

## Dyslexia-A Learning Difference

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### Abstract

Dyslexia is a specific learning difficulty which is more prevalent amongst students than any other disability. With an increasing awareness of this disability and the need for support, there have been many articles written on this subject. This article considers the definition of dyslexia, how it manifests and the difference it makes to learning. The implications of this study are presented as well as some recommendations for those working with students with dyslexia in various settings.

**Keywords:** Dyslexia; Learning disabilities; Cognition; Reading disabilities; Environment

### Introduction

Nature is very diverse and hence there exist a lot of differences amongst humans due to their genetic constitution. These differences could be manifested in their physical structure and intellectual abilities, just to name these two. The concept of exceptionalism has existed from the beginning of life on earth and could be viewed by society as positive or negative. In educational settings, students who need additional support or help in order to achieve academic success due to disability are often described as exceptional. Amongst these students are those with dyslexia [1-3], a specific learning difficulty. Specific learning disabilities include dyslexia, dysgraphia, and dyscalculia. Prominent among specific learning disabilities is dyslexia [2,4].

A lot of learners are faced with different types and degrees of difficulties in their studies. A learning disability or difficulty is a neurological condition that affects an individual's ability to process, store, and reproduce information [3]. A learning difficulty therefore affects cognition. Additionally, learners with these disabilities may present with one or more of the following: poor reception, recognition, organization, storage, retrieval and reproduction of information [1-3].

Succinctly put, at contact with most information, learners with specific learning difficulty do not receive, recognize, store, decode and reproduce such information on demand. Thus it is imperative to deduce that information transiting from the senses to the brain may encounter some difficulties or may be distorted.

Dyslexia is a specific learning difficulty that mostly affects how learners read and also manifests in poor spelling. Despite conventional instruction, proper motivation, intact senses, normal intelligence and freedom from gross neurological deficit, dyslexia is a severe problem in learning to read with normal proficiency [3]. Thus dyslexia is a language-based disability and results from poor decoding ability; affecting more than half of learners with learning difficulties.

Learners with dyslexia may be able to read, but read at a level lower than expected for their age and level of study. Their proficiency in reading is poor and sometimes below average depending on the severity of the disability. This difficulty in reading is irrespective of required motivation from both teachers and the learning environment. For a learner to be labelled Dyslexic, such learner's senses are intact and function maximally. This also means that learners diagnosed for dyslexia are not at the same time diagnosed for intellectual disability, health impairments and behavioral or emotional disturbances. Thus a learner is labelled dyslexic when these impairments and disturbances are carefully delineated [3]. Over the years, teachers have shown concern over learners who are intelligent, normal, and healthy but at the same time struggle with reading, spelling and writing [1,2]. Learners with dyslexia may also present with verbal short-term impairment [5].

The International Dyslexia Association reckons that an estimated 15-20% of the world's population experience at least one symptom of dyslexia or the other. According to research carried out in Britain, America and Sweden, 30-52% of prison inmates in these countries are dyslexic [6].

Washburn et al. similarly asserted that one out of every five persons in the United States of America show one or more symptoms of dyslexia [7]. Previous research carried out by the authors of this article have confirmed the prevalence of dyslexia amongst students, compared to other types of disability. For instance, a survey conducted in some public primary schools showed that one out of every three children in Phalga Rivers State Nigeria has at least one symptom of dyslexia, including some difficulty with reading. In recruiting students to test a piece of e-learning software, the authors also found that most of the participants were those with dyslexia. Given this prevalence, educational institutions need to double their efforts in supporting and seeking solutions in order to improve the learning experience of students with dyslexia.

The question some parents and teachers have been asking is 'why is it so easy for some learners to read, solve mathematical problems, spell and write effectively while some other learners of same age and in the same class struggle endlessly to achieve a pass grade on any reading,

math, spelling and writing tasks [2]. The greater part of this problem has been how to effectively understand these disabilities and subsequently manage them. To this end lots of research have been carried out and are on-going into these learning disabilities with the aim of understanding the etiology, epidemiology and management of these learning disabilities.

Educational institutions need to ensure that their support structure enables students with disabilities to study at an equivalent level as those without disabilities. This also includes having a fair system of evaluating students. Unfortunately for learners with dyslexia the most popular examination structures are based on time limit which learners must adhere to, and demands speed and high levels of literacy [6,8]. This makes it difficult for learners with dyslexia to achieve as much as their peers without dyslexia. Learners with dyslexia are continuously seen as failures or performing below average in virtually all academic evaluations [6,9].

### Concept of dyslexia

Specific learning disabilities have existed since time immemorial. Today there is awareness and recognition given to dyslexia as a concept that is affecting the educational system. A lot of learning differences are experienced by learners at different stages of their academic journey. Some of the difficulties and struggles learners experience disappear as maturity sets in, others become less difficult with management and support from teachers and other care givers.

Snowling defines dyslexia as a learning difficulty in acquiring and processing language that is typically manifested by a lack of proficiency in reading, spelling and writing [10]. This is to say that dyslexia is a reading, spelling and writing disability, implying that some people with dyslexia will rarely be excellent in tasks that involve lots of reading, writing and spelling. Succinctly put, learners with dyslexia are tailored to learn differently. Some are better with learning tasks that have little to do with writing, spelling and reading. In our experience working with students with dyslexia, we have found varying degrees which could be mild, moderate or severe.

Ikediashi citing Martin et al. sees dyslexia as a disorder that is associated with reading, writing and spelling impairments [11]. This definition categorizes dyslexia not just as a learning difficulty which comprises of a wide variety of disorders including reading, listening, writing but as specific learning difficulty in terms of coherent and operational domains when it comes to reading disabilities.

The definition by the International Dyslexia Association (IDA) has gained a wider acceptance as a leading professional research body. According to IDA dyslexia is a specific learning disability that is neurological in nature [12]. This is to say that there is notable difference in brain structure in learners with dyslexia, compared with the brain of learners without dyslexia.

Dyslexia may result from poor development or deficit in the phonological component of language. This is not expected with good cognitive ability and where the classroom instruction is effective. Research on dyslexia and other specific learning difficulties have shown the benefits of using technology to help students with disabilities [13].

Three types of dyslexia that can affect a learner's ability and performance in school have been identified notably:

**Trauma dyslexia:** Trauma dyslexia is regarded as acquired dyslexia. Ikediashi notes that this type of dyslexia occurs after some form of

brain injury in the part of the brain associated with reading and writing [11]. It can also result from any disease such as infections from flu, cold or ear infections which affects how a child hears or decodes sounds in words or phonemes. Much of what we sound is from what we hear, thus infections and diseases affecting hearing or ability to comprehend language can consequently affect learning to read and actually reading or spelling.

**Primary dyslexia:** Primary dyslexia is more of a dysfunction of the left side of the brain which controls learning experiences especially reading and spelling. It does not change with time, and can last a life time. Learners with this type of dyslexia cannot read above primary four [11]. This type of dyslexia is hereditary in nature and can pass from one generation to the other. Czepita in Ikediashi asserts that primary dyslexia is more prevalent in boys than girls [11,14].

**Secondary or developmental dyslexia:** This type of dyslexia occurs during fetal development, this is caused by problems with development of the brain of the fetus resulting in impaired ability for word recognition and spelling. Foetal hormonal development is indicated in this type of dyslexia. Gordon et al. note that this form of dyslexia may also be caused by "a failure in the establishment of neural pathways and immaturity of neural mechanisms or focal heterotopias" [15]. The good aspect of the secondary dyslexia is that the learner can improve with age and maturity thus the child with dyslexia can perform better in secondary school and later adult life if given proper attention and help. It is also more common in boys than girls [16,17].

### Symptoms of dyslexia

Some symptoms of dyslexia are notable before school (preschool) which includes difficulty with manual preference, constant confusion with left and right, difficulty to reproduce rhythms or follow simple nursery rhymes, difficulty with telling the time of the day, and easily disoriented [18]. During the early school days (primary), most students who have dyslexia make regular auditory and or visual confusions when faced with similar graphemes and phonemes for example; 'b' is perceived as 'd' or even 'p' which have similar sounds, as well as 'b'-'d', 'u'-'n', 'f'-'t', 'm'-'w', 'p'-'q' which have similar forms. They may sometimes make mistakes of inversion, addition and omission of elements of words, between letters and syllables and also affixes. Apart from these symptoms, several risk factors can contribute to dyslexia including family history, it is therefore important to know the prevalence of these symptoms in parents and family lines as a clue for diagnosis of dyslexia in children especially early childhood.

According to Davis, these signs can range from mild to severe. It is important to note that these symptoms cannot be considered in isolation. Thus it is a combination of several risk factors and symptoms, a reoccurrence of these symptoms despite corrections and persistence of these symptoms over a period of time which is alarming.

### The difference in learning pattern

All brains are not wired the same way, the brain of an individual with dyslexia is wired differently from the fluent reader's brain, they function differently apparently because they are organised differently. Various brain studies indicate difference in the cerebral cortex and the thalamus of readers with dyslexia and those without dyslexia [19,20]. One major component of literacy is learning to read, write and do basic maths. Learning difference can be better explained using a model (simple view of Reading) developed by two American researchers Gough and Tunmer in the early 80's and 90's. The simple view of

reading focuses on a two-way matrix of reading. This two way matrix is all about two main ingredients of reading; the word recognition part and the language comprehension part. This model results in a quadrant, and explains where the reader's ability is at.

Learners who show good word recognition which is evidenced by good word decoding and at the same time have good language comprehension are placed in the first quadrant and are termed good readers. These are normal readers and have good ability for alphabetic principle. These learners have little or no problems at all with learning (Figure 1).

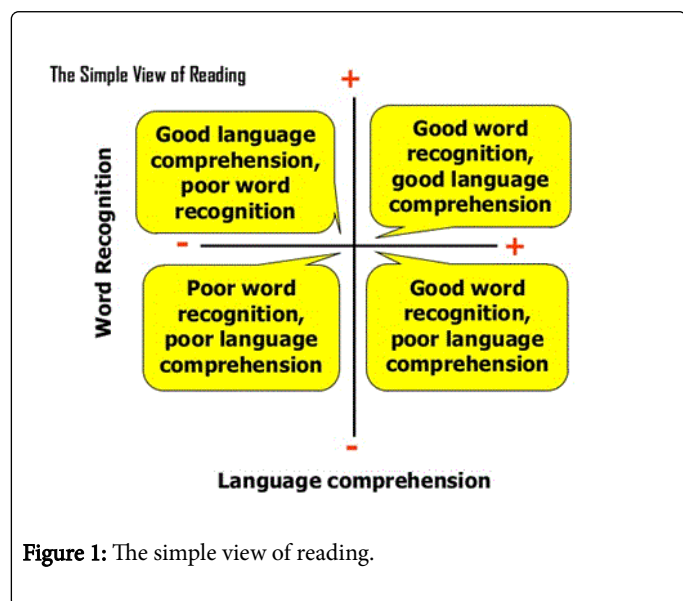


Figure 1: The simple view of reading.

In the second quadrant we have poor word recognition and good language comprehension. These learners find it difficult with the alphabetic principle of grapheme-phoneme relationship. They are the poor word decoders and non-fluent readers; they apparently show poor ability for alphabetic principle and thus have difficulties learning like the other students in a regular class room environment.

The third quadrant is where we find learners with good word decoding and recognition but poor language comprehension. This category is characterised by good reading and ability for alphabetic principle, they typically have problem with reading comprehension. They are termed poor language comprehends or specific comprehension deficit. They will need some comprehension strategies to succeed in the regular academic environment.

Finally we have the last quadrant which is made up of learners with poor word recognition and decoding as well as poor language comprehension. These learners have double issues with learning. They will have to struggle through school because of the nature of their learning problem. Students with dyslexia have problems with word-level decoding [21].

Here lies the learning difference, emanating either from a disorder in hormonal development of some sort or from an accident or disease, learners are diagnosed to have issues with the part of the brain that is responsible for cognition and reading. The left side of the brain is responsible for literacy. A lot is involved in reading and comprehension. The temporal lobe is responsible for phonological awareness. This involves the ability to decode and discriminate sounds. The speech production and language production ability is regulated by

the Broca's area located in the frontal lobe and the white matter in the brain which also helps in proper learning and functioning, connecting the back of the brain to the front. This white matter tract which is concerned with reading ability and connects the language center to the visual information processing part of the brain is compromised in students with dyslexia, while readers without dyslexia show strong and stronger connectivity over time [22].

The difference in the use of left versus right brain is gaining more grounds. Recent studies in neurology indicate that readers with dyslexia use more of the right brain areas as opposed to those without dyslexia who use the left brain system to read. This accounts for the difficulty they experience with fluency [23]. There is an inverse connection between ability to read and blood flow patterns in the cerebrum. Studies show that for those without dyslexia a stronger activation of the left hemispheric reading system (which includes the left angular gyrus) corresponds to better reading skill. On the other hand, those with dyslexia showed increased reading skills and correlated with greater dependence on the right hemispheric systems [23].

Furthermore, brain studies indicate that normal or ordinary readers use the left temporal area for sounding out words while poor readers or those with dyslexia rather than use the left temporal area to sound out words use the right temporal area [20,23,24]. On the same note, while reading for meaning, normal readers use the left temporal area when reading for meaning as opposed to readers with dyslexia who rely on the right. This over dependence of the dyslexic reader on the right brain makes the left hemisphere brain connections somewhat less well developed and the right hemisphere connections far more extensive for other activity which in some ways makes the dyslexic reader superior to the fluent reader [23,25].

While the reader without dyslexia shows good phonological awareness and thus performs better in the regular school environment, the dyslexic thrives more on 3D visuals, physical strength for sports, auditory strengths for music and arts, great mental strength, personality strength etc. A handful of inventors, artists, designers, scientist, mechanics, electricians, engineers fall into this category of dyslexics.

### Implication

Findings from numerous brain studies indicate structural brain differences that account for learning differences [19,25]. This implies that different teaching methods should be applied for the different learning needs and disabilities. Thus using same teaching methods or regular teaching methods may not be effective for a vast majority of learners especially those with dyslexia. Furthermore, employing strategies and teaching methods that continuously tests the phonemic awareness of those with dyslexia exposes their weakness for phonetic decoding and subsequently increases their failure in school work. Falling behind grades will not be a boost to their self-worth. Decline in self-worth or poor self-esteem could invariably lead to frustration which paves way for future juvenile delinquencies and later adult criminal tendencies [6].

### Recommendation

There should be early assessment of language processing to diagnose for dyslexia in struggling readers.

Government should provide required enabling facilities, tools and resources to ensure that proper assessment and assistance is made available to learners with dyslexia as the need arises.

In-service training should be provided for serving teachers. This will equip the serving teachers with skills to diagnose, assist and support learners with dyslexia.

The services of trained counsellors are highly needed to provide emotional support and counselling to learners with dyslexia who may be experiencing fleets of frustration.

Student support Services should be set up in educational institutions to provide the necessary support to all students with disabilities throughout their study.

It is important to help learners and their parents understand their dyslexic condition, emphasising their strengths and ability while de-emphasising their weaknesses.

Schools should employ systematic programs that address phonemic awareness and phonics to help dyslexic learners.

## Conclusion

A review of different brain studies indicated difference between the brains of learners with dyslexia and typical learners without dyslexia. The gray and white matters in the left parietotemporal area of people with dyslexia, which make up the brain and are very important for information processing and transfer around the brain are less. This may account for problems with processing sound structure of language.

All learners do not use the same learning style. Learners with dyslexia need special help probably in the form of technological intervention. There are a number of assistive technology aids and software available for people with dyslexia.

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