# *Awareness of Dyscalculia Among Educators and Stakeholders in Malaysia*

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***Abstract*— Despite the growing recognition of dyscalculia as a significant learning difficulty, awareness among educators remains a concern. This study delves into the awareness of dyscalculia among educators in Malaysia, aiming to shed light on its prevalence and implications for students' learning outcomes. Employing a survey methodology, data were collected from 153 educators and stakeholders across various fields. Descriptive statistics were utilized to analyze the data. The findings reveal that as of 2023, a staggering 47.1% of respondents in Malaysia still lack awareness of dyscalculia. This highlights a crucial gap in understanding within the educational community, potentially hindering support for students with dyscalculia. These results underscore the urgent need for targeted interventions to enhance dyscalculia awareness among educators. Addressing this gap could lead to improved identification and support for students with dyscalculia, ultimately enhancing educational equity and outcomes. This study underscores the importance of incorporating dyscalculia awareness into educational policy and practice to ensure inclusive and effective learning environments for all students.**

***Keywords: Dyscalculia, Awareness, Educators, Stakeholders***

## I. INTRODUCTION

Dyscalculia is a specific learning disability that affects a person's ability to understand and process numerical and mathematical concepts (Butterworth, 2019). Individuals with dyscalculia have difficulty with number sense, counting, arithmetic operations, and mathematical reasoning (Butterworth, 2019). Unlike a lack of mathematical skills that can be remedied with practice, dyscalculia is a neurodevelopmental disorder that requires specific interventions (Fu, 2023) and accommodations (Butterworth, 2019). It is estimated that around 5-7% of the population is affected by dyscalculia (Butterworth, 2019).

Dyscalculia is often misunderstood and overlooked, leading to frustration and low self-esteem in individuals who struggle with math (Kunwar & Sharma, 2020). It is important to recognize that dyscalculia is not a reflection of intelligence or effort, but rather a brain-based condition that affects how the brain processes and understands numbers (Kunwar & Sharma, 2020). By understanding what dyscalculia is and how it impacts learning, we can better support individuals with this learning disability (Kunwar & Sharma, 2020).

Dyscalculia manifests differently in individuals, and not everyone exhibits the same challenges. Common signs include difficulty with number concepts, such as recognition, counting, and understanding relationships (Hornigold, 2017; Chinn, 2020). Calculations like addition, subtraction, and multiplication pose challenges, often requiring reliance on counting aids (Hornigold, 2017; Chinn, 2020). Spatial and temporal concepts, like reading clocks or estimating distances, may be problematic (Hornigold, 2017; Chinn, 2020). Word problems are particularly challenging, hindering understanding and application of mathematical operations (Hornigold, 2017; Chinn, 2020).

Individuals with dyscalculia may struggle with time comprehension and sequencing tasks (Hornigold, 2017; Chinn, 2020). It's crucial to recognize these signs early for timely intervention and necessary support (Hornigold, 2017; Chinn, 2020). Dyscalculia symptoms may evolve over time, emphasizing the importance of early identification (Butterworth, 2019; Chinn, 2020).

Research on dyscalculia has been rapidly evolving over the past few decades (Chin & Fu, 2021). This indicates a growing concern about specific learning disabilities, particularly in the context of numeracy. Dyscalculia significantly hinders math learning, impacting number sense, arithmetic operations, word problem-solving, and spatial concepts (Hornigold, 2017; Chinn, 2020). Individuals with dyscalculia struggle with recognizing numbers, performing basic operations, comprehending word problems, and understanding spatial concepts (Fu, 2023). This can lead to low self-esteem and anxiety, hindering motivation and engagement in math-related activities (Hornigold, 2017; Chinn, 2020). Targeted interventions and accommodations are crucial to support individuals with dyscalculia in overcoming these challenges and building a strong mathematical foundation (Fu, 2023). With appropriate strategies and support, individuals with dyscalculia can develop the skills needed for successful math learning (Fu, 2023).

In Malaysia, primary one school education begins at the age of seven. The primary school education curriculum emphasizes the development of basic literacy skills, including spelling, reading, writing, and numeracy (MOE, 2013). According to the Special Education Division, Ministry of Education Malaysia (MOE, 2023), official data on the category of Students with Special Needs (SEN) with specific learning disabilities in Malaysia has been continuously increasing from 2018 to 2022. Based on the Special Education Data 2022, there is a total of 105,785 students categorized as Students with Special Needs (SEN) in Malaysia. Out of these, 88,118 are SEN students categorized as having specific learning disabilities, which is 83.3% of the total SEN population (MOE, 2023). In this case, the government has taken the initiative to increase investment in physical resources and special education for SEN students with specific needs in the early years (MOE, 2013). In line with that, SEN students with specific learning disabilities need early intervention, and teachers must ensure that every student with dyscalculia has the opportunity to learn according to their needs (Adawiah Dzulkifli, 2023).

Supporting students with dyscalculia is a collaborative effort that involves coordination among teachers, parents, and educational professionals (Deruaz et al., 2020). Hudson & English (2016) indicated that teachers should be sensitive, understanding, and supportive to those pupils with dyscalculia and not think they are stupid or lazy. To create an effective support system, it is crucial to establish a positive learning environment where students feel safe to take academic risks and ask questions, fostering a growth mindset that prioritizes effort and progress over grades (Deruaz et al., 2020). Teachers can enhance instruction by breaking down mathematical concepts into manageable steps, using clear explanations, visual aids, and real-life examples. Offering students frequent opportunities for practice in various contexts, such as real-life situations, games, and hands-on activities, is essential for developing strong mathematical skills. Employing multi-sensory approaches, including visual, auditory, and kinaesthetic activities, enhances the learning process (Hornigold, 2017; Chinn, 2020). Celebrating small victories and recognizing progress helps instil a growth mindset, emphasizing effort and improvement. Open lines of communication between teachers, parents, and other professionals are vital for sharing updates on student progress, discussing strategies, and collaborating on the necessary support and accommodations (Deruaz et al., 2020). Through these collective efforts, teachers and parents can empower students with dyscalculia to overcome math difficulties and succeed academically.

Recent studies have emphasized the importance of dyscalculia awareness initiatives and interventions in educational settings. For instance, Kunwar & Sharma (2020) conducted a study in basic-level schools in Nepal involved 150 teachers and 500 students from Ilam Municipality, finding inadequate teacher awareness of dyscalculia, with no significant associations between awareness and

demographic factors except for teaching experience. It revealed 6.8% of students were dyscalculic, underscoring the need to improve teacher knowledge for better identification and support of dyscalculic learners.

Similarly, Asiya and Dayan (2023) explored 364 primary school teachers' awareness of dyscalculia factors in District Mardan, KP, Pakistan. Findings showed varying awareness levels, with higher awareness of dyscalculia factors but lower awareness of teaching methods and curriculum issues. Recommendations include incorporating ICT in mathematics teaching training, enhancing curriculum content, and organizing regular seminars and workshops for teachers to better support students with dyscalculia.Moreover, understanding dyscalculia within the context of intersectionality with other learning disabilities or cognitive challenges is crucial. Research by Crisci et al. (2021) examined the overlapping manifestations of dyscalculia with dyslexia and attention deficit hyperactivity disorder (ADHD), underscoring the need for holistic approaches to assessment and intervention that address the diverse needs of students with comorbid conditions. In addition, initiatives such as assistive technology (AT) have surfaced as promising frameworks, emphasizing its significance in facilitating educational access for students with disabilities. This framework offers educators recommendations to seamlessly integrate AT into educational frameworks, acknowledging its differentiation from educational technology and catering to the unique requirements of students with learning disabilities. By advocating for adaptable instructional strategies and offering various avenues for representation, expression, and engagement, AT accommodates the diverse learning needs of all students, including those with dyscalculia (Schmeisser & Courtad, 2023). In summary, recent research highlights the importance of dyscalculia awareness initiatives and interventions in educational settings, as well as the significance of understanding dyscalculia within the broader context of intersectionality with other learning disabilities. Incorporating these perspectives into educational policy and practice is essential for creating inclusive learning environments that support the diverse needs of all students, including those with dyscalculia.

In Malaysia, according to Chin et al. (2014), a pilot study indicates that approximately 5.5% of primary school children show signs of dyscalculia in Malaysia. Additionally, teachers in Malaysia have a low level of awareness of dyscalculia, with 57.5% of teachers not knowing what dyscalculia is and having limited knowledge of dyscalculia characteristics, as dyscalculia topics are rarely discussed in their teaching field (Fu & Chin, 2017). After seven years, this study aims to 1. find out the information of the educator and stakeholders' awareness about their dyscalculic. 2. To investigate the educator and stakeholders' knowledge towards dyscalculia in relation to gender, school type, educational qualification, and teaching experiences. Hence, this study seeking to answer two specific research questions as follows: 1. What is the level of dyscalculia awareness of educators and stakeholders in Malaysia? 2. To what extent does the educator and stakeholders' knowledge towards dyscalculia in relation to gender, school type, educational qualification, and teaching experiences?

## II. METHODS

This study was guided by a conceptual framework rooted in the understanding of dyscalculia as a specific learning difficulty, influenced by cognitive and educational psychology theories (Geary, 2004). The operationalization of constructs involved defining dyscalculia awareness as the understanding of symptoms, causes, and effective strategies for supporting students with dyscalculia. Variables related to dyscalculia awareness were measured through a survey instrument adapted from established scales and literature on dyscalculia assessment and teacher knowledge. The study has adopted the quantitative survey design to investigate the educator and stakeholders' knowledge about dyscalculia in Malaysia. The survey design was used in the light of the nature of this study to accomplish the objectives of the study. The instrument had been adapted from Dyscalculia questionnaire by Fu & Chin (2017). The researcher had administered a survey questionnaire through

the platform of Google Form to 153 educators and stakeholders. Google Form is selected as a medium to distribute the survey as it is the most suitable and convenience medium.

To operationalize dyscalculia awareness, the survey included items assessing teachers' knowledge of dyscalculia symptoms, causes, and evidence-based interventions. Additionally, demographic variables such as teaching experience, educational qualifications, and school type were included to explore potential factors influencing dyscalculia awareness among teachers. The survey instrument underwent rigorous validation procedures, including expert review and pilot testing, to ensure reliability and validity. In this study, simple random sampling technique was employed to investigate the educator and stakeholders' awareness on dyscalculia and some knowledge about dyscalculia in Malaysia. During this study, 153 respondents from various field and expertise, and including both male and female educators and stakeholders in different states in Malaysia were selected as the sample for this study.

This study employed random sampling methodology to ensure the representativeness of the sample from government and private learning institutions across four states in Malaysia: Johor, Penang, Kuala Lumpur, and Sabah. This approach aimed to capture a comprehensive understanding of dyscalculia awareness among educators in different types of learning institutions, considering the reliability and validity of the findings (Mertler, 2021), providing valuable insights into dyscalculia awareness across diverse educational settings in Malaysia. By including institutions from Johor, Penang, Kuala Lumpur, and Sabah, the study sought to provide insights into potential regional differences in dyscalculia awareness and support practices. While random sampling enhances the generalizability of findings, it is important to acknowledge potential limitations, such as variations in institution size and urban-rural distribution (Mertler, 2021). Researchers mitigated these limitations by stratifying the sample based on geographic location to ensure adequate representation across different contexts within each state.

In summary, the theoretical basis of the study encompassed principles of inclusive education, recognizing dyscalculia awareness as fundamental to creating equitable learning environments. Drawing upon socio-cultural theories of learning, the study aimed to explore how teachers' understanding of dyscalculia influences their instructional practices and support for students with dyscalculia. The methodology of this study was informed by a conceptual framework grounded in cognitive and educational psychology theories, with dyscalculia awareness operationalized through a validated survey instrument. The study also considered demographic variables and theoretical principles of inclusive education to provide a comprehensive understanding of dyscalculia awareness among teachers.

This study focuses on examining the awareness of dyscalculia among educators and stakeholders in Malaysia. The survey, which included 153 respondents, revealed that 91.5% of the participants were female, while 8.5% were male. The age group distributions indicated that among the respondents, 37.9% fell within the age range of 21-30 years, another 37.9% were in the 31-40 years range, 18.3% were within 41-50 years, and 5.9% were in the 51-60 years range. This breakdown provides insights into the age demographics of the surveyed individuals. The survey respondents consisted of various professionals and individuals from different backgrounds. Among them, 96 academic teachers represented the largest group, comprising 62.7% of the respondents. The distribution also included occupational therapists (8), JPN Officers (2), headmasters (5), lecturers (5), parents (10), undergraduate students (7), clinical psychologists (2), special needs educators (3), KPM officers (5), teacher assistants (1), school administrators (2), educational therapists (1), speech language therapists (1), psychologists (2), kindergarten owners (1), early childhood teachers (1), and behaviour analysts (1), each making up a varying percentage of the total respondents. The distribution of participants across the states was as follows: 36 participants (23.5%) were from Johor, 51 participants (33.3%) were from Kuala Lumpur, 35 participants (22.8%) were from Penang, and 31 participants (20.4%) were from Sabah. These educators represented a diverse range of roles and levels within their

respective institutions, including primary and secondary school teachers, special education teachers, and educational administrators. In terms of teaching experience, the respondents exhibited a diverse range. Specifically, 48.4% had less than 5 years of teaching experience, 29.4% had no more than 10 years, 19.6% had no more than 20 years, and a smaller percentage, 2.6%, had less than 30 years of teaching experience. This distribution highlights a variety of teaching backgrounds and expertise among the participants. In terms of academic qualifications, the respondents exhibited diverse educational backgrounds. Specifically, 4.6% individuals held a Ph.D., 20.9% had a master's degree, 42.5% held a bachelor's degree, 21.6% had a diploma, and 10.5% held certificates. This varied distribution reflects the educational diversity among the survey participants.

*Table 1. Demographic data of respondents*

| Aspect | | Percentage (%) | Number of Respondents |
|---|---|---|---|
| Gender | Male | 8.5% | 13 |
| | Female | 91.5% | 140 |
| Age Group | 21- 30 years old | 37.9% | 58 |
| | 31-40 years old | 37.9% | 58 |
| | 41-50 years old | 18.3% | 28 |
| | 51- 60 years old | 5.9% | 9 |
| Position | Academics teachers | 62.7% | 96 |
| | Non-academic teachers | 37.3% | 57 |
| States | Johor | 23.5% | 36 |
| | Kuala Lumpur | 33.3% | 51 |
| | Penang | 22.8% | 35 |
| | Sabah | 20.4% | 31 |
| Teaching Experience | < 5 years | 48.4% | 74 |
| | < 10 years | 29.4% | 45 |
| | < 20 years | 19.6% | 30 |
| | < 30 years | 2.6% | 4 |
| Highest Academic Level | PhD | 4.5% | 7 |
| | Master | 20.9% | 32 |
| | Bachelor | 42.5% | 65 |
| | Diploma | 21.6% | 33 |
| | Certificate | 10.5% | 16 |

## III. RESULTS AND DISCUSSION

The The findings from the first item, which inquired about awareness of dyscalculia (i.e., "Do you know what dyscalculia is?"), revealed that 47.1% (72 respondents) answered "NO," indicating a lack of awareness, while 52.9% (81 respondents) responded with "YES," indicating awareness of dyscalculia. The data reveals that 47.1% of respondents lacked awareness about dyscalculia. Notably, there is a positive trend, with a 10.4% increase in awareness among educators and stakeholders in Malaysia compared to the 2017 data, where 57.5% of educators in Sabah, Malaysia, had no knowledge of dyscalculia (Fu & Chin, 2017). This improvement signals a growing awareness and understanding of dyscalculia, suggesting an increased focus on supporting dyscalculic students in mathematics lessons. It serves as a call for the Malaysia Ministry of Education and non-government organizations to persist in addressing the issue of educators with insufficient exposure to dyscalculia, emphasizing the necessity for training to meet the unique learning needs of dyscalculic pupils.

The second aspect focused on the awareness of dyscalculia, inquiring whether the subject was covered during participants' teacher training programs in college. Surprisingly, 68.5% of respondents answered in the negative, indicating a limited exposure to dyscalculia during their teacher training. In contrast, a noteworthy 31.5% of respondents reported having encountered the topic during their time in teacher training colleges. This revelation underscores the need for increased attention and

integration of dyscalculia education within teacher training curricula. In addressing Item 3 of the questionnaire, participants were queried on the inclusion of dyscalculia in their continuous professional development courses. The findings mirrored those of the preceding item, with a significant 72.5% of respondents asserting the absence of dyscalculia discussions in their continuous professional development courses. Conversely, a mere 27.5% acknowledged exposure to the topic during their ongoing professional development endeavors. These results underscore a prevailing gap in addressing dyscalculia within professional development courses, highlighting the potential need for greater emphasis on this crucial aspect of educational training.

Interestingly, 42.5% of the respondents expressed the belief that dyscalculia was synonymous with mathematics anxiety, while 57.5% disagreed with the statement presented in Item 4. This divergence in perspectives highlights the varying interpretations and understanding among participants regarding the relationship between dyscalculia and mathematics anxiety. The results suggest a need for clarification and a deeper exploration of these concepts to foster a more accurate comprehension within the educational community. In response to the question, "Which of the following can be signs of dyscalculia?"—a multiple-choice item, 3.3% of respondents identified difficulty telling left from right as a potential sign, 7.8% associated dyscalculia with trouble remembering phone numbers, and 2.6% linked it to difficulties in keeping track of time. Strikingly, a significant 86.3% of participants believed that all the aforementioned symptoms were indicative of dyscalculia. This overwhelming majority underscores a widespread perception among respondents associating a range of challenges with dyscalculia, indicating the need for a nuanced understanding of its diverse manifestations.

Notably, 41.8% of respondents found it intriguing to consider dyscalculia as extremely rare among children, while a majority of 58.2% disagreed with this perspective. This divergence in opinions suggests varying perceptions among participants regarding the prevalence of dyscalculia in the context of childhood. It underscores the importance of further exploration and awareness-building to foster a more informed understanding of the occurrence of dyscalculia among children within the educational community. Indeed, research indicates that dyscalculia affects approximately 4-6% of the population, challenging the perception that it is an extremely rare condition among children in classrooms (Luoni et al., 2022). This estimation suggests that, on average, at least one child in a typical classroom may be impacted by dyscalculia. The prevalence underscores the importance of recognizing and addressing dyscalculia as a relatively common learning difficulty, emphasizing the need for heightened awareness and tailored support strategies in educational settings. In response to Item 7, which queried, "Which of the following terms for dyscalculia are you most likely to hear in your child's school?"—60.1% of respondents indicated "specific learning disability in mathematics," 24.2% mentioned "mathematics dyslexia," and 15.7% referred to it as "mathematics disorder." These responses shed light on the varying terminologies used to describe dyscalculia within educational settings. The prevalence of the term "specific learning disability in mathematics" suggests its prominence in discourse surrounding dyscalculia within the surveyed community. In response to Item 8, which asserted, "There's no sure test to diagnose dyscalculia," 59.5% of respondents concurred with the statement, indicating the prevailing belief that there is no definitive test to diagnose dyscalculia. This perspective suggests a widespread awareness among participants about the challenges associated with conclusively diagnosing dyscalculia, highlighting the need for further research and education on effective assessment methods in the field.

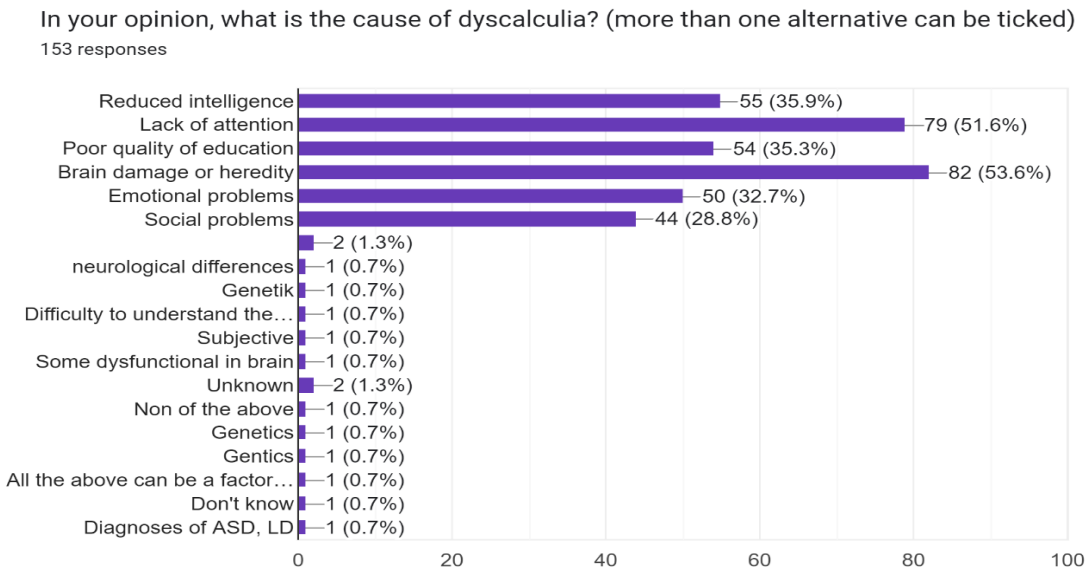
In response to Item 9, inquiring whether "Kids outgrow dyscalculia," an intriguing 45.8% of participants believed that children can indeed outgrow dyscalculia. Furthermore, 26.1% of respondents asserted that signs of dyscalculia didn't manifest until they commenced their schooling. These varied perceptions emphasize the need for increased awareness and understanding of the developmental trajectory of dyscalculia, shedding light on differing perspectives within the surveyed group regarding its prevalence and potential resolution over time. The majority of respondents (69.9%) acknowledged in response to this item that they have never encountered situations during their professional careers that led them to suspect the presence of dyscalculia. This prevailing

sentiment among professionals underscores the potential under recognition or lack of awareness regarding dyscalculia in educational settings. It signals a need for increased training and awareness initiatives to equip educators with the skills to identify and address dyscalculia-related challenges in their students.

In an unexpected revelation during the analysis of the item that queried, "Do you think that you are able to identify a child with dyscalculia in your class?" a noteworthy 43.8% of respondents expressed confidence in their ability to identify a child with dyscalculia. Educators and stakeholders must possess the ability to early detect symptoms of dyscalculia and, if necessary, refer affected pupils to clinical psychologists for a comprehensive diagnosis. Lacking awareness and knowledge about dyscalculia could lead educators and stakeholders to mislabel dyscalculic pupils as lazy when they struggle with mathematics, potentially causing these pupils to experience a loss of confidence or develop anxiety about learning the subject. It is imperative for professionals in the education sector to be well-informed about dyscalculia to ensure accurate identification, proper support, and a positive learning environment for affected students.

Interestingly, over half (34.6%) of them believed that a pupil with dyscalculia consistently also had dyslexia. These findings underscore the varying levels of self-perceived proficiency among educators in recognizing dyscalculia, along with a notable association made between dyscalculia and dyslexia within the surveyed group. A significant 66% of respondents indicated that they believed a pupil experiencing difficulties in measurement could potentially be exhibiting signs of dyscalculia. Notably, an even larger majority, comprising 79.7% of participants, felt that a pupil struggling with sequencing elements might also be indicative of dyscalculia. These perceptions emphasize the importance of recognizing diverse manifestations of dyscalculia, including challenges related to measurement and sequencing, and underscore the need for heightened awareness and training among educators. The analysis of the causes of dyscalculia, as depicted in Table 2, reveals various perceptions among 153 respondents. The majority, with 82 respondents, identified brain damage or heredity as the primary cause, closely followed by 79 respondents attributing dyscalculia to a lack of attention. Additionally, 54 participants believed poor-quality teaching contributed to dyscalculia, while 50 considered emotional problems as potential causes. Social problems were cited by 44 respondents. Furthermore, 55 respondents expressed a belief in other contributing factors, highlighting the multifaceted nature of perceived causes associated with dyscalculia.

*Table 2 The causes of dyscalculia*



## IV. CONCLUSION AND RECOMMENDATION

Dyscalculia is a specific learning disability that affects a person's ability to understand and process numerical and mathematical concepts (Butterworth, 2019). It can have a significant impact on an individual's ability to learn mathematics and can lead to frustration and low self-esteem (Hornigold, 2017; Chinn, 2020). However, with the suitable strategies, support, and interventions, individuals with dyscalculia can overcome their mathematics difficulties (Butterworth, 2019; Hornigold, 2017; Chinn, 2020; Fu, 2023). Educators and stakeholders play important roles to detect the symptoms and tendency of dyscalculic pupils as to assists them in different learning styles.

By understanding what dyscalculia is, recognizing the signs and symptoms, and understanding the causes, we can better support individuals with this learning disability. Strategies for identifying and diagnosing dyscalculia, as well as accommodations and interventions, can help provide the necessary support for students with dyscalculia to succeed academically. With the suitable support and interventions, individuals with dyscalculia can unlock the mysteries of math and develop the skills and confidence to thrive academically and in life. However, this study found that there were 47.1 % of the respondents did not know what dyscalculia is 68.6% of the respondents stated that they never exposed to the topic of dyscalculia in teacher training colleges and there were 72.5% of the respondents claimed that dyscalculia was not discussed in their continuous professional development courses.

Expanding on the research findings, implications for educational policy and practice are significant. Regional differences in dyscalculia awareness among educators highlight the need for tailored interventions at the state level, including targeted professional development programs and resources. Additionally, integrating dyscalculia education into teacher training curricula and ensuring equitable access to support across all learning institutions are crucial steps toward creating inclusive environments for students with dyscalculia. These efforts can lead to improved identification and support for affected students, ultimately enhancing educational outcomes and promoting equity in Malaysian institutions.

It was observed that some respondents exhibited confusion between the definitions, the causes, intervention about dyscalculia. This highlights the importance of enhancing awareness and understanding among educators and stakeholders to distinguish between these two distinct challenges. Clear delineation between mathematics anxiety and dyscalculia is crucial for accurate identification, effective intervention, and providing appropriate support to individuals experiencing these conditions. In a nutshell, it can be concluded that educators and stakeholders in Malaysia still have a moderate level of awareness of dyscalculia as they had limited knowledge of the characteristics of dyscalculia and the topic of dyscalculia rarely been discussed in their teaching field. Educational initiatives and training programs can play a vital role in addressing such misconceptions and ensuring a more nuanced understanding within the educational community.

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