SOUTH ASIAN JOURNAL OF SOCIAL SCIENCES & HUMANITIES

ISSN: 2582-7065 (Online) SAJSSH, VOL 2, ISSUE 6, PP. 125-136

Malaysian Primary Teachers' Perceptions on Dyscalculia

Yoong Soo May[1], Fu Sai Hoe[2], Wong Wei Lun[3] & Lijuan Shen[4]

[1]*Department of Special Education, Sultan Idris Education University, Malaysia.*

[2]*Sandakan District Education Office, Tingkat 5, Wisma Persekutuan Beg Berkunci 02, 90400 Sandakan, Sabah.*

[3]*Faculty of Language and Communication, Sultan Idris Education University, Malaysia.*

[4]*Athena Institute of Holistic Wellness, Wuyi University, Wuyishan, China.*

Corresponding Author: Yoong Soo May, **Email:** soomayyoong@gmail.com

Received: 18th October 2021 **Accepted:** 22nd November 2021 **Published:** 4th December 2021

ABSTRACT

This study aims to examine the perceptions of primary school teachers in Malaysia regarding dyscalculia using a survey. The researchers conducted the study using a quantitative design. The survey data had been collected using a questionnaire. The survey data were analysed using descriptive and inferential statistics. The questionnaire was adapted from Chinn's (2020) checklist for dyscalculia with permission from Professor Dr. Steve Chinn. Thirty Mathematics teachers from Year One to Year Three in primary schools were randomly chosen. The severity of dyscalculia were analysed by using means and standard deviations. In contrast, independent *t*-tests were used to compare the severity of dyscalculia between school locations, and analysis of variance (ANOVA) was used to compare the severity of dyscalculia between different school types. According to teachers' perceptions, the difficulty level for dyscalculic pupils in our country is medium-high (M=3.684, σ=.994). There is no significant difference in dyscalculia severity between school locations (p=.243, p>.05). However, there is a significant difference in dyscalculia severity between school types (p=.007, p.05). Dyscalculic pupils need to be detected since primary schools. The future agenda for this study is to design and develop an instrument in order to detect the dyscalculic pupils among the population. The disparities in dyscalculia severity levels between school types and s are important for the Ministry of Education, educators, teachers, and researchers. This is because it will be useful to determine the allocations of funding and resources so that the learning capability for pupils with different learning abilities can be improved to the maximum.

Keywords: Dyscalculia, Dyscalculic Pupils, Mathematics, Learning Difficulty, Primary School, Survey, Quantitative

DOI: 10.48165/sajssh.2021.2610

INTRODUCTION

The Zero Reject Policy requires that pupils with disabilities to be educated. However, it does not specifically clarify how state and local education authorities must implement the rule of zero rejection. Often, agencies begin by evaluating pupils to determine if they have a disability and require special education (Meral & Turnbull, 2014). It is critical that all pupils, regardless of their disability, have equal access to education, which is why pupils with learning disabilities and difficulties must be included in general education (Mallanhanse, Alias, & Bidin, 2020). Effective inclusion requires parents and pupils to have confidence in their ability to get the same level of support as their peers in school and community (Hardiman, 2020).

In Malaysia, the Ministry of Education had phased in the Zero Reject Policy to ensure that pupils with special needs have access to education without additional documentation. Since the Ministry of Education Malaysia implemented the Zero Reject Policy, teachers have been expected to accommodate all pupils with special needs, including those with learning difficulties (Omar & Ali, 2019). Teaching should be handled and prepared effectively to assist pupils with learning difficulties such as dyscalculia in achieving their goals and developing into productive citizens in the future (Ahmad & Yoong, 2018).

Mathematics is an important subject in elementary schools. However, many pupils may have difficulty acquiring maths (Yoong & Ahmad, 2018). The development of mathematical abilities is a process that begins well before school starts (Aquil, 2020). Several factors that can obstruct dyscalculic pupils from learning Mathematics include their ability to work with symbols, math vocabulary, working memory, short-term and long-term memory, processing speed, sequencing, reversing, cognitive style, generalising or pattern recognition, and anxiety (Chinn, 2019). Thus, pupils with specific learning difficulties, such as dyscalculia need to be detected by the teachers in order to provide them with appropriate activities or interventions for their cognitive development.

Dyscalculia is a novel term that has to be identified and investigated more. Compared to dyslexia, research on this topic is relatively scarce (Yoong & Ahmad, 2020c). It affects between 5% and 8% of primary school pupils (Aquil & Ariffin, 2020). Numerous dyscalculic pupils in our typical classroom have not been detected (Yoong & Ahmad, 2020a). Without detecting dyscalculic pupils, they will continue to be left behind or labeled (Yoong & Ahmad, 2020b). The severity of dyscalculia must be determined to comprehend the real-world condition that exists in schools.

DOI: 10.48165/sajssh.2021.2610

Thus, three research questions in this study are: (1) What is the level of severity for dyscalculia in primary schools based on teachers' perception?; (2) Is there a significant difference for the severity level of dyscalculia between different school locations based on teachers' perception?; and (3) Is there a significant difference for the severity level of dyscalculia between different school types based on teachers' perception? Two null hypotheses of the study were; (1) There is no any significant difference for the severity level of dyscalculia between different school locations based on teachers' perception; (2) There is no any significant difference for the severity level of dyscalculia between different school types based on teachers' perception.

METHODOLOGY

This study employed a quantitative design methodology. A survey design gives a quantitative description of a population's trends, attitudes, and opinions, or tests for associations between population variables, by examining a sample of that group (Creswell & Creswell, 2018). To determine the reliability of the data, it had been analysed using SPSS version 23. Descriptive and inferential statistics were applied to describe the data.

Dyscalculia checklist (Chinn, 2020) has been adapted in this instrument with permission. The original dyscalculia checklist contains 31 items. The 11th item has been adjusted to reflect our country's currency, whereas the 31st item has been eliminated because algebra was included in the Year One to Year Three syllabus. The researchers had distributed the survey questionnaire to 30 Mathematics teachers via Google Form. Google Form is selected as a medium to distribute the survey as it is the most suitable and convenience medium during the Covid-19 pandemic in order to avoid the physical interactions among people.

Sample

Thirty teachers were chosen from three distinct types of national schools. In other words, there were ten teachers from the Malay Medium National School (SK), ten teachers from the National Type Chinese Primary School (SJKC), and ten teachers from the National Type Tamil Primary School (SJKT). Random sampling method was used to select the teachers as the sample. The teachers involved in this study were teaching Mathematics for pupils from Year One to Year Three. Besides, they are working in government national schools. The number of respondents in the survey is shown in Table 1.

DOI: 10.48165/sajssh.2021.2610

Table 1. Number of Respondents in the Study

School Type	Number of Respondents
SK	10
SJKC	10
SJKT	10
Total	**30**

This sample was drawn from these school types because these are the three main types of government national schools in our country. The same number of teachers from each school type was chosen to ensure that the sample is representative and that the findings may can be generalized to the situation of a multi-racial environment regardless of different ethnics and races.

RESULTS

The questionnaire contains 30 items. These items were adapted from Chinn's dyscalculia checklist (2020). SPSS version 23 was used to analyse the data in order to generate descriptive and inferential statistics. This section will cover three subtopics: (1) teachers' perception on dyscalculia, (2) comparison between school locations; and (3) comparison between school types.

Teachers' Perception on Dyscalculia

The teachers were asked to tick (✓) on the scale provided to express their opinions accordingly. In this five-point likert scale, 1 represents [never], 2 represents [once], 3 represents [once in a while], 4 represents [several times], and 5 represents [many times]. Table 2 shows the results on severity of dyscalculia.

Table 2. Results on Severity of Dyscalculia

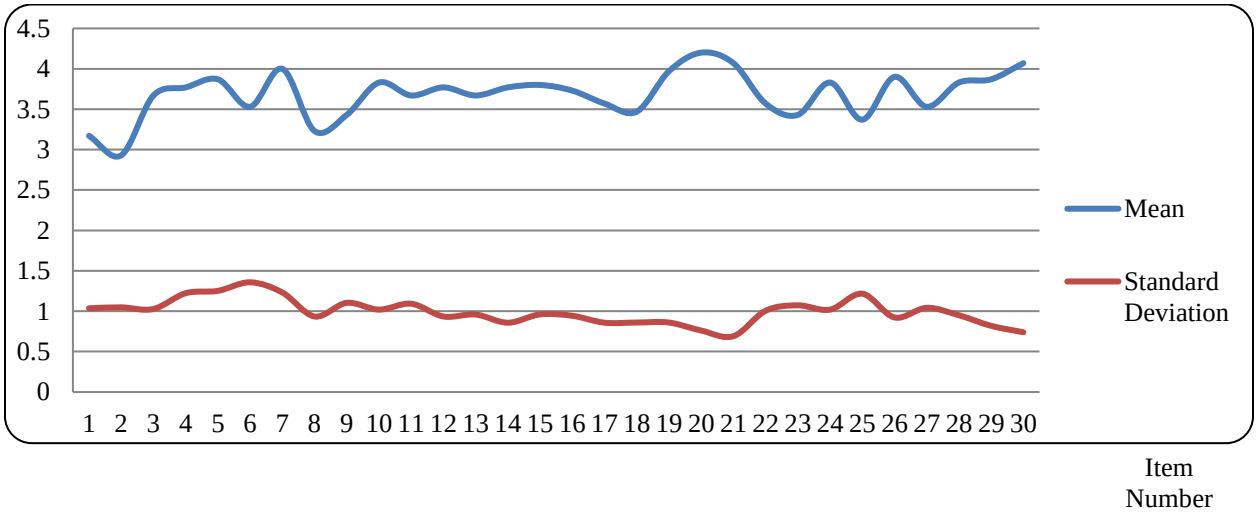
Item No.	Mean	Standard Deviation	Number of Item
1	4.20	1.037	20
2	4.07	1.048	21
3	4.07	1.028	30
4	4.00	1.223	7
5	3.97	1.252	19
6	3.90	1.358	26
7	3.87	1.232	5
8	3.87	0.935	29
9	3.83	1.104	10
10	3.83	1.020	24
11	3.83	1.093	28

DOI: 10.48165/sajssh.2021.2610

12	3.80	0.935	15
13	3.77	0.959	4
14	3.77	0.858	12
15	3.77	0.961	14
16	3.73	0.944	16
17	3.67	0.858	3
18	3.67	0.860	11
19	3.67	0.860	13
20	3.57	0.761	17
21	3.57	0.691	22
22	3.53	1.006	6
23	3.53	1.073	27
24	3.47	1.020	18
25	3.43	1.217	9
26	3.43	0.923	23
27	3.37	1.042	25
28	3.23	0.950	8
29	3.17	0.819	1
30	2.93	0.740	2
Average	**3.684**	**0.994**	

Based on the results, the 19th item has the highest mean (M=4.20), whereas the 2nd item has the lowest mean (M=2.93). On the other hand, the 6th item achieved the largest standard deviation (σ=1.358), whereas the smallest standard deviation fell on the 30th item (σ=0.740). In sum, most of the items have a mean value more than or equal to 3. There is only one item obtained the mean below 3, which is the 2nd item. The average value of standard deviation is 0.994, which was less than 1. This result shows the consistency of the data. Lastly, the Cronbach's Alpha value of these items is 0.970. Thus, the reliability is high and the items can be applied on the larger scale of respondents.

Figure 1. Mean and Standard Deviation for the Items



DOI: 10.48165/sajssh.2021.2610

The mean and standard deviation of the items are depicted in Figure 1. The blue line represented the mean score for each item, while the red line represented the standard deviation. Averagely, the range of mean scores for these 30 items is between 2.93 to 4.20. The standard deviation, on the other hand, is between 0.691 and 1.358.

Comparison Between School Locations

This survey includes 30 Mathematics teachers. Fourteen teachers (46.7 per cent) from urban schools and 16 teachers (53.3 per cent) from rural schools had completed the questionnaire. Independent *t*-tests were conducted on the data using SPSS version 23. The result of the independent *t*-test for the first null hypothesis is shown in Table 3. Levene's Test has a p-value of 0.168, which is more than.05 (p>.05), suggesting that the null hypothesis of Levene's Test is not rejected. The output with assumed equal variances has a *p*-value of 0.243, which is greater than 0.05 (p>.05). Hence, the null hypothesis was not rejected. In general, there is no significant difference for the level of problems of dyscalculia between urban and rural schools.

Table 3. Result of Independent T-test for H_{01}

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Average Mean	Equal variances assumed	2.003	.168	1.193	28	.243	.313	.263	-.225	.851
	Equal variances not assumed			1.165	22.776	.256	.313	.269	-.243	.870

Comparison between the school locations is shown in Table 4. The average mean score for difficulty level of dyscalculia in urban schools is higher (M=3.837) than the average mean in rural schools (M=3.524). Likewise, the standard deviation of urban schools is also higher (σ=0.844) than the standard deviation of rural schools (σ=0.586).

Table 4. Comparison between the School Locations

Location	N	Mean	Std. Deviation
Urban	14	3.837	0.844

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Rural	16	3.524	0.586

Comparison Between School Types

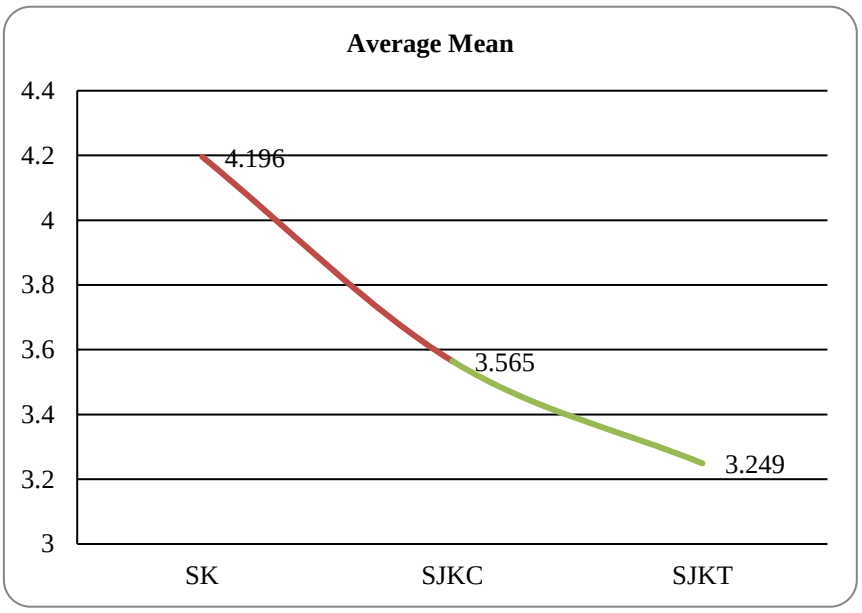
The mean scores for severity level of dyscalculia had been compared between three different school types. The *p*-value for the ANOVA test is 0.007, which is less than 0.05 ($p<.05$). Hence, null hypothesis was rejected. There is a significance difference between the severity level of dyscalculia among three different school types based on teachers' perception. Table 5 shows the results of analysis of variance (ANOVA) for the second null hypothesis.

Table 5. Results of ANOVA for H_{02}

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.649	2	2.325	5.975	.007
Within Groups	10.505	27	.389		
Total	15.155	29			

The average mean for three school types is depicted in Figure 2. The highest mean score is 4.196 at SK, the medium mean value is 3.565 at SJKC, and the lowest mean value is 3.249 at SJKT. As a result, there is a significant difference in the severity of dyscalculia among three different school types.

Figure 2. Average Means for Three School Types



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DISCUSSION

The questionnaire had been adapted according to the context in Malaysia. According to the findings, dyscalculia is prevalent among our national primary school pupils. This is notably true for the 7th, 20th and 30th item, which all received mean ratings of four or above. Item 20 is about the difficulty in mental arithmetic. This is congruent with Bird (2017), who stated that dyscalculic pupils could not recall facts and procedures precisely or consistently, regardless of how many times they attempt to memorise them. However, pupils whose face arithmetic difficulties due to environmental factors, such as inadequate instruction, lack of support, or too little practice, do not meet the criteria of dyscalculia (Aquil, 2020).

Then, the 30th item obtained a mean value of 4.07. The item was about an inability to view patterns or make generalisations. For example, a dyscalculic pupil may not able to see the fractions' sequence for 1/2, 1/3, 1/4, 1/5 as getting smaller. This is consistent with the fact that fractions are the most challenging topic in Mathematics (Chinn, 2019). The 7th item is about the difficulty to count sequences fluently especially for those less familiar one like 1, 3, 5, 7, and so on. This is supported by Khing (2016) who mentioned that dyscalculia has made difficult for the pupils to count numbers in a sequence.

Then, the severity of dyscalculia was analysed based on school location. It was discovered that urban pupils have a higher mean (M=3.837) than rural pupils (M=3.524). Wong, Pang, Chin, and Tan (2016) also discovered that urban pupils had a greater prevalence of dyscalculia (3.91%) than rural pupils (3.42 per cent). However, its independent *t*-test found a significant difference between pupils in urban and rural schools, which oppose the finding of this study that indicated no significant difference for problems of dyscalculia between different school locations.

Thereafter, there is a significant difference for severity of dyscalculia between different school types based on teachers' perception. Previous study shows that the prevalence rate of dyscalculic pupils in primary schools is around four per cent (Miundy, Zaman, Nosrdin, & Ng, 2019). However, the researcher did not find any match for the results that comparing the problems of dyscalculia among three main national school types in our country.

DOI: 10.48165/sajssh.2021.2610

Schools must provide more reasonable accommodations to accommodate the needs of pupils with varying levels of learning difficulties. Studies had shown that pupils with learning difficulties have a higher absenteeism rate and school exclusion than pupils without special educational needs (Hatton, 2018). This demonstrates there is an urgent need of detecting and identifying pupils with learning difficulties in order to offer them the most appropriate educational services.

In a nutshell, dyscalculia is occurring among primary school pupils. This occurs in three different types of national schools in our country. Additionally, these data indicate that teachers' understanding of dyscalculia has increased compared to prior findings by Fu and Chin (2017), which indicated that teacher awareness of dyscalculia was deficient. Teachers should accommodate each pupil's demands more effectively so that they may work collaboratively in recognising and embracing the varied needs among their pupils (Mallanhanse et al., 2020). In fact, the knowledge of dyscalculia is very crucial among teachers and parents as to assist their dyscalculic pupils in minimising the effect of dyscalculia on their daily living (Yoong, 2020).

LIMITATIONS OF THE STUDY

In fact, the knowledge of dyscalculia is very crucial among teachers and parents, the study's small sample size has become one of its limitations. Future research is suggested to use a larger sample size to ensure a more significant result. In addition, this study is restricted to government national schools. Future studies may include teachers from various school types, including private schools, international schools, religious schools, and so on. Finally, this study examined the severity of dyscalculia. Following the investigation on Mathematics teachers' perceptions, future research may focus on designing and development appropriate interventions and instruments for dyscalculic pupils.

CONCLUSION

Dyscalculia is a specific learning difficulty in Mathematics that can affect pupils in mainstream, remedial, or special education classrooms. The present study contributes to the body of knowledge and research on learning difficulties by adding an insight on the possibility for Ministry of Education, educators and teachers, parents, and dyscalculic pupils. This study will also raise awareness among the society that dyscalculia is happening in our daily environment.

DOI: 10.48165/sajssh.2021.2610

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DOI: 10.48165/sajssh.2021.2610