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Numbers in the Dark: Teacher Awareness and Identification of Dyscalculia in Primary Schools

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ABSTRACT

Developmental dyscalculia is a learning difficulty that affects pupils' ability to understand and manipulate numerical concepts, yet it remains largely under-identified in Nigerian primary schools. There are few empirical studies exploring teachers' awareness and knowledge of dyscalculia, particularly in Kebbi State, Nigeria. Therefore, this study assesses the awareness level of primary school teachers regarding dyscalculia and also identifies students with dyscalculia in primary schools in Kebbi State, Nigeria. The study used a descriptive survey design. A sample of 115 teachers participated in the study. One hundred and fifteen questionnaires were distributed to collect data, and a total of 112 questionnaires were successfully retrieved and valid for data analysis. The instrument was validated with an average reliability estimate of 0.79. Findings revealed that a notable proportion of primary three pupils exhibited characteristics of dyscalculia. Moreover, among 115 teachers, 84 primary school teachers were unaware of and had limited knowledge of dyscalculia. It was recommended that the government should ensure capacity building to educate the teachers on the symptoms, causes, and remedies/intervention dyscalculia.

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1. Introduction

Mathematical knowledge is a fundamental pillar of human cognitive and creative development, influencing various aspects of our lives (Salami, 2021). From childhood to adulthood, mathematics is an essential tool for completing numerous tasks. It shapes our way of thinking and provides a comprehensive body of knowledge that enhances logical reasoning, analytical thinking, and the ability to conceptualize abstract ideas in a concrete manner (Butterworth, 2013). From a social and economic perspective, mathematics plays a crucial role in daily life, as everyone engages with it in some capacity (OECD, 2024). In modern society, we encounter numbers and digits

everywhere—on store signs, street signs, and billboards. Consequently, mathematics is a core subject in schools, making it a mandatory area of study for all students (Aquil et al., 2020).

Mathematics plays a crucial role in shaping learners' cognitive growth, logical reasoning, and problem-solving capabilities (Kilpatrick et al., 2015). It is known that the students who solve math problems in their daily life have higher logical skills than those students who don't solve the problems (Butterworth et al., 2011). However, the report shows that some students have difficulty in learning and comprehending numbers. At the lower basic education level, mathematical skills such as number recognition, counting, and basic arithmetic operations form the foundational competencies upon which advanced numeracy skills are developed. However, a significant proportion of children struggle to meet these learning expectations due to neurodevelopmental disorders such as Developmental Dyscalculia (Shalev & Gross-Tsur, 2021). Dyscalculia is an arithmetic and mathematical disability that is seen in different aspects of life, like the concept of number counting, use of ordinal numbers, recognising numbers, comparing numbers and writing of numbers (Shalev & von Aster, 2008; Butterworth, 2019). Dyscalculia is recognised as a persistent difficulty in acquiring fundamental mathematical skills, even when adequate learning opportunities, instructional exposure, and intelligence are present (Mohammed et al., 2024).

Dyscalculia is often underdiagnosed yet widely prevalent. Recent empirical studies show that children diagnosed with dyscalculia display severe challenges in understanding quantities, number magnitudes, mathematical symbols, and the logic that links these concepts together (Nwono &Wonụ, 2022; Nwoko et al., 2023). These difficulties are strongly linked to deficits in working memory, reasoning, attention processing, and executive functioning—all cognitive mechanisms essential for mathematical competence (Mohammed et al., 2024). Consequently, pupils with dyscalculia typically exhibit math anxiety, low confidence, poor academic performance, and disengagement from mathematical activities. Globally, researchers have acknowledged the importance of adopting more inclusive learning approaches that meet the needs of neurodiverse learners (UNESCO, 2020).

Identifying students with dyscalculia early is crucial because it allows for timely intervention, which can significantly improve their mathematical understanding and academic performance (Butterworth & Yeo, 2018). Early diagnosis helps tailor teaching strategies to the student's unique learning needs, reduces frustration and anxiety related to math, and supports the development of essential numeracy skills. Without identification, students may struggle silently, leading to long-term educational challenges, low self-esteem, and decreased motivation (Van Zyl, 2026).

Peer solidarity should be supported in the academic environment to meet the students' needs. The teacher's support is very crucial to dyscalculic pupils. Although several teachers have pointed out the difficulty in identifying dyscalculic pupils in their classrooms (Williams, 2013), the importance of teachers' awareness of dyscalculia was considered in this study. Consequently, Brownell et al. (2010) posit that teachers need more and adequate training to be able to shoulder the enormous task of special needs pupils. It takes only a teacher equipped and trained with adequate knowledge of dyscalculia to give a proper diagnosis, which is foremost to proffering solution and support. Teachers may not give appropriate diagnoses of dyscalculia but may observe

some of its characteristics. Thus, teachers' knowledge of specific learning disability and ability to support pupils with these learning needs exacts an important influence on what pupils can learn.

Research has been carried out and is ongoing into these learning disabilities to understand the aetiology, epidemiology and management of these learning disabilities (Grigorenko et al., 2020), but no studies were found in Nigeria. For any educational system to achieve its aims and objectives, especially as it relates to the dyscalculic pupils, it needs to identify pupils with dyscalculia and teachers who are aware of or have knowledge of dyscalculia. Teachers are concerned about the failure rate of some pupils and have expressed their helplessness to meet the needs of these pupils because they are not adequately equipped with knowledge and training to enable them to offer required assistance to these pupils with special needs or learning disabilities (Brownell et al., 2010). Some have also claimed responsibility for the pupils' failure. This call is assessing teachers' awareness and knowledge of dyscalculia, particularly in Nigeria.

Therefore, identifying students with dyscalculia is vital for bridging the mathematics achievement gap and fostering academic success. Many students may be struggling silently with math due to undiagnosed dyscalculia, leading to low self-esteem and limited future opportunities. By screening and identifying these students, educators can provide targeted support, tailored interventions, and accommodations, empowering them to excel in mathematics and related fields (Adebayo & Yusuf, 2022).

1.1 Statement of the Problem

Mathematics remains one of the most persistently challenging subjects for primary school pupils in Nigeria, particularly at the lower basic level where foundational numeracy skills are expected to be solidified. Reports from national assessments, classroom evaluations, and regional literacy–numeracy surveys consistently show that many pupils struggle with basic arithmetic, number sense, and problem-solving tasks (National Bureau of Statistics [NBS], 2021). Children with dyscalculia learning issues will definitely have some trouble with a lot of aspects of mathematics. For example, they will not have the ability to understand the notion of biggest against smallest. They will also have the limitation of understanding that the numeral 5 is actually the same meaning as the word five. Yet, in many Nigerian schools, there are few research attempts to identify students with dyscalculia. This will not only assist the teachers but also school stakeholders in supporting their students' academic proficiency.

The issue related to learning disabilities (dyscalculia) is being frequently misinterpreted by teachers as laziness, carelessness, or a lack of concentration. This misinterpretation persists largely because teachers themselves have limited awareness of dyscalculia as a distinct learning disorder. Teachers with strong awareness can recognise signs of dyscalculia early, enabling timely intervention to support affected pupils, while a lack of awareness may lead to misjudging pupils as lazy or careless. Based on the document analysis and review of the previous literature, there is a need for more empirical evidence for both the identification of dyscalculic pupils and teachers' awareness of dyscalculia in Nigeria.

2. Literature Review

2.1 Identify Dyscalculia in Primary Schools

Education at the primary school level becomes a burden when there are problems in learning. Learning becomes difficult and painful when children have reading, writing and mathematical learning disabilities due to cognitive deficit (Radhika & Kiran, 2017). These children face difficulty in performing tasks that their peers do easily, such as reading the multiplication table and doing basic arithmetic; they have a hard time doing simple calculations, while their peers can learn them easily. This is a result of what is called dyscalculia. There are different learning disabilities, but dyscalculia seems to be the major challenge affecting students mathematically, thereby reducing their thinking skills, creativity skills, and productivity in general (Mahmud et al., 2020). Dyscalculia, according to Nwabueze (2020), is a combination of two different words in Latin and Greek; namely, Latin 'dys' meaning a form of special difficulty and the Greek Word 'calculus' which means 'calculating' or counting. In other words, dyscalculia is a specific learning difficulty that affects the acquisition of numerical understanding, arithmetic skills, and mathematical reasoning despite adequate intelligence and conventional instruction (Butterworth et al., 2011).

A dyscalculia is characterised as a disorder in one or more of the essential learning processes required in comprehension or in utilising language, spoken or written, that may show difficulties in influencing the capacity to listen, read, write, spell, or do arithmetic. Someone living with dyscalculia will have difficulty in the areas of math reasoning, computation (addition, subtraction, multiplication and division), mathematics memory, mathematics writing, sequencing and mathematics speaking, as well as visual-spatial orientation. Dyscalculia can be a serious obstacle to learning in the classroom and often manifests itself even when doing other tasks, not directly related to calculations that require logical thinking. In Nigeria, both at the primary and secondary levels, mathematics is seen as one of the most difficult subjects, and therefore students tend to fear being engaged in it (Okafor & Anaduaka, 2013). Nigeria has been recording a high rate of failures by students in mathematics; these failures may result from a learning disability called dyscalculia (Ogeogbunam et al, 2022).

Mathematical educators worried that although 90% of kids want to go to college, paradoxically, 50% of them also want to drop out of mathematics classes due to the difficulty they experience during the learning process (Ogeogbunam et al, 2022). Some categories of learning disabilities are dyslexia, dyscalculia, and dysgraphia. Pupils with dyscalculia face difficulties when it comes to learning, as they are slower than their peers of the same age (Intriago et al., 2021). Students find it difficult to discuss their problems with their guardians or teachers; therefore, there is a need to help detect these children and offer help in the best possible way, so they can function just as their peers do in all-day activities. Uzairu et al. (2022) reported that many primary school teachers lack both the theoretical knowledge and practical assessment skills required to identify dyscalculia in the classroom. As a result, pupils with dyscalculia remain undiagnosed, unsupported, and vulnerable to long-term academic setbacks.

Many countries, including the United Kingdom, the United States of America, Canada, Australia, China, and Malaysia, are trying to investigate and identify pupils with dyscalculia. For example, the governments and some non-governmental organisations in the United Kingdom are

working hard to assess students with dyscalculia and ensure they get what they desire. Similarly, in Malaysia, the government, in collaboration with universities, are making an effort to identify dyscalculic pupils and provide a lasting solution for them by developing educational games to support their learning activities. Also in Malaysia, researchers used a computer-based dyscalculia screener to identify pupils with dyscalculia, and it was reported that the prevalence rate was 5.5% of the primary school students who suffered from dyscalculia (Aquil & Ariffin, 2020). Likewise, in Canada and the United States of America, various approaches are being employed to identify and address dyscalculia, including mathematics intervention (supplemental instruction), accommodation (modified assignment, calculators), and assistive technology.

Moreover, a study adopted screening approaches to identify pupils with dyscalculia before intervention. Olatoye and Aderogba (2018) identified primary school pupils with dyscalculia in Abuja using diagnostic mathematics tests and intelligence measures before exposing them to explicit instruction and concrete–representational–abstract (CRA) strategies. Researchers claimed to have identified pupils with learning disabilities (including dyscalculia) before implementing multisensory instructional strategies (Palacios, 2025); however, the techniques they used were not clearly stated. Olagunju et al. (2015) employed a combination of the Myklebust Pupil Rating Scale, Slosson Intelligence Test, and a Mathematics Achievement Test to differentiate pupils with dyscalculia from those with general low achievement. The review confirmed the existence of dyscalculia among Nigerian primary school pupils, and it often co-occurs with other learning difficulties. Consequently, it was observed that there is an absence of standardised dyscalculia screening tools adapted to the Nigerian context. Therefore, this study uses a 15-item diagnostic test adapted from Butterworth (2002). This tool assesses core numerical competencies such as number sense, quantity comparison, basic arithmetic operations, and symbolic number recognition.

2.1 Teachers' Awareness of Dyscalculia

Understanding dyscalculia helps teachers adapt their instructional methods to meet the specific learning needs of pupils with mathematics difficulties. It equips teachers to foster a more inclusive classroom, where all learners, regardless of their challenges, can thrive, and with the right support from knowledgeable teachers, pupils with dyscalculia can develop confidence and perform better in mathematics (Okafor & Anaduaka, 2013). The problem of dyscalculia has been a major issue in our education system, which implies that teachers are not very aware of the factors responsible for it, and they themselves may even have been victims of it; hence the need to investigate teachers' awareness and knowledge of dyscalculia at the basic education level in some selected primary schools in Kebbi State.

In Nigeria, a study conducted by Ogoegbunam et al. (2022) reported that over 150 primary school teachers in Rivers State had limited awareness and conceptual understanding of dyscalculia. Many respondents were unfamiliar with its symptoms, causes, or recommended intervention strategies. Consequently, many pupils with dyscalculia pass through the school system without receiving specialised support, leading to ongoing struggles with basic mathematical tasks, declining self-efficacy, and cumulative academic underachievement (Anjum et al., 2023). In a related study, the results showed that 57.5% of the 80 respondents in Sandakan did not know dyscalculia (Fu &Chin, 2017). However, Esendemir (2025) reported that a study was conducted

to determine the awareness levels of 103 teachers regarding dyscalculia. Based on the findings, teachers demonstrated an overall moderate-to-high level of awareness regarding dyscalculia.

Research conducted by Longjohn and Sililayefa (2019) revealed that most teachers lacked sufficient awareness of dyscalculia as a distinct learning disorder. Many teachers could not differentiate between poor performance due to general academic struggles and performance affected by cognitive difficulties related to number processing and mathematical reasoning. As a result, pupils with dyscalculia were often mislabeled as lazy or unintelligent, which could negatively affect their self-esteem, motivation, and academic progress. Furthermore, the researchers argued that teachers' awareness of dyscalculia in dyscalculia remained under-explored in the Nigerian context. As such, this study explores two research objectives:

1. To identify pupils with dyscalculia in primary schools in Nigeria
2. To examine the teacher's awareness of pupils with dyscalculia in primary schools in Nigeria

3. Research Methods

The study adopted the descriptive survey design. This design involves the collection and analysis of numerical data to describe phenomena and assess the simple mean, standard deviation, and frequency or percentage. Two thousand five hundred and forty-one (2541) primary school pupils from selected primary schools comprise the population. The selection of pupils for the study was based on quantitative evidence obtained from their previous academic records in mathematics. Two hundred and sixty-one (261) primary pupils who met the predetermined performance criteria were selected and administered the research instrument. For teachers' awareness, one hundred and fifty (150) teachers from selected primary schools comprise the population. A census sampling was employed to include all the teachers because the population of the mathematics teachers in those selected schools was small (N = 115) and manageable. This ensures complete coverage and eliminates sampling errors. Allowing for an accurate description of the entire population.

3.1 Instrument.

The primary instrument for identifying pupils with dyscalculia was a 15-item diagnostic test adapted from Butterworth (2002). This tool assesses core numerical competencies such as number sense, quantity comparison, basic arithmetic operations, and symbolic number recognition. The validity of this instrument was established by three experts from special education and educational measurement. The reliability coefficients obtained through the Cronbach Alpha estimate were .842.

For the teacher's awareness, the data was collected through a validated questionnaire titled dyscalculia awareness assessment scale (DAAS). The instrument has two sections. Section A consists of information on the demographics of the respondents, while Section B contain 18 items measuring teachers' awareness of dyscalculia. The instrument has five sub-constructs, including knowledge of identification, characteristics, baseline assessment, curriculum adaptation, and individualised education plan. The validity of this instrument was established by three experts from special education and educational measurement. The reliability coefficients measured using the Cronbach Alpha estimate were .811. Before collecting the data, researchers requested permission and consent from the school administrations and the teachers themselves. The data collected was analysed using descriptive statistics.

4. Results

4.1 Demographic Information

Table 1 below explains the demographic information of the four primary pupils. The sample comprised 250 pupils, with a gender distribution of 54.0% male (n = 135) and 46.0% female (n = 115). Age was categorised into three groups: 7–8 years 44.0%, n = 110), 8–9 years 30.8%, n = 77), and 9 years and above 25.2%, n = 63).In summary, the pupil demographic profile indicates a sample that is gender-balanced and predominantly composed of younger primary school pupils.

Table 1: Pupils Demographic Data

S/N	Response	Frequency	Percentage
1.	**Gender**		
	Male	115	54.0
	Female	135	46.0
	Total	**250**	**100**
2.	**Age of Respondents**		
	7-8 Years	110	44.0
	8-9 Years	77	30.8
	9 and Above Years	63	25.2
	Total	**250**	**100**

Source: Field work (2025)

Table 2 presents the demographic characteristics of the 112 teachers who participated in the study. There were 53 male teachers (47.3%) and 59 female teachers (52.7%). Participants' ages were distributed across four categories: 29 teachers (25.9%) were under 25 years, 30 teachers (26.8%) were aged 25–30 years, 26 teachers (23.2%) were aged 30–40 years, and 27 teachers (24.1%) were 40 years and above.

Table 2: Teachers' Demographic Information

S/N	Response	Frequency	Percentage
1.	**Gender**		
	Male	53	47.3
	Female	59	52.7
	Total	**112**	**100**
2.	**Qualification**		
	B.Ed.	18	16.1
	HND	23	20.5
	NCE	25	22.3
	ND	17	15.2
	SSCE	29	25.9
	Total	**112**	**100**
4.	**Years of Working Experience**		
	1-5 Years	31	27.7
	6-10 Years	22	19.6
	10 Years and Above	30	26.8
	< 1 Year	29	25.9

Total	**112**	**100**

Source: Field work (2026)

Teachers' qualifications varied: 29 teachers (25.9%) held the Senior Secondary Certificate Examination (SSCE), 25 teachers (22.3%) possessed the Nigeria Certificate in Education (NCE), 23 teachers (20.5%) held a Higher National Diploma (HND), 18 teachers (16.1%) held a Bachelor of Education (B.Ed.), and 17 teachers (15.2%) held a National Diploma (ND). Teaching experience ranged from less than one year to over ten years: 29 teachers (25.9%) had less than one year of experience, 31 teachers (27.7%) had 1–5 years of experience, 22 teachers (19.6%) had 6–10 years of experience, and 30 teachers (26.8%) had more than ten years of experience. The demographic profile suggests that the sample represents teachers of different genders, ages, qualifications, and experience levels, which may enhance the generalizability of findings to similar teacher populations in comparable educational settings.

Research Objective 1: To identify pupils with dyscalculia in primary schools in Nigeria

Table 3 presents the distribution of dyscalculia status among 250 primary school pupils in the selected schools in Nigeria, Kebbi State. The results indicate that 188 pupils (75.2%) were identified as having dyscalculia, while62 pupils (24.8%) were identified as not having dyscalculia.

Table 1: Simple percentage analysis of primary school pupils with dyscalculia

Responses	Frequency	Percent
Dyscalculia	188	75.2
Not Dyscalculia	62	24.8
Total	**250**	**100.0**

Source: Field work (2026)

Research Objective 2: To examine the teacher's awareness of pupils with dyscalculia in primary schools in Nigeria

Table 4 presents the distribution of teachers' self-reported awareness of dyscalculia among 112 teachers in basic Education schools in Kebbi State. The data reveal that 84 teachers (75.0%) reported having no knowledge of dyscalculia, 22 teachers (19.6%) identified as knowledgeable, and 6 teachers (5.4%) were unsure of their knowledge level.

Table 2: Teachers' Awareness of Dyscalculia

Responses	Frequency	Percent
Aware	22	19.6
Not Aware	84	75.0
Not Sure	6	5.4
Total	**112**	**100.0**

Source: Field work (2025)

5. Discussion of Findings

Findings reported that a significant number of primary school pupils in Nigeria exhibit indicators consistent with learning difficulty in mathematics. This implies that dyscalculia is not a rare or marginal condition within the educational context studied, but rather a widespread pedagogical

challenge affecting quite a number of students. The observed frequency rate of 75.2% substantially exceeds rates reported in most international literature. Previous research has typically estimated dyscalculia prevalence between 3–7% in general school populations (Butterworth, 2019; Shalev & von Aster, 2018). The higher rate found in this study may be a result of assessment methodology differences. For example, the screening instruments and diagnostic criteria employed in this study have captured a broader spectrum of mathematical difficulties than other instruments used in previous research. The high percentage also indicates systemic challenges in mathematics instruction, limited early intervention programs, or inadequate teacher preparation for identifying and addressing mathematical learning difficulties in the studied region (Intriago et al., 2021).

This study is aligned with previous findings that a significant number of students showed signs of mathematical learning difficulties. For instance, a study conducted by Okafor and Anaduaka, 2013) in primary schools found that 68.3% of pupils performed below grade level in basic numeracy skills, suggesting widespread mathematical learning challenges in certain educational environments. However, this study contrasts with a study which uses a large-scale screening study to identify pupils with dyscalculia and results showed that it identified only 5.8% of primary pupils as having significant mathematical learning difficulties (Aquil & Ariffin, 2020). Similar research conducted by Ogeogbunam et al. (2022) reported that only 6.2% of students identified as dyscalculic. This disparity highlights that the high rate in the present study may reflect not only individual neurological variations but also instructional quality, curriculum appropriateness, and educational resource availability.

Research showed that the majority of the teachers in Nigeria, Kebbi State in particular, do not have adequate awareness of children with dyscalculia. Teacher's awareness of characteristics of the pupil with dyscalculia. The participants had very little specific knowledge of dyscalculia. This is also an indication that most of the teachers do not have sufficient knowledge of the characteristics, symptoms, and intervention strategies for dyscalculia. This finding suggests a substantial deficiency in professional preparation and ongoing training related to mathematical learning difficulties, which may have significant implications for the identification, support, and academic outcomes of students with dyscalculia. Beyond the teacher's awareness, it appears that very little is known about teachers' knowledge and their skills to efficiently teach students with dyscalculia, although currently the presence of students with dyscalculia in school classrooms is increasing.

This is in line with a study by Sousa et al. (2017), who assessed teachers' awareness of dyscalculia. The results showed that most of the teachers have no knowledge of the characteristics of children with dyscalculia. Likewise, previous studies confirmed that the majority of teachers were found to have poor awareness and knowledge of the meaning, causes and characteristics of dyscalculia (Kunwar et al., 2021). Similarly, as stated by Fu and Chin (2017), the teachers in Malaysia have a low level of awareness of dyscalculia, as 57.5 % of the teachers did not know what dyscalculia actually is and had limited knowledge of the characteristics of dyscalculia, with the topic of dyscalculia rarely being discussed in their teaching field. Teachers who are limited or unaware of dyscalculia may not implement evidence-based instructional strategies known to support pupils with learning disabilities, such as concrete-representational-abstract sequencing or systematic explicit instruction. The empirical knowledge gap identified in this study aligns with international research documenting limited teacher awareness of specific learning disabilities

beyond dyslexia. For example, a study reported that only 28% of primary teachers in Ireland could accurately define dyscalculia (O'Rourke & Houghton, 2020), and research in Australia indicated that more than 70% of teachers expressed low confidence in identifying mathematical learning disabilities (Skues & Cunningham, 2011).

6. Limitation and Future Direction

This study has limitations, including a small sample size, which may limit the researcher's ability to generalise the results to all learning situations. The data were mainly quantitative. Future research should incorporate quantitative and qualitative data. Additionally, future research should explore the relationship between teacher knowledge and student outcomes, examining whether increased awareness of dyscalculia translates to improved identification, appropriate interventions, and better mathematical achievement for affected students. Comparative studies across different educational systems could identify effective approaches to developing teacher expertise in mathematical learning disabilities.

7. Conclusion

The majority of the participants (pupils) in this study exhibit symptoms of dyscalculia; they have serious learning difficulties in mathematics, and always perform below average. For teachers, a significant number of them were found to be unaware of what dyscalculia is all about; their knowledge on the identification of children with dyscalculia was relatively low; they had no idea about early classroom intervention for pupils with dyscalculia. The findings underscore the need for enhanced teacher training in identifying and supporting pupils with mathematical learning difficulties. Regular professional development in evidence-based mathematics interventions appears crucial.

8. Recommendations

1. The government and non-governmental organisations should organise teachers' capacity building specifically designed to meet the increasing need for teachers with competence in educating children with this disability.
2. Educators should provide a workable collaborative framework to ease the challenges of educating children with this disability in Nigeria.
3. The government should come up with a policy making it mandatory for teachers' training colleges to include dyscalculia and other learning disabilities as a course to be taken during teachers' training.

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