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Parental Involvement in Young Children's Learning of Numeracy

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Abstract. This study seeks to assess the Malaysian parental involvements in young children's numeracy learning. A questionnaire was administered to 327 parents of kindergarten-going children. The data then analysed descriptively using Statistical Package for the Social Sciences version-26. The present survey shows that the parents' knowledge, understanding, and attitude towards preschoolers' numeracy are high. Despite the positive findings, the parents' attitudes and experience in mathematics are moderate. The analysis found that parents need a relevant guide to support their children learning at home using effective instructional strategies. This research's data formed an initial insight to support a comprehensive follow-up study in parental involvement in young children's numeracy learning. Based on these findings, it is pertinent to investigate the underlying factors and constraints behind these results. The study will benefit researchers, parents, children, school, as well as the entire community in general. Conclusion and future recommendation are further discussed.

Keywords: numeracy; pre-school; parental involvement; parent participation; questionnaire

1. Introduction

Numeracy refers 'to the ability to do basic arithmetic operations, understanding the simple mathematical ideas and applying the knowledge and skills in mathematics in daily life' (Curriculum Development Centre [CDC], 2010). As much as the numeracy is concerned in the national education system, the children early numeracy is fostered by the quality of home-learning (Purpura et al., 2020; Soto-Calvo et al., 2020) and parental support at an early age (Lin et al., 2019; Visser, Juan & Hannan, 2019). The importance of numeracy is fairly acknowledged, as it sets as profound for the understanding of much complex mathematic later on. A comparative study on Trends in International

Mathematics and Science Study (TIMMS), particularly in mathematics found that the Malaysian students perform relatively lower than Singapore. Ng et al., (2012) further emphasized that even though both countries have similar educational structures such as centralized educational systems and schooling routine, parental involvement positively predicts both countries' mathematics achievement regardless of their performance. However, Ubale and Abdullah (2015) acclaimed that parental involvement in Malaysia is scarce even though the Malaysian Ministry of Education (MOE) encouraged parents to be an active partner with the school. Husen and Mansor (2018) even conclude that elementary mathematics children's performance depended on the reflection of their parents' attitudes and aspirations. Although it is accepted that children's later mathematical achievement is most directly affected by prior knowledge and experience in early numeracy, the research on examining the parental involvement in children's numeracy learning environment before formal schooling in Malaysia is insufficient.

The purpose of this study is to explore the parental involvement in the facilitation of their children's acquisition of numeracy and number concepts. Therefore, to fulfil the purpose of the study, some research questions are underlined;

i. What is the level of parents' knowledge about preschool mathematics?
ii. What is the level of parents' readiness to be involved in the mathematical activities at home?
iii. What is the level of parents' understanding of the importance of mathematics?
iv. What is the level of parents' experience in mathematics?
v. What is the level of parents' attitudes towards mathematics?

The data accumulated from this research provides baseline evidences of the current practice of parental involvement in young children's mathematical education in the Malaysian education landscape. The reference value from the analysis reveals misunderstandings that may represent obstacles to the ongoing numeracy-related program and serve a ground to propose a new intervention strategy related to parental involvement in early numeracy in Malaysia.

2. Background of Study

Early numeracy is crucial in a child's learning progression in mathematical skills and mathematical thinking. The awareness should be raised to ensure that the quality of early numeracy serves a firm ground for more advanced numerical cognitions. The importance of children's ability to master necessary numeracy skills is acknowledged in the Malaysian education system since 1996 (Harun et al., 2017). The preschool mathematic curriculum in Malaysia underwent several changes until the recent newly revised National Preschool Curriculum Standard (KSPK) was developed in 2010. According to Harun et al. (2017), early numeracy in the Malaysian preschools covers the topics that include pre-number numbers, basic number operation, the value of money, time, shape, and space.

Meanwhile, LINUS (Literacy and Numeracy Screening) is introduced as the national diagnostic assessment system since 2013 to monitor the students'

numeracy ability from year one until year three. This assessment is tailored with a remedial program to decrease the young children's polarisation in an early numeracy ability (Wei & Hutagalung, 2014). Despite this program positive remark (Peng, Leng & Hutagalung, 2016), this standard tools-aided program was repealed in 2019. Singh et al. (2019) found out that the newly introduced syllabus (i.e Standard Based Curriculum for Secondary Schools and Standard Based Curriculum for Primary Schools) integrated with the mathematical thinking and enumeration in composite and multi-layered across all the topics, compared to the confined remedial program which specifically to cater a particular group of students in LINUS.

Henceforth, the government's remarkable approach in the new syllabus is also a part of the current notion to acknowledge the school initiatives to address and curb their respective issue (i.e., numeracy) at the individual level. The sound decision is aligned with the recent finding that shows the development of young children's numerical cognition is fluid, dynamic, and unique based on biological and cultural perspectives (Pantsar, 2019; Xu, Spelke & Goddard, 2005).

2.1. Children's ability in numeracy

The numeracy is a composite proficiency of the mathematical thinking (Díez-Palomar, 2019; Jain & Rogers, 2019) and numerical skills (Mutaf-Yıldız et al., 2019; Susperreguy et al., 2020). Vacher (2014) claimed that from the psycholinguistic and ontological perspectives, numeracy is synonymous with "quantitative literacy" and "quantitative reasoning." It is widely accepted that numeracy is not segmented in one topic; it is somewhat stretched throughout the cross-topically in the early mathematical curriculum (Bennison, 2019; Goos et al., 2020). The study concerning numeracy in early childhood has been documented for more than 200 years (Cohen, 2001; Sharp, 2018) and proliferated in the broad corpus of study.

The importance of early numeracy experience as the foundation for mathematical learning in school is frequently reported. To demonstrate, the past studies found a significant predictive link between the verbal counting skills (Koponen, Aunola & Nurmi, 2019), subitising (Hannula-Sormunen, Lehtinen & Räsänen, 2015), basic arithmetics (Singer & Strasser, 2017; Pardo, et al., 2020), and number concepts (Balt, Fritz & Ehlert, 2020) in early years with later mathematics performance in school. Sobkow, Olszewska and Traczyk (2020) and Darriet, et al. (2020) claimed that the numerical competency could further predict preferences in real-life choices. However, the individual differences in numeracy are distinguished in an early age and persisted in later development.

2.2. Parental Involvement Could Affect the Numeracy Learning of Children

From the perspective of human development, the innate number sense is naturally developed since fetal (Bull, Davidson & Nordmann, 2010) and infancy/toddler (Vandervert, 2017; Whitacre, Henning & Atabas, 2017; Xu, Spelke & Goddard, 2005). Ostensibly, studies in number sense or early numeracy tried to comprehend the physiological determinant (Wilkey & Ansari, 2019), psychological determinant (Kesler et al., 2011), gene and heritability determinant (Tosto et al., 2014) in early numerosity. For instance, the nature of individual

factors extensively studied include neurocognition (Raghubar & Barnes, 2017), inhibition (Clayton & Gilmore, 2015), attention (Brueggemann & Gable 2018), motivation (Martin & Lazendic, 2018), challenged learner (Silva et al., 2020) and gender (Brandlistuen & et al., 2020; Toivainen et al., 2017).

Hence, despite the 'nature', the advancement and competency in numeracy are also determined by 'nurture' as well. The nurture or environmental factors denote as contributing factors in the development of early numeracy, such as home ecology (Napoli & Purpura, 2018), socioeconomic status (Forgasz & Leder, 2020), cultural variations (Ayonrinde et al., 2020) and pedagogical approach (i.e., Piper et al., 2018; Budgen & West 2020). These studies consistently found that children's ability to perform numerical competency is attributed to early childhood home-learning environments as support to preschool education.

Parental involvement in supporting children's ability in numeracy is fairly appraised. Ubale and Abdullah (2015) analyse several definitions on parental involvement, concluded that "*parental involvement can be a label as a parental contribution as well as taking part towards the learning goals' achievement of their children*" (p.348). Thus, the parental involvement is diverged beyond home-based-teaching towards the various domain of parent-child interaction. The positive relationship between parent-child interactions in the numeracy activities include numerical content, attention focus, emotions, and social connection (Skwarchuk, Vandermaas-Peeler & LeFevre, 2016; Vandermaas-Peeler, Westerberg & Fleishman, 2019). Theoretically sound with Vygotsky's social development theory (Vygotsky, 1978), parental involvement in children's early numeracy is a form of social internalisation of knowledge (Edens & Potter 2013). To put it simply, the parent-child interactions in numeracy are considered as one of the critical educational capitals and resources.

The parent-child interactions in numeracy are further framed into two; formal and informal (Cahoon, Cassidy, & Simms, 2017). Formal activities refer to a well-structured outline of teaching and learning guides with explicit instruction. The guides serve as the manual for the parents or educators outlined with particular objectives, plans of activities, and assessment meant for reflection. The stimulating formal activities include worksheet activity, drilling practice, oral memorisation, and technology-guided software or application (Aunio et al., 2016; Baccaglini-Frank, Carotenuto & Sinclair, 2020). In contrast, informal activities are the result of situational or incidental learning. The learning prompt at home may occur during a visit to the museum (Vandermaas-Peeler, Massey, & Kendall, 2016), playing board or card games (Ramani & Scalise 2020), money-talk when shopping (Barrera-Mora & Reyes-Rodriguez, 2019), and measuring ingredients when cooking (Son & Hur, 2020; Finn & Vandermaas-Peeler, 2013). The endless possibilities to infuse numeracy learning at home means that the preschool period may be an especially important time to examine the effects parents can have in developing children's mathematical skills.

The pool of research evidence demonstrates that first-grade children's mathematics performance differs in different environments (Lore, Wang &

Buckley, 2016; Silinskas et al., 2020; Aunio et al., 2016). Weerasinghe (2017) identified parental attitudes, beliefs, expectations, values, educational aspirations, and academic standards as crucial attributes in children's perception of learning mathematics to understand the difference. Pritchard (as cited in Muir, 2012) concluded that there were links between parents' attitudes, perceptions, and beliefs about mathematics and children's attitudes and performance in mathematics. In a similar vein, Rogers, Bastandardisedrblett and Robinson (2018), measured the parent's perception by highlighting parental involvement in an early numeracy which is linked with children's primary numerical and/or mathematical performance (Mutaf-Yıldız et al., 2018). However, previous studies examining parents' beliefs on mathematics were somewhat inconclusive (Sonnenschein et al., 2012; Galindo & Sonnenschein, 2015; Missall et al., 2015).

Several studies have shown that low-income parents thought that the children mathematics learning were more critical in pre-school than in the home environment (DeFlorio & Beliakoff, 2015), presumably due to low socioeconomic and educational status, parents had lower confidence in their teaching abilities (Burns, 2020; Drummond & Stipek, 2004; Cui, Zhang & Leung, 2019). Furthermore, past cross-country studies found that parental involvement in early childhood education relied on their country economic status (i.e., Sobayi, 2018; Cheung & Pomerantz, 2011; Nilsen et al., 2020) and parents past experiences (O'Toole & de Abreu (2005).

Therefore, the preschool period may be an especially important time in examining the effects parental involvement can have towards the development of children's mathematical skills. This article was part of a bigger study that explored parents' knowledge in numeracy specifically through the following constructs; knowledge about preschool mathematics, readiness to be involved in preschool mathematics activities at home, understanding the importance of preschool mathematics, experience during respective parents' previous learning of mathematics and attitudes towards mathematics.

3. Methodology

This survey employed a quantitative method using a set of predefined questions formatted in systematised questionnaires (see **Appendix 1**). The questionnaire-based survey was administered to the representative samples (n=327) of parents residing in Peninsular Malaysia (Kedah, Kelantan, and Pulau Pinang) and East Malaysia (Sarawak). The sampling procedure was carried out through stratified purposive sampling. From the 327 questionnaires distributed, 307 of the questionnaires were returned. The final 307 questionnaires were further analysed to establish the understanding of parental involvement in terms of five constructs; 1) parents' knowledge about preschool mathematical practices and curriculum, 2) parents' readiness to involve in mathematical activities at home, 3) parents' understanding of the importance of mathematics, 4) experience in mathematics and 5) attitude towards numeracy and number concepts of four following components of numeracy. These components are comparison, classification, one to one correspondence and seriation concept. The number of items per construct and the constituents' Likert Scale point is summarised in Table 1.

Table 1. The number of items for each construct and the Likert scale point.

Constructs	Number of items	Likert-scale point
Knowledge about preschool mathematics practices and curriculum	11	5
Readiness to involve in mathematical activities at home	5	5
Understand the importance of mathematics	10	5
Experience in mathematics	5	3
Attitudes towards mathematics	8	5

The concept of parental involvement in the early numeracy in this study was indexed via questionnaires. Thus, self-perspectives on parental involvement to facilitate the children's acquisition of numeracy was recorded using declarative rated-statement. The data was analysed descriptively. The frequency of the demographic profile was tabulated and all the response means were analysed descriptively.

3.1 Instrumentation

The instruments consisted of five aspects which specifically encompassed parental involvement in young children's learning of numeracy according to previously discussed construct. The questionnaire item was developed by the team of expert from our institution through a series of questionnaire development training. Even though the data were collected from multiracial community, the medium of instruction in classroom was in the Malay language as the national language or/and English, similar to the medium of instruction in the questionnaire. The procedure of participant and data confidentiality was adhered to the guidelines by Education Policy Planning and Research Division, Ministry of Education Malaysia [EPRD], 2021). The details of instruments development, piloting, validity/reliabity testing and research ethics were reported comprehensively in the monograph in Ghazali et al. (2017).

4. Findings of Study

The parental involvement in the facilitation of their children's acquisition of numeracy and number concepts was obtained from the quantitative data. The frequency of all the response means were analysed descriptively.

4.1 Parents' Knowledge about Preschool Mathematics

As shown in Table 2—on parents' perceived knowledge about preschool mathematics, this research focused on the 11 items according to the topics in the early mathematics curriculum. Based on **Table 3**, most respondents answered "Capable." Based on SPSS data, it appeared that item 1 of writing numbers showed the highest means value of M = 4.65 (SD = 0.73). Item 11 displayed the lowest mean value of M = 4.30 (SD = 0.93). In this construct, more than 60% of parents answered all the items on the scale of "very capable". In contrast, only for items 10 and 11, the percentage that was less than 60%.

Table 2. Distribution of mean and standard deviation of parents' knowledge about preschool mathematics

No.	Items	Mean (M)	Standard Deviation (SD)
1.	Writing numbers	4.65	0.73
2.	Comparing objects based on particular characteristics	4.63	0.69
3.	Comparing numbers	4.58	0.75
4.	Classification of objects based on particular characteristics	4.58	0.73
5.	Arranging object based on particular criteria	4.59	0.74
6.	Matching identical pair object	4.61	0.72
7.	Matching non-identical pair object	4.56	0.74
8.	Matching object with equal or different quantity	4.55	0.75
9.	Number concepts	4.53	0.78
10.	Exercises/Activities with learning materials/games	4.39	0.81
11.	Simple mathematical operation problem solving	4.30	0.93

The items 1 until 9 referred to the Low-Order Thinking skills (LOTs) and basic numeracy content learning according to KPSK that would be further enhanced in the early primary-years curriculum. The items 1 to 9 (i.e., numbers writing, comparing objects based on particular characteristics, numbers comparing, classifications of objects, object arranging, identical and non-identical pair object matching, object matching, and number concepts resembled the lists of activities of children to remember, understand and apply the concept that they understood in numeracy. Meanwhile, the items 10 and 11 were the High-Order Thinking Skills (HOTs), including analysing, evaluating, creating through games, and simple arithmetic problem-solving activity. The data revealed that the parents' perceived knowledge about early numeracy was confined towards the cultivation of Low-Order Thinking skills.

4.2. Parents' Readiness to be Involved in Mathematical Activities at Home

Table 3 shows the mean and standard deviation of the parents' readiness to be involved in mathematical activities at home by analysing the items 12 to 16. According to Table 4, most parents self-rated as "Quite Ready" in this construct that focused on parents' readiness to be involved in mathematical activities at home. Based on SPSS data, the item 15 of "I assist my child in mathematics-related problem solving" showed the highest mean value of M = 4.29 (SD = 0.88) and the item 13 of "I prepare concrete materials for my child to understand mathematics" indicated the lowest mean value of M = 3.64 (SD = 1.14).

Table 3. Distribution of mean and standard deviation of parents' readiness to be involved in mathematical activities at home

No.	Items	Mean (M)	Standard Deviation (SD)
12.	I prepare mathematics-based activities for my child at home	3.84	1.00
13.	I prepare concrete materials for my child to understand mathematics	3.64	1.14
14.	I asked my child questions on mathematics concepts while doing activities at home	3.97	1.00
15.	I assist my child in mathematics related problem solving	4.29	0.88
16.	I sing counting songs with my child at home	3.68	1.24

Parents' readiness to assist their children can be detected through the parents' actions that are done by them in supporting children's learning at home. Even though the parents have prepared the material to learn at home, the preparation seemingly focused on non-concrete materials such as asking mathematics questions and assisting in problem-solving. On the contrary to the earlier findings, these data indicated that even though parents believed that they have limited content knowledge related to early numeracy problem solving, they were dedicated to assist their children in this area. However, the least non-concrete learning material rated by parents was singing counting song activity.

4.3. Parents' Understanding of the Importance of Mathematics

By referring to Table 4, parents had a high understanding of the importance of mathematics measured through items 17 to 26. The item 17, "numbers writing," showed the highest mean value of M=4.78 (SD=0.56), while the item 23 of "doing exercises with other children" indicated the lowest mean value of M = 4.49 (SD = 0.92). More than 70% of respondents rated "very important" for all items in this construct except 64.5% on the item 25, which was "doing exercises with materials/games."

Table 4. Distribution of mean and standard deviation of parents' understanding of the importance of mathematics

No.	Items	Mean (M)	Standard Deviation (SD)
17.	Writing numbers	4.78	0.56
18.	Comparing objects based on particular characteristics	4.68	0.63
19.	Comparing numbers	4.76	0.55
20.	Classification of objects based on particular characteristics	4.69	0.62
21.	Arranging object based on particular criteria	4.72	0.59
22.	Mathematical games	4.59	0.81
23.	Doing exercises with other children	4.49	0.92

24.	Doing homework/exercises	4.65	0.69
25.	Doing exercises with materials/games	4.47	0.85
26.	Simple problem solving	4.60	0.80

Based on the findings, most parents grasped the mathematical importance by employing behaviourist task-based exercise. Even with a small sparsity, the games and inter-child activities were not seen as part of learning mathematics than rote learning (write and compare numbers, compare and classify objects based on particular characteristics). The finding was in line with the lowest score in parents' perceived knowledge in exercising using activities with learning materials and/or games and in parents' readiness to prepare concrete material. The consistent emergence in terms of games and material-based activity in the home environment has predicted instructional knowledge of underlying issue among parents.

4.4 Parents' Experience in Mathematics

As compared to the five-point scale in the parents' knowledge, understanding, and attitude constructs, the parents' experience in mathematics was to identify the perception of mathematics-related-past schooling experience using three point-Likert scales (Table 5). Based on the Table 5, the lowest mathematics experience score was in item 27 (M = 1.21). Meanwhile, the experience in secondary school mathematics was rated at the highest (M = 1.40).

Table 5. Distribution of mean and standard deviation of parents' experience in mathematics

No.	Items	Mean (M)	Standard Deviation (SD)
27.	My opinion about mathematics	1.21	0.48
28.	My experience in primary school mathematics	1.22	0.50
29.	My experience in secondary school mathematics	1.40	0.62
30.	My confidence in mathematics	1.31	0.61
31.	My ability in mathematics	1.31	0.59

The overall finding of the parents' experience was centered at the midpoint. Thus, this evidence debunked that most parents' mathematics experiences during their school days were moderately scored. The findings were unlikely to complement with the demographic profile of the parents who participated in this study. Although most parents attained the basic secondary education, their experience with mathematics during schooling was moderate.

4.5. Parents' Attitudes towards Mathematics

As presented in Table 6, parents' attitudes towards mathematics were relatively moderate. Based on the finding, item 32 of "only teachers are responsible to teach my children about mathematics," and item 33 of "parents are solely responsible to teach my children about mathematics" showed the lowest mean value, which was M = 1.87 (SD = 1.29) and followed by M = 1.73 (SD = 1.17). The two lowest

scored items underpinned the idea that a child's early numeracy was both-parents' and teachers' responsibility. From the finding of item 34 till 39, most parents had a positive attitude in facilitating their children's numeracy.

Table 6. Distribution of mean and standard deviation of the parents' experience in mathematics

No.	Items	Mean (M)	Standard Deviation (SD)
32.	Only teachers are responsible to teach my children about mathematics	1.87	1.29
33.	Parents are solely responsible to teach my children about mathematics	1.73	1.17
34.	Activities in the home could be related to mathematics	4.07	1.09
35.	All children have the opportunity to excel/succeed in mathematics	4.59	0.76
36.	I can assist my child to enhance mathematical knowledge	4.33	0.86
37.	My involvement in learning will enhance my child's positive attitudes towards mathematics	4.35	0.83
38.	It is important for children to have fun while learning mathematics	4.66	0.68
39.	I have a role in inculcating positive attitudes towards mathematics among children	4.39	0.83

4.6. Parental Involvement in Young Children's Learning of Numeracy

The mean values of all constructs are tabulated in **Table 7** to view the overall finding of this study.

Table 7. The descriptive statistics of all constructs

Constructs	Number of items	Min	Max	Mean (M)	Percentage (%)	Likert-scale point
Parents' knowledge about preschool mathematics	11	4.30	4.65	4.54	93.0	5
Parents' readiness to involve in mathematical activities at home	5	3.64	4.29	3.88	77.6	5
Parents' understanding of the importance of mathematics	10	4.47	4.78	4.64	92.8	5
Parents' experience in mathematics	5	1.21	1.40	1.29	43.0	3
Parents' attitudes towards mathematics	8	1.73	4.66	3.75	75.0	5

From the data, three constructs with five point-Likert scales mean were more than M=4.5. The finding indicated that parents had high perceived knowledge about preschool mathematics; parents are ready to be involved in mathematical activities at home; and parents understand that mathematics are vital for their children. Considering the three-point Likert scale to measure the fourth construct,

the M=1.29 highlighted that the parents encountered moderate mathematics experience. Finally, the mean (M=3.75) of the fifth construct showed that parents had moderate attitude towards mathematics. The mean percentages of all constructs are presented in **Figure 1.**

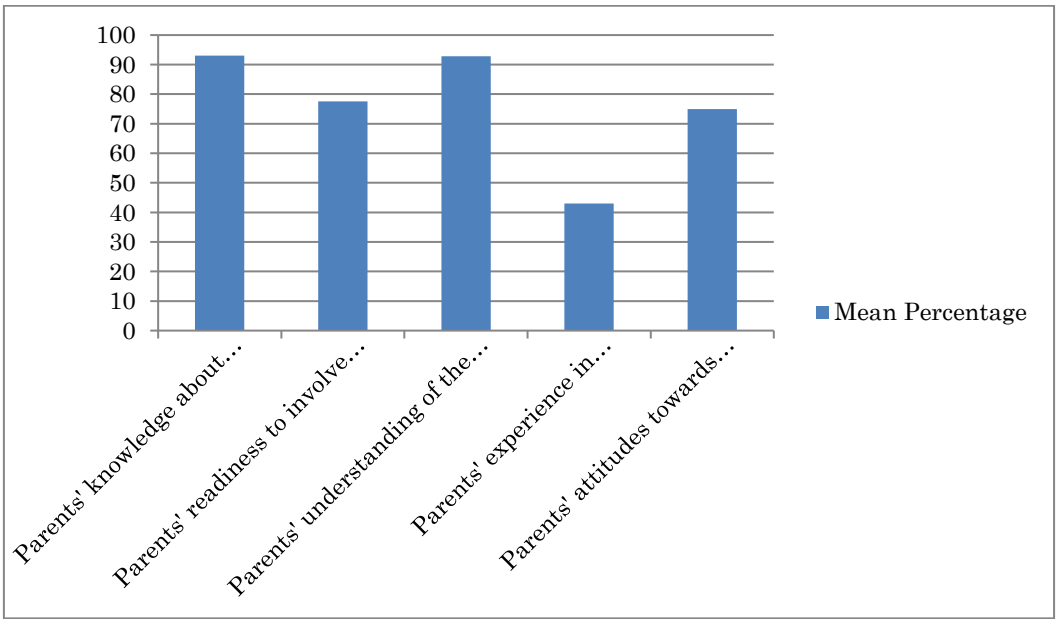

Figure 2. The descriptive statistics of all constructs

5. Discussion

The parental involvement was measured through five constructs consisted of parents' knowledge about preschool mathematical practices and curriculum, parents' readiness to be involved in mathematical activities at home, parents' understanding, experience, and attitudes towards numeracy and number concepts. It was found out that parents' knowledge, understanding, and attitude towards preschoolers' numeracy was high. Parents also had moderate experience and attitudes toward mathematics.

In this study, most parents perceived that mathematics is essential and willing to get involved in their children's numeracy activity. From the analysis throughout 39 items, overall, the parents in this study preferred to advance the operational activities, LOT's-levelled, non-concrete, indirect activities, behaviourist-task based activities. The finding was similar to Susperreguy et al. (2018), Ramani et al. (2015), and Sobayi (2018), who studied the early numeracy in primary-schooled children, the parent-child interaction in numeracy was limited at an operational basic-level and inclined towards the advancement of current development stage and improvement to prepare for primary years schooling. Soto-Calvo et al. (2020) and Kleemans et al. (2012) also found that the parents tended to be involved in task-based behaviourist activity and promote the rote-learning of LOTs. Nevertheless, advancing beyond the children's current development stage is heavily criticised by early childhood researchers (Gersten, Jayanthi & Dimino, 2017; Little & Cohen-Vogel, 2016). Therefore, there is a requirement for systematic guidelines and consultation for parents in facilitating advanced numeracy

principles by manifesting HOTs and tool-aided numeracy activity (Linder & Emerson 2019; Smith et al., 2020) to facilitate an effective the parents' involvement in numeracy learning.

Despite moderate positive self-experience in mathematics, encouragingly, parents showed their confidence that they have substantial mathematical knowledge and ready to impose on mathematics importance for their children. Based on this study, there was a requirement for a deeper understanding of the parents with moderate experience and attitude in mathematic that encouraged children's early numeracy at home. To sum, we believe that the parents had some driving forces to assist their children in numeracy at home regardless of the moderate experience and attitudes toward mathematics. Nevertheless, the factors that drive the parents to be involved in their children's numeracy activity need to be further studied.

6. Conclusion

This study has provided new tangents of perceived reality in parental numeracy involvement in the Malaysian context. From the finding, there is an evident that the parents had already an awareness of their involvement in early numeracy. Parents should be supported by 'how to facilitate the home early numeracy' rather than 'what to teach at home.' The pedagogical knowledge, instructional strategies, and the psychology of child development as the principles of home-numeracy are essentially required to conduct effective home-based learning. Thus, this research was the indication for the policymaker to design a systematic program for parents in engaging with their children at home.

The present study has discrepant views of self-rating with reality. The survey methodology was prone to self-rating bias and social desirability issues, affecting the finding practical and vocational circumstances. Henceforth, the follow-up study which measures parental involvement is suggested to include a comprehensive measure to examine parents' economic status and motivational factors to be involved with their children's numeracy activity at home. Besides, the frequency, quality, and extent of parental involvement will better understand the potential instructional strategies to be introduced to the parents; which in turn refers to the limitation of this study. The local circumstances and cultural factors also require to be further studied in the Malaysian multicultural context to assure for a numerate citizen.

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Appendix 1

Appendices

Meneroka Pengetahuan Pembelajaran Numerasi Sebelum Persekolahan Formal

Exploring Knowledge in Learning Numeracy
Before Formal Schooling

Pusat Pengajian Ilmu Pendidikan, Universiti Sains Malaysia
Geran ERGS (Grant No: 203/PGURU/6730128)
Kementerian Pelajaran Malaysia

Universiti Sains Malaysia
2013 – 2015

<u>Instrument</u>
Soal Selidik Ibu Bapa
Parents' Quentionnaire

BAHAGIAN A : DEMOGRAFI
Maklumat Ibu Bapa

SECTION A : DEMOGRAPHY
Parents' Information

Tarikh
Date : _____

Jantina
Gender : Lelaki/Male ☐ Perempuan/ Female ☐

Etnik
Ethnic : Malay ☐ Chinese ☐ India ☐

Lain lain/Others :_____(sila isikan)

Negeri/State: _____
Daerah/_____

Pendidikan/Education

Ibu/Mother		**Bapa/Father**	
SPM/SPVM	☐	SPM/SPVM	☐
STPM	☐	STPM	☐
DIPLOMA	☐	DIPLOMA	☐
BACHELOR	☐	BACHELOR	☐
MASTER	☐	MASTER	☐
PhD	☐	PhD	☐

Pekerjaan Ibu
Mother's Occupation : _____

Pekerjaan Bapa
Father's Occupation : _____

BAHAGIAN B
SECTION B

- **Pengetahuan Berkaitan Matematik Prasekolah**
- **Knowledge about preschool mathematics**

No.	Items Saya boleh mengajar anak saya perkara berikut: I am able to teach my child the following:	Tidak boleh Incapable 1	Tidak Pasti Not Sure 2	Boleh Capable 3
1.	Menulis Nombor Writing numbers.			
2.	Membandingkan Objek Comparing objects.			
3	Membandingkan Nombor Comparing Numbers			
4	Mengklasifikasi objek Classification of objects.			
5.	Seriasi Seriation.			
6.	Padanan satu – ke - satu Matching one-to-one.			
7.	Memadankan objek tidak seiras Matching non-identical pair object			
8.	Ukuran mudah Simple measurement.			
9.	Konsep nombor Number concepts.			
10.	Latihan/Aktiviti dengan bahan pembelajaran/permainan Exercises/Activities with learning materials/games			
11.	Penyelesaian masalah mudah Simple problem solving.			

- **Kesediaan untuk melibatkan diri dalam aktiviti matematik di rumah**
- **Readiness to involve in mathematical activities at home**

Bil/No.	Item	Tidak Bersedia Not Ready 1	Tidak Pasti Not Sure 2	Bersedia Ready 3
11.	Saya menyediakan untuk anak saya aktiviti berunsurkan matematik di rumah. I prepare mathematics based activities for my child at home.			
12.	Saya menyediakan untuk anak saya bahan/peralatan konkrit yang cukup bagi menguasai matematik. I prepare enough concrete materials for my child to understand mathematics.			
13.	Saya bersoal jawab dengan anak saya tentang konsep matematik semasa melakukan aktiviti di rumah. I asked my child questions on mathematics concepts while doing activities at home.			
14.	Saya membantu anak saya dalam menyelesaikan masalah berkaitan matematik. I assist my child in mathematics related problem solving.			
15.	Saya menyanyi lagu berkaitan membilang bersama anak ketika di rumah. I sing counting songs with my child at home.			

- **Kefahaman tentang kepentingan numerasi**
- **Understanding about importance of numeracy**

Bil./Nos.	Item Adakah aktiviti berikut penting untuk meningkatkan pengetahuan numerasi kanak-kanak prasekolah? Are the following activities important in enhancing preschool children's knowledge about numeracy	Tidak Penting Not important 1	Tidak Pasti Not Sure 2	Penting Important 3
16.	Membilang nombor. Counting numbers			
17.	Menulis nombor. Writing numbers			
18.	Membandingkan objek dan nombor. Comparing objects and number			
19.	Mengelaskan objek. Classifying objects.			
20.	Membuat padanan objek di persekitaran. Matching objects in the environment.			
21.	Permainan matematik. Mathematical games.			
22.	Melakukan latihan dengan kanak-kanak lain. Doing exercises with other children.			
23.	Melakukan kerja rumah/latihan. Doing homework/exercises.			
24.	Melakukan latihan dengan peralatan/bahan permainan. Doing exercises with materials/games.			
25.	Menyelesaikan masalah mudah. Simple problem solving			

❖ **Pengalaman dalam matematik/Experience in Mathematics**

Bil./Nos.	Item	Positif 1	Tidak Ingat 2	Negative 3
26.	Pengalaman saya berkaitan numerasi dalam matematik. My opinion about numeracy in mathematics.			
27.	Pengalaman saya dalam matematik sekolah rendah. My experience in primary school mathematics.			
28.	Pengalaman saya dalam matematik sekolah menengah. My experience in secondary school mathematics.			
29.	Keyakinan saya dalam mata pelajaran matematik. My confidence in mathematics.			
30.	Kebolehan saya dalam mata pelajaran matematik. My ability in mathematis			

❖ **Sikap terhadap numerasi**
❖ **Attitudes towards numeracy**

Bil./ No.	Item Saya berpendapat bahawa/I think that	Sangat Tidak Bersetuju Strongly disagree 1	Tidak Bersetuju Disagree 2	Setuju Agree 3	Sangat Bersetuju Strongly agree 4
31.	Hanya guru sahaja yang bertanggungjawab mengajar anak saya tentang numerasi. Only teachers are responsible to teach my children about numeracy.				
32.	Aktiviti yang dilakukan di rumah dapat dikaitkan dengan numerasi. Activities in the home could be related to numeracy.				
33.	Semua kanak-kanak berpeluang untuk berjaya dalam matematik. All children have the opportunity to excel/succeed in mathematics.				
34.	Saya boleh membantu anak saya meningkatkan pengetahuan matematik. I can assist my child to enhance mathematical knowledge.				
35.	Penglibatan saya dalam pembelajaran dapat meningkatkan/menerap sikap positif anak terhadap matematik. My involvement in learning will enhance my child's positive attitudes towards mathematics.				

36.	Adalah penting untuk kanak-kanak berasa seronok ketika belajar matematik. It is important for children to have fun while learning mathematics.				
37.	Saya mempunyai peranan dalam menerapkan sikap positif kanak-kanak terhadap matematik. I have a role in inculcating positive attitudes towards mathematics among children.				

- **Kepentingan Pengetahuan Berkaitan Matematik Prasekolah**
- **Importance of Knowledge about preschool mathematics**

No.	Items Sila berikan kepentingan 1(paling kurang penting) – 10 (paling penting) untuk item berikut. Please rank from 1(least importance) – 10 (most importance) the following items	Kepentingan (sila bulatkan) Rank (please circle) 1(paling kurang penting) – 10 (paling penting) 1(least importance) – 10 (most importance)
1.	Menulis Nombor Writing numbers.	1 2 3 4 5 6 7 8 9 10
2.	Membandingkan Objek dan Nombor Comparing objects and numbers.	1 2 3 4 5 6 7 8 9 10
3.	Mengklasifikasi objek Classification of objects.	1 2 3 4 5 6 7 8 9 10
4.	Seriasi Seriation.	1 2 3 4 5 6 7 8 9 10
5.	Padanan satu – ke - satu Matching one-to-one.	1 2 3 4 5 6 7 8 9 10
6.	Memadankan objek dan persekitaran Matching objects in the environment.	1 2 3 4 5 6 7 8 9 10
7.	Ukuran mudah Simple measurement.	1 2 3 4 5 6 7 8 9 10
8.	Konsep nombor Number concepts.	1 2 3 4 5 6 7 8 9 10
9.	Latihan/Aktiviti dengan bahan pembelajaran/permainan Exercises/Activities with learning materials/games	1 2 3 4 5 6 7 8 9 10
10.	Penyelesaian masalah mudah Simple problem solving.	1 2 3 4 5 6 7 8 9 10

Sekian, terima kasih.
That's all. Thank you