, presenting a full paragraph to students, especially lower grade students, sometimes causes students' anxiety. Preliminary reading teaching is a solution to initiate students to want to learn to read even though it is a difficult thing for them.

The process of identifying the causes of student learning difficulties requires an assessment from a psychologist. Psychologists will assess students who have difficulties in learning to read based on the given recommendation from a neurologist. The results of the diagnosis from this neurologist are the subject of a psychologist's assessment. This is associated with the psychological feature theory that seeks to elucidate behavior by psychological processes, and neurobiology aims

to produce neuroscience proof of the validity of those processes. Whereas instructional follow and theory target reading behavior and ask for to elucidate this behavior regarding learning methods [8], [17]–[19]. Based on the researcher's findings, there are several 4th-grade students in Bandung, Indonesia who have difficulty in reading but their parents object to the assessment and diagnosis. Many reasons make parents choose to fully hand over this problem to the school. Difficulties in learning to read are very important to be addressed immediately so that these students do not hinder classroom instructions now or in the future. Therefore, the author tries to identify it using the IRI (Informal Reading Inventories) instrument developed by Lovitt [20]. The purpose of this study is to determine the causal factors and objective conditions of students' reading difficulties, as well as to identify the efforts of teachers and parents in dealing with these difficulties. This research implies that it is hoped that teachers can act appropriately in dealing with students who have difficulties in learning, especially in learning to read.

The purpose of this study is to identify the causal factors and solutions that must be done to overcome students' reading difficulties in elementary school. This research is a qualitative descriptive study in elementary schools. This research is relatively new because it involves a neuroscience point of view in the analysis process.

Students' difficulties in reading might be caused by many factors, one of the dys. Dyslexia may be a language-based neurologic learning condition that impairs the neurologic and verbal-linguistic process parts of the brain, each of that area unit needed for triple-crown reading [21]. According to the researchers, the left hemisphere's occipito-temporal, temporo-parietal, and inferior frontal cortex, which house traditional, visual, and linguistic areas, are functionally compromised [3], [22], [23].

When a stimulus is linked to an incorrect visual cognitive code, and then text pieces are conveyed out of order, a processing impairment is thought to develop. It is a neurobiological impairment in phonological processing, as stated by Norton, Beach, & Gabrieli, and Redford [21], it is a neurobiological loss in phonological processing.

Reading, writing, and spelling, which is the purview of language and is processed in the left hemisphere of the brain, were found to be barriers for kids with dyslexia. The occipito-temporal, temporal-parietal, and inferior frontal cortex (Broca's region) are all dysfunctional in dyslexic students, as previously stated. The occipital temporallexia cortex recognizes visual word shapes, whereas the temporal-par and inferior frontal cortex (Broca's region) handle phonology and semantics [24]. Normally, we will employ these three sections of the brain when reading, but in dyslexia, only Broca's area is active, therefore reading activities need extra effort. This is what causes dyslexic kids to have trouble identifying letterforms, altering their shapes, or flipping letters upside down. In addition to the three sections of the brain, the planum temporale, which has anomalies in dyslexia

instances, is another component that has anomalies. In general, the left planum temporale is larger than the right planum temporale, but in dyslexia, the opposite is true: the left planum temporale is smaller than the right planum temporale.

Materials and Methods

This study aims to identify the condition of students who have difficulty in learning to read and the main factors causing the difficulties. Qualitative descriptive is used in this study to describe the conditions and difficulties of students in learning to read in Indonesian subjects. The research subjects are six 4th grade students

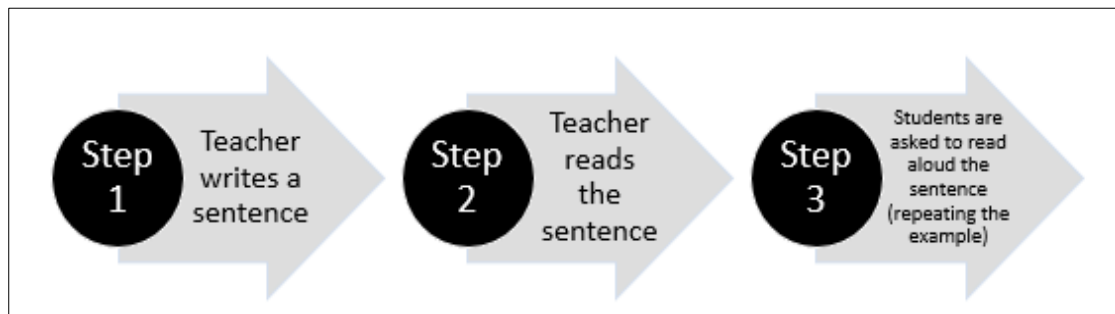


Fig. 1. Steps of assessment

Table I research Subjects

No.	Initial	Age	School
1.	MF	10	SD Lab UPI Cibiru
2.	FU	11	SD Lab UPI Cibiru
3.	AIK	10	SD Cahaya Pelita
4.	JR	10	SD Lab UPI Cibiru
5.	AL	10	SD Lab UPI Cibiru
6.	MD	11	SD Lab UPI Cibiru

Data collection techniques consisted of observation, interviews, documentary studies, and the IRI (Informal Reading Inventories) instrument developed by Lovitt [20]. The stages of the assessment of the students are shown in Fig.1. While the sentences made by the researcher used during the assessment

Table 2.List Of Sentences Used In The Assessment

No.	Sentence (in Bahasa Indonesia)
1	<i>Bapak membeli dukuh</i>
2	<i>Kakak pergi ke sekolah</i>
3	<i>Itu buku kakak</i>
4	<i>Ibu pergi ke pasar</i>
5	<i>Bunga mawar merah</i>
6	<i>Adik sedang bermain</i>
7	<i>Tas ayah di dalam mobil</i>
8	<i>Baju bibi baru</i>

Results and Discussion

Students' Reading Difficulties

Class observations were conducted to grade 4 students at SD Lab UPI Cibiru and Cahaya Pelita to identify which students had difficulty learning to read. This observation assessed several indicators that indicated learning difficulties, namely (1) students did work without disturbing others, (2) students participated in the learning process in class, (3) students paid attention and listened when the teacher was explaining, (4) students obeyed the teacher's orders, (5) students did class assignments, and (6) students collected assignments. The results of this observation indicated that 6 students had learning difficulties.

The next step is to conduct an assessment using the IRI instrument developed by Lovitt [20]. Although some IRI instruments have been standardized, some of them are made by teachers with general reading materials. The advantage of independent manufacture is that the content of the instrument can be directly related to the curriculum used. In addition, word lists, reading passages, and accompanying questions are prepared according to reading levels. The results of the assessment revealed that four students had difficulty reading visually and 2 others had difficulty reading. Table 3 shows a description of the difficulties experienced by the six students.

Stages of interviews with class teachers and parents of students were carried out after the assessment process was completed. The results of the interview stated that the possible cause of the students' reading difficulties was the delay in preliminary reading learning in the lower grades (grades 1-3). In the earliest class (grade 1), the students had not been introduced to learning to read so that some students need more time to master the initial learning skills. The parents showed the same attitude, i.e. they surrendered and fully entrusted their child's learning process to the school. They are not too worried about the difficulty in learning to read experienced by their son/daughter and consider it as something that is usually experienced. This is because their son/daughter does not show any conspicuous deviations in both physical and psychological aspects. Efforts have been made by the teacher in the form of providing additional lessons specifically for learning to read after class hours are over, which is 1 hour after school time using the SAS (Synthetic Analytic Structural) method and the alphabetical method as well as counseling services by the guidance and counseling teacher team.

Table 3 shows a description of the difficulties experienced by the six students.

No.	Initial	Description	Type of Difficulty
1.	MF	<ul style="list-style-type: none"> Incompleteness in reading sentences Sentence "Itu buku kakak" read as "Itu kakak" Sentence "Tas ayah di dalam mobil" read as "Tas di mobil" Reversed reading Sentence "Ibu pergi ke pasar" read as "Ubi ke pasar" Sentence "Baju bibi baru" read as "Baju bibi biru" 	Visual
2.	FU	<ul style="list-style-type: none"> Incompleteness in reading sentences Sentence "Bapak membeli dukuh" read as "Bapak beli dukuh" Reversed reading Sentence "Ibu pergi ke pasar" read as "Ibu pegi ke pasar" Sentence "Baju bibi baru" read as "Baju bibi biru" 	Visual
3.	AIK	<ul style="list-style-type: none"> Difficulties in differentiating sounds Word "Mawar" read as "Tawar" Word "Bapak" read as "Kakak" 	Auditory
4.	JR	<ul style="list-style-type: none"> Incompleteness in reading sentences Sentence "Kakak pergi ke sekolah" read as "Kakak ke sekolah" Sentence "Baju bibi baru" read as "Baju baru" 	Visual
5.	AL	<ul style="list-style-type: none"> Difficulties in differentiating sounds Word "Pergi" read as "Pagi" Word "Sedang" read as "Senang" 	Auditory
6.	MD	<ul style="list-style-type: none"> Difficulties in visual discrimination and visual memory Sentence "Tas ayah dalam mobil" read as "Ayah dalam mobil" Sentence "Baju bibi baru" read as "Baju baru" 	Visual

General Perspective

A strong reading ability is influenced by a variety of factors, ranging from oral language abilities to word reading and reading comprehension strategies. Students' success in reading words is determined by their ability to identify words accurately and fluently. Accuracy and fluency are critical components of the reading process because incorrect word reading creates a barrier to reading and prevents students from reaching deeper levels of comprehension. Successful word reading requires the interaction and integration of phonology (how words sound), orthography (how words appear visually), and semantics (what words mean) (what they mean) [25], [26]. Because of this multi-component nature, deficiencies in any

of its components can result in reading difficulties. In reality, students may have deficiencies in one or several components or may not be able to integrate information throughout the process causing them to have reading difficulties. [27]. Reading difficulties can be categorized as 1) difficulty in reading single words; 2) initial difficulty deciphering or pronouncing words; 3) difficulty reading sight words; 4) inadequate phonological processing; namely the understanding that sentences consist of words, words consist of syllables, and syllables consist of individual sounds or phonemes; 5) expressive or receptive language difficulties; and 6) difficulty with understanding.

Based on the results of the assessment in Table 3 regarding the difficulties in learning to read experienced by 6 students, it was found that there was a tendency for students to experience more difficulties with the visual type compared to the auditory type. The difficulty of visual types is a disturbance in the function of processing information through the eyes so that they experience misperceptions when capturing symbols of letters that are turned upside down such as the letter d as b, p becomes q, or incomplete letter h becomes n [28]. On the other hand, the auditory type is an obstacle to the acceptance (perception) of the form of sound, thus causing errors in the sound that is spoken. These difficulties in learning to read experienced by grade 4 students will have an impact on their learning process where at this level they should have been at the level of learning new ideas and more complex knowledge. If they have not mastered basic reading skills, it can hinder the process of understanding new knowledge. Students with low learning abilities need the longest time to understand the material compared to children with moderate or high cognitive abilities. Thus, they need special assistance so that teachers need the right strategy to assist in learning [29].

Students' development of reading, as described by Chall [30], contains 6 stages. The first phase consists of three initial stages that students encounter from kindergarten to third grade in elementary school. Prior to beginning formal literacy education, students develop literacy behaviors in the first stage (eg basic word concepts, knowledge of book handling). Students develop the fundamental ability to recognize symbol-sound correlations during the second stage, which occurs at the start of formal reading instruction. Students develop the ability to recognize words automatically in the third stage of education, based on their previous education and abilities. Additionally, the second phase contains three final stages that students aged 9 to 18 years encounter. Students must be able to effectively assimilate knowledge through reading texts beginning in the fourth stage. Students acquire knowledge in a variety of areas during the fifth stage. They must be able to evaluate both the information and the sources from which it is derived. After amassing a significant amount of vocabulary and diverse points of view based on their knowledge, students progress to the sixth stage, where they develop into independent thinkers [31], [32].

In theory, the process of reading development will produce competent and

successful individuals. However, the situation in the field shows that in the learning process of preliminary reading, many students are asked to read the letters written by the teacher on the blackboard without other supporting media. We need to know that the characteristics of the material in the early reading stage are short and predictable, repetitive, use simple language, use rhythm, the text is simple, easy to remember, using appropriate pictures and text, and dominant use of the picture. The teacher's instructions asking students to read the letters without being accompanied by other support such as media or variations of instructions, such as reading simple stories with the most frequently used words, can give the impression of being monotonous. The biggest impact is the phenomenon of students who have difficulty following the flow of reading skills development in class. The lack of readiness for information processing at the microstructure level makes students who have reading difficulties unable to process high-level information (identification of the main subject of the text and introduction of textual structures) especially in organizing work in general.

Factors causing learning difficulties in students are still being studied until now. Starting from gender, class size, family, and environmental factors [28]. Previous analysis advised a attainable impact of sophistication size on learning the way to browse within the early years, with smaller category sizes being related to higher performance (depending on the scale and sort of school). Some researchers also investigated whether having a sibling positively affects students' reading development in aiding learning [33], [34]. Learning difficulties can be caused by external factors, such as family environment factors that do not support the child's learning process and school environments that apply to learn methods that are not by the abilities and condition of students. This has an impact on not achieving optimal performance and depression which affects emotions which causes students to experience disturbances in concentration, perception, and memory. [17], [35].

Recognizing the basic pattern of reading difficulties helps provide effective intervention and differentiation of classroom instruction [5]. Given that students who have difficulty in learning to read also have difficulty in spoken language, the development of preliminary reading learning is very useful. In addition to overcoming reading difficulties, it can also facilitate aspects of language/speech development. As revealed by many researchers that language development/speech of children begins with palpatng (sounds or sounds without meaning) then followed by one-syllable, two-word language. The next stage is compiling simple sentences and socializing using complex language according to the level of social behavior. At the age of 8-12 months, the first words spoken by children are pa – pa or ma- ma, su – su, pus – pus, gung -gung etc. Similarly, according to some researchers, the importance of early reading for children with learning difficulties to read by introducing varied syllable patterns VC (vocal consonant), CV (vocal consonant), CVC (consonant-vowel-consonant) can stimulate memory because among them, children who have difficulty in learning to read experience problems with their memory [33].

Some of the efforts that teachers can do in the classroom to prevent reading

difficulties in students, among others, are 1) providing high-quality preliminary learning together with small group learning based on student needs, 2) screen-testing and progress monitoring which is needed to identify students who are lagging in their reading development, and 3) providing encouragement and assistance to students with reading difficulties to accelerate their reading development towards grade-level standards [36]. This encouragement can be in the form of explaining to students how to choose the right reading book. Choosing the right reading material is a difficult thing for many students because they may put the book down. After all, it is too difficult or they lose their interests.

In the case of learning difficulties, especially reading difficulties, cooperation between the school and parents is needed because not all students' time is spent in class. Parents need to provide opportunities to read books together from an early age in their child's development. The activity of book-reading ought to encompass the foyeys demonstrating reading the print on the page and looking out at the images. When children enroll in school, teachers need to explicitly demonstrate reading skills such as phonemic awareness, letter naming, and letter-sound correspondence, and whole-word reading skills. They also need to model these skills as they carry out reading activities in class. During the learning process, both in the preliminary and advanced stages, students need corrective feedback for mistakes made during reading activities. This corrective feedback given by the teacher can make students identify the word they read wrong. **Providing** reinforcement or corrective feedback is taken into account the simplest way of supporting students through the reading method. while not this corrective feedback, students with browsing issues can become pissed off as they proceed through the trial and error method of learning to read [6].

A. *Neuroscience Perspectives*

Humans fundamentally have a nervous system, with the brain serving as the system's control center, controlling the mind, the neurological system, and the mechanics of human organs, including the mechanism for language. As a result, the development of human language varies from one person to the next, as it is impacted by the growth of the human brain. The cerebrum, also known as the cerebrum, is one of the components of the human brain. There are four lobes in the cerebrum, each of which plays a role in the human body, general language skills, and the ability to interpret information and language in sound. The frontal lobes are located at the front of the cerebrum and the temporal lobes which are at the bottom of the brain, play a role in the human body, general language skills, and the ability to interpret information and language in sound.

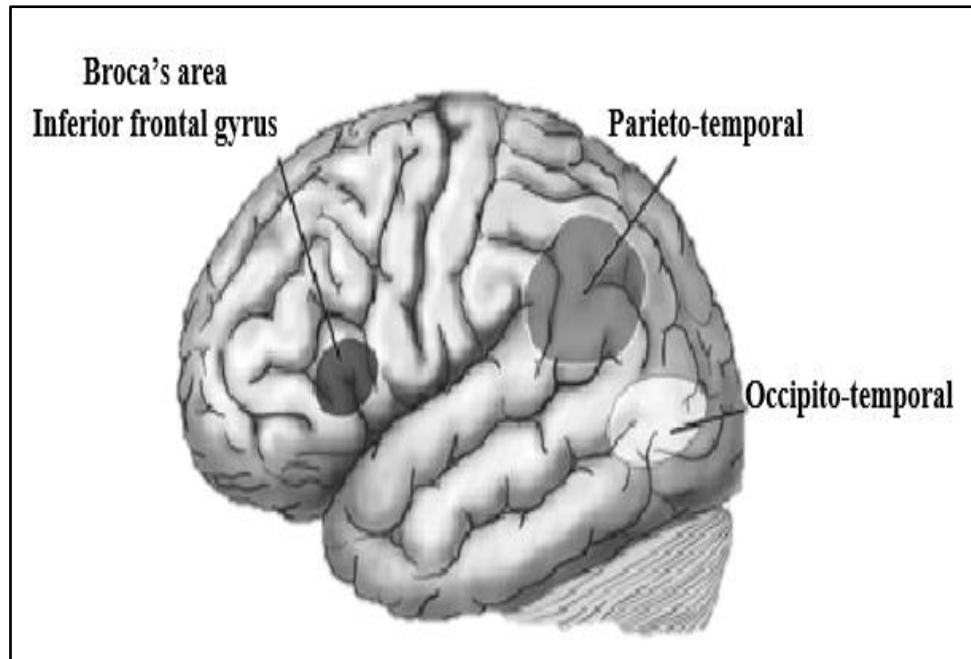


Fig. 2. Neuro systems for reading in the brain's left hemisphere [38].

Some researchers did research to determine which area of the brain is necessary for human language intelligence development. The experiment was carried out by injecting fluid into both hemispheres (brain hemispheres), and the results revealed that putting the left hemisphere to sleep caused speaking problems. Furthermore, a French physician called Pierre Paul Broca once treated a stroke patient who lost his capacity to talk; the patient was only able to pronounce *tan* after death, and an autopsy revealed that the patient had brain damage in the lower left frontal lobe or Broca [37]. The visualization of the neuro system for reading in the brain can be seen in Fig. 2. Students' difficulties are might be caused the trouble in the left frontal lobe or Broca. words are formed in the occipito-temporal. The analysis is conducted in parieto-temporal. While broca's area inferior frontal gyrus is a place of articulation of the words. Students with difficulties reading have problem on those spots.

When a hemispheric removal surgery, also known as a hemispherectomy, is performed to prevent epilepsy, it has been demonstrated that when the left hemisphere is removed, the person's ability to speak is drastically reduced, whereas when the right hemisphere is removed, the person can speak, albeit imperfectly. Although the left hemisphere is more prominent in language intelligence development, the right hemisphere also contributes to language, such as arranging events or narratives and making it simpler for people to form conclusions and identify confusing phrases [39]. Another study found that children under the age of 12 had not experienced lateralization (the tendency for a person to use one side of the brain over the other), as evidenced by cases of children

under the age of twelve who had left hemispheric injuries but could still speak normally like other children. Left-handedness and right-handedness can impact a child's linguistic verbal intelligence. Right-handed children have dominating language abilities utilizing the left hemisphere, whereas left-handed children utilize the right hemisphere and are occasionally controlled by both hemispheres [10], [37], [40-43].

The development of verbal language intelligence and the development of the brain are inextricably linked. The development of linguistic abilities will be hampered or harmed if the brain is affected. The region of the brain that plays a role in growing a person's verbal language intelligence is more prominent in the left brain than the right brain, according to several of these researches. But, in essence, both the left and right brains are critical in a person's ability to develop linguistic verbal intelligence, especially in children. By providing repeated stimuli, it is hoped that good coordination between the left and right brains of children will occur in their ability to develop linguistic verbal intelligence. One of the ways to help student's difficulties in reading is not only giving repeated stimuli but also giving them the teaching preliminary reading so the performance of the hemisphere will be increased. The damages to the brain caused the low performance to read many words in a paragraph.

Conclusion

During the process of learning basic reading skills, students may experience learning difficulties caused by many factors. Teachers and parents have an important role in preventing or overcoming difficulties in learning to read experienced by students or their children. In this study, it was found that there was a tendency for students to have visual difficulties, which were impaired information processing functions through the eyes, so that they experienced misperceptions when capturing symbols of letters that were turned upside down, such as the letter d, which they saw as b, p became q, or incomplete sight of the letter, for instance, h became n. Preliminary reading instruction can be a solution to overcome these reading difficulties. The school has made countermeasures through additional lessons specifically for learning to read after class hours are over, which is 1 hour after school time using the SAS (Synthetic Analytic Structural) method and the alphabetical method as well as counseling services by a team of guidance and counseling teachers. For teachers in the classroom that it is recommended to take the initial step of identifying the difficulties experienced by students so that they get immediate treatment so that it does not hinder their learning achievement. Parents are recommended to introduce reading culture from an early age at home and not to hand it over completely to the school when their son/daughter has difficulty reading or other basic skills.

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