Content Analysis of Primary School Mathematics Textbooks and its Relationship with Pupils Achievement

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Abstract: Malaysia has undergone several changes in its education policy from KBSR to KSSR over the decades and the changes in school textbooks follow suit. The current KSSR Math textbooks used were developed in 2014/15 and millions of Ringgits has been spent by the government to provide quality education for all. However, the findings from International studies such as TIMSS and PISA have shown a low level of attainment, especially in word problems, among Malaysian pupils in the learning of mathematics. Is there a possibility that this low attainment in mathematics education in schools, among other factors, have something to do with the content analysis of the textbook's pupils use in the classroom? A three-phase descriptive-correlational content analysis design was utilized for the study. In the first phase of the research, a total of eleven mathematics texts (4 textbooks and 7 activity books) from Primary One to Primary Four were analyzed according to eleven types of categories as modelled by the Van de Walle (1998) framework. The findings show that the problem categories were not represented in a systematic manner throughout Year One to Year Four mathematics texts. Some categories were overrepresented while others were underrepresented. The next phase finding depicts a significant relationship between pupils' achievement in the Word Problem Test categories and the distribution of word problem categories across all grade levels. In other words, results showed that pupils face more difficulty on the problems that were underrepresented and least difficulty that were overrepresented. As mathematics syllabuses in KSSR keep expanding and focus more on high order thinking skills among pupils, it is important to make sure that the sources are well prepared for the cause. Therefore, the curriculum and textbook developer should consider taking input from research to provide up to date information related to curriculum matters and in this case to the variety of word problem categories in ration that benefit pupils across levels.

Keywords: Addition, Subtraction, Textbook, Van de Walle, Word Problems

1. Background

Content analysis, as per the description given by Wallen and Fraenkel (2001), pointed to a study of document contents, which could be either written or visual in nature. Furthermore, decades ago Best (1959, p. 150) states that, "content or document analysis should serve a useful purpose in research, adding important knowledge to the field of study, or yielding information that is helpful in evaluating and improving social or educational practices". In other words, it's a method to elicit the characteristic of the information (whether written or visual) from the content of a document in an objective manner.

In the context of this paper, our analysis is based upon "How much does the content of Mathematics textbook used by pupils in Primary School meet the requirements of international content benchmark as elucidated in the scientific literature and its relationship with pupils' achievement?

Despite many studies being conducted on the usage of school textbooks by both teachers and pupils, there are still gaps in terms of the textbook contents in Malaysia. Teachers and pupils use textbooks as their main source in teaching and learning. According to Rezat (2009), teachers use textbooks in their teaching and learning sessions and for lesson planning. On the other hand, pupils use textbooks in a self-directed way and not only when they are being told. Despina and Harikleia (2014) also state that textbooks define the boundaries of what pupils may perceive. A textbook is in fact the written content of the curriculum. If the content of the textbook is not sufficiently consistent with the aims of the program, it will not be possible to achieve the educational aims. In light of this setting, Chieppetta, Fillman, and Sethna, (1991) similarly opines that it is vital that the relevant textbooks are congruous as far as the content and aim are concerned, hence propelling the fulfillment of the necessary goals underlying any curriculum.

Thus, for the textbook to function as a useful instructional guide, its content must not only be suited to the interest and abilities of pupils, but rather, it must also be acceptable in light of the current curriculum content standard point of-view. In addition, a teacher should also select beneficial mathematical tasks to create a supportive and challenging condition that can encourage mathematical discourse among students in a class (Rasid, Nasir, Singh, & Cheong, 2020).

Recent trends in international studies have shown a downturn in Malaysian students' performance in both Mathematics and Science at schools. The 2007's Trends in Mathematics and Science Study (TIMSS) results revealed that nearly 20% of Malaysian lower secondary students failed to meet the minimum requirement for both Mathematics and Science compared to only 7% in Mathematics and 5% in Science which was in 2003 (Chew, Noraini & Leong, 2014). Subsequently Malaysia scored 440 points in the 2011 results which was below the international average benchmark (TIMSS Scale Centre point, 500) and below the previous 2007 TIMSS achievements (Ministry of Education, 2014). Is there a possibility that the textbooks used by students might have a contributing factor towards this downturn in Malaysian students' performance? A great deal of unsettling and distress befell upon those in the USA, for example, emanating from lower success rate in the TIMSS. The concern centered on science education. As noted by Singer and Tuomi (2003), "the deteriorating quality of teaching equipment, namely textbooks, played a role in contributing to the said situation" (p. 5).

In the learning of mathematics content for primary schools, after numbers and counting, addition and subtraction are the earliest entry points for primary school children's syllabus. Pupils must be able to acquire the skills in addition and subtraction as they are an inverse operation of each other (TIMES, 2011). For example, 7 + 3 = 10 is equivalent to 10 – 3 = 7 and 10–7=3. This also means that addition and subtraction operations are the most basic arithmetic operations in mathematics and the understanding of these concepts are important in helping pupils develop further concepts for more arithmetic operations. However, research has shown that pupils are 'skilful' in computation problems but face great difficulty in comprehending the problems in words. Solving number problems for instance "____ - 35 = 70" is easier than solving mathematics word problems, for instance "Kamal has some marbles. He gave 35 to his sister and has a balance of 70. How many marbles did he have at the beginning?" Ismail (2009) also found that pupils face great difficulty in comprehending word problems rather than solving problems in symbols and numerals. Most pupils had difficulties in understanding the concepts and determining the right operations to solve the problems. Various other studies have also been conducted on the types of difficulties faced (Zahara et al. 2009; Tarzimah 2005; Parmjit, 2010), and they elucidated that a large number of pupils lacked the very basic skills required in solving these word problems. A majority of these studies cognize low cognitive ability as the root of the problems faced by pupils. However, on the other hand, there is a dearth of studies investigating its relationship with textbook analysis. Is there a possibility that the difficulty faced by pupils might also have to do with the types of problems they are exposed to in the math textbook used in the classroom?

In the literature, the various modality types of word problems that classify addition and subtraction areas of learning are well established. For instance, Riley, Greeno and Heller (1983) classified it as combine, change and compare problems. On the other hand, Van de Walle (1998) micronized it in more detail and identified 4 main categories based on the semantic structures of the

word problem which are: joint, separate, part-whole and comparison. Since basic mathematical sentences have three quantities which are: start, change and result, combining all the different types will produce eleven types of categories as in Table 1. Based on these two models, one can surmise that Van de Walle's model provides a more detailed view on the categories as compared to Greer and Heller's model.

Table 1. The Categorization of Word Problems According to Its Categories and Operation

Acronym	Categories	Operation
1. JRU	Join result unknown	Addition
2. JCU	Join change unknown	Subtraction
3. JIU	Join initial unknown	Subtraction
4. SRU	Separate result unknown	Subtraction
5. SCU	Separate change unknown	Subtraction
6. SIU	Separate initial unknown	Addition
7. CDU	Compare difference unknown	Subtraction
8. CLU	Compare larger unknown	Addition
9. CSU	Compare smaller unknown	Subtraction
10. PWU	Part-whole whole unknown	Addition
11. PPU	Part-whole part unknown	Subtraction

Based on the model above, several researchers (Olkun & Toluk , 2003; Parmjit, 2006; Parmjit, 2010; Despina & Harikleia, 2014) conducted studies to differentiate the types of word problem operations in the textbook. The findings from both Parmjit et. al. (2010) and Parmjit (2006) were based on the previous KBSR curriculum based on Primary One and Primary Two text using van Van de Walle (1998). Findings from these studies (including Olkun & Toluk , 2003; and Despina & Harikleia, 2014) indicate that the school textbooks did not represent all the eleven categories of addition and subtraction. Hence, it can be said that most textbooks did not adhere to Van De Walle's model of word problems. This then raises the question: What about the new KSSR books being used in Malaysian Primary Schools in current times?

There is a need to conduct empirical research since there is not much research done in Malaysia in determining the quality and content of the current textbooks used in classrooms. This study aims to provide insights into the Malaysian Mathematics textbooks used in primary schools.

The objectives of this study are:

a) To identify the composition distributions of type of word problems in addition and subtraction according to Van De Walle's model in Year One to Year Four Malaysian Mathematics textbooks.
b) To analyse pupils' performance on addition and subtraction word problems using Van de Walle's model in Word Problem Tests (WPT).
c) To study the relationship between the distribution of the types of word problems in the Mathematic Text and pupils' achievement in WPT.

2. Methodology

This three-phase study utilized a descriptive-correlational content analysis design to assess primary school mathematics textbook used in schools, discuss the result of the assessment, and examine the results of the assessment relationship with pupils' achievement. During the initial analysis phase, the data has gone through preliminary data cleaning to determine whether there are any errors, outliers and common method bias (Aziz, Seman, Hashim, Roslin, & Ishar, 2019).

First phase – Textbook Analysis

The first phase utilized descriptive research design of content analysis guidelines procedures, which is the document analysis of school textbooks from Year 1 to Year 4 (refer Table 2) according to the Van de Walle's word problem model (refer Table 3). A total of eleven books (4 textbooks and 7 activity books) were analysed according to the Van de Walle's model. To be noted that, no activity books were provided by the ministry for Year 4 students. This research design allowed the researcher to analyse the textbooks qualitatively by observing, coding, and categorising the content in relation to addition and subtraction problem categories. After that, the data was grouped, summarised and analysed using descriptive analyses.

Table 2. List of Textbooks

No.	List of textbooks	Publisher
1.	Buku Teks Matematik Tahun 1, Jilid 1	Dewan Bahasa dan Pustaka, 2014
2.	Buku Teks Matematik Tahun 1, Jilid 2	Dewan Bahasa dan Pustaka, 2014
3.	Buku Aktiviti Matematik Tahun 1, Jilid 1	Dewan Bahasa dan Pustaka, 2014
4.	Buku Aktiviti Matematik Tahun 1, Jilid 2	Dewan Bahasa dan Pustaka, 2014
5.	Buku Teks Matematik Tahun 2, Jilid 1	Dewan Bahasa dan Pustaka, 2013
6.	Buku Teks Matematik Tahun 2, Jilid 2	Dewan Bahasa dan Pustaka, 2014
7.	Buku Aktiviti Matematik Tahun 2	Dewan Bahasa dan Pustaka, 2014
8.	Buku Teks Matematik Tahun 3, Jilid 1	Dewan Bahasa dan Pustaka, 2012
9.	Buku Teks Matematik Tahun 3, Jilid 2	Dewan Bahasa dan Pustaka, 2014
10.	Buku Aktiviti Matematik Tahun 3	Dewan Bahasa dan Pustaka, 2014
11.	Buku Teks Matematik Tahun 4	Dewan Bahasa dan Pustaka, 2014

Second Phase-Pupils Achievement

Based on stratification (area of school's location) sampling in a state in Selangor, a total of 570 primary school pupils (refer Table 4) were involved in the second phase of this study. The composition of the pupils comprised 136 pupils from Year 1, 141 pupils from Year 2, 161 pupils from Year 3 and 132 pupils from Year 4. From this total, 46.8% were male pupils (n=267) and 53.2% female (n=303) pupils.

This phase involved the administration of the Word Problem Test (WPT) as shown in Table 3. This test instrument which was adapted from Olkun and Toluk (2003) comprised eleven questions based on Van de Walle's categories. Pupils' responses for the WPT were categorized based on the following 4-point scoring scale as shown in Table 5. The maximum score for the WPT is 33.

Table 3. *Word Problem Test* Categorization Using Van De Walle's (1998) Model

No	Category	Information	Malay translations
1.	JRU	Join Result Unknown	Hasni ada 12 kuntum bunga di dalam bakul. Sara memberi 6 kuntum bunga lagi kepada Hasni. Berapa kuntum bunga yang Hasni ada kesemuanya?
2.	JCU	Join Change Unknown	Nadim ada 11 biji mangga. Farah memberi Nadim beberapa biji mangga lagi. Sekarang Nadim ada 27 biji mangga. Berapa biji mangga yang Farah beri kepada Nadim?
3.	JIU	Join Initial Unknown	Lina ada beberapa biji gula-gula. Aishah memberinya 15 biji lagi. Sekarang Lina ada 33 biji gula-gula. Berapa biji gula-gula Lina ada pada mulanya?
4.	SRU	Separate Result Unknown	Amin membeli 27 batang pensel. Dia memberi 15 batang pensel kepada Vijay. Berapa batang pensel yang Amin ada sekarang?
5.	SCU	Separate Change Unknown	Osman memancing 36 ekor ikan. Dia memberi beberapa ekor kepada Ahmad. Sekarang Osman ada 27 ekor ikan yang tinggal. Berapa ekor ikan Osman beri kepada Ahmad?

6.	SIU	Separate Initial Unknown	Hana ada beberapa keping biskut. Dia memberi 8 keping biskut kepada Lily. Sekarang Hana ada 16 keping biskut. Berapa keping biskut Hana ada pada mulanya?
7.	CDU	Compare Difference Unknown	Danish ada 23 biji belon dan Amir ada 13 biji belon. Berapa biji belon Danish lebih daripada Amir?
8.	CLU	Compare Larger Unknown	Afiq baca 25 buah buku cerita. Alya baca 9 buah buku cerita lebih daripada Afiq. Berapa buah buku cerita yang Alya baca?
9.	CSU	Compare Smaller Unknown	Haifa ada 4 keping setem kurang daripada Lim. Lim ada 17 keping setem. Berapa keping setem yang ada pada Haifa?
10.	PWU	Part-whole Whole Unknown	Dina ada 24 biji guli merah dan 13 biji guli biru. Berapa biji guli yang ada pada Dina kesemuanya?
11.	PPU	Part-whole Part Unknown	Chong membeli 43 biji epal daripada sebuah pasaraya. 29 biji epal berwarna merah dan selebihnya berwarna hijau. Berapa biji epal hijau yang dibeli oleh Chong?

Table 4. Samples involved in study according to grade levels

	Grade	Frequency	Percent
Level	Year 1	136	23.9
	Year 2	141	24.7
	Year 3	161	28.2
	Year 4	132	23.2
	Total	570	100.0

Table 5. Responses classification

Label	No attempt	Some attempt but unlikely to lead to a solution	Minor/careless/silly error(s)	Correct answer
Value	0	1	2	3

Max Score:33

Third phase - Relationship between Textbook Distribution and Pupils Achievement

This third phase investigates the relationship between the distribution of the types of problems in the texts with pupils scored in the achievement test.

3. Findings of study

This section presents the findings of study.

a) ***Phase One- Distribution of Van De Walle's Word Problem Categories in Mathematics Texts across Grade Levels***

Table 6 depicts the distribution of Van De Walle's word problem categories in mathematics texts across grade levels. The analysis shows that the highest representation across grade levels are in the SRU, JRU and PWU categories. On the other hand, the lowest representations are in the JIU, CSU (except grade 4) and CLU categories. It shows a consistency of these high and low categories representation across grade levels in Malaysian school text, especially among Year 1, Year 2 and Year 3.

Table 6. Distribution of Van de Walle's Categories in Mathematics Texts across Grades

Cat	Y1 (%)	R1	Y2 (%)	R2	Y3 (%)	R3	Overall Y1, Y2, Y3	R123	Y4 (%)	R4	Overall Y1, Y2, Y3, Y4	R1234
JRU	33.1	2	24.59	2	18.49	3	25.39	2	17.92	2	23.53	2
JCU	4.24	6	1.64	7	8.40	5	4.76	5	5.19	6	4.87	5
JIU	0.85	10	0	10	0	11	0.28	11	1.89	11	0.69	11
SRU	35.0	1	32.79	1	22.69	1	30.16	1	14.15	4	26.16	1
SCU	5.10	5	1.64	8	0.84	9	2.53	8	4.25	9	2.96	8
SIU	2.50	8	6.56	5	5.04	6	4.70	6	2.36	10	4.12	6
CDU	5.93	4	8.20	4	19.33	2	11.15	4	16.98	3	12.61	4
CLU	1.69	9	1.64	9	3.36	7	2.23	9	4.72	7	2.85	10
CSU	0.80	11	0	11	0.84	10	0.55	10	9.91	5	2.89	9
PWU	6.78	3	18.03	3	17.65	4	14.15	3	19.34	1	15.45	3
PPU	4.23	7	4.92	6	3.36	8	4.17	7	3.30	8	3.95	7

*R denotes Ranking

b) ***Phase 2-Pupils' Achievement Analysis in Word Problem Test (WPT)***

This test was administered to 570 pupils ranging from Year 1 to Year 4. Table 7 shows the descriptive statistics pupils' achievement in the WPT. As expected, the highest mean score is obtained by the Year 4 pupils, followed by Year 3, Year 2 and Year 1 with mean scores of 26.92 (SD=4.77), 23.63(SD=5.27), 22.05 (SD=6.09) and 16.42 (SD=5.82) respectively. In other words, the percentages scores from Year 4 to Year 1 in the WPT are 81.6%, 71.6%, 66.8% and 49.8% respectively.

Table 7. Descriptive statistics of pupils' achievement in the WPT across grades

Year	N	Mean	Std. Deviation
Year 1	136	16.42	5.82
Year 2	141	22.05	6.09
Year 3	161	23.63	5.27
Year 4	132	26.92	4.77
Overall	570	22.28	6.63

Max score: 33

To investigate if there are significant differences among these mean scores, a One-Way ANOVA analysis was conducted as shown in Table 8. The finding shows significant differences [$F(3,566) = 85.778$, $p < .05$] at the 0.05 level. This indicates that pupils at higher grades obtain a higher mean score than pupils at lower grades namely Year1, Year 2, Year 3 and Year 4. A post Hoc test was conducted in order to identify the differences within the grade levels (refer to Table 8).

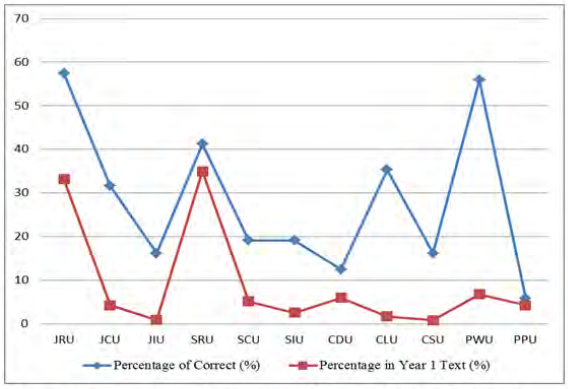
Table 8. One-Way ANOVA Outcomes

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	7821.140	3	2607.047	85.778	.000
Within Groups	17202.384	566	30.393		
Total	**25023.525**	**569**			

The LSD comparisons show significant differences in the mean scores between all grade levels involved in this study. The Year 4 mean score (M=26.92) has a significantly higher mean value than the Year 1 (M=16.42), Year 2 (M= 22.05) and Year 3 (M=23.63) scores. Similarly, Year 3 has a significantly higher mean score than Year 2 and Year 1 and Year 2 has a significantly higher mean score than Year 1.

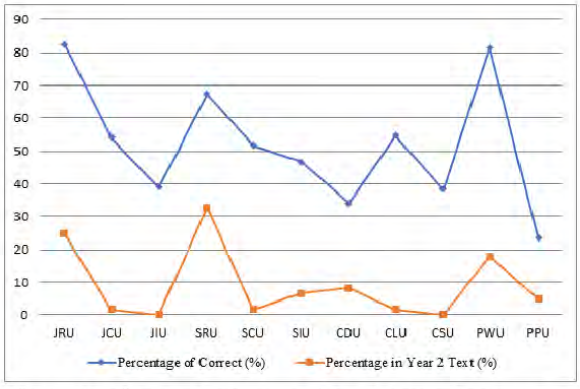
c) *Relationship Between Achievement in the WPT Categories and Distribution of Van De Walle's Categories in Mathematics Texts across Grade Levels*

In comparing the relationship between the pupils' achievements (based on rank) with the distribution of word problem categories in Mathematics Text year 1 as shown in the visual representation in Figure 1, there seems to be a similar ranking for all categories except for the CDU, CLU and PPU category. Similarly, as shown in Figure 2 between achievement in the WPT categories and the distribution of word problem categories in Mathematics Texts for Year 2, there seems to be a similar ranking for all categories except for CDU and CLU. This visual representation of these similarity rankings is also prevalent in Figure 3 and Figure 4 representing the text for Year 3 (except for CDU and SCU) and Year 4 (except for CDU and CSU).



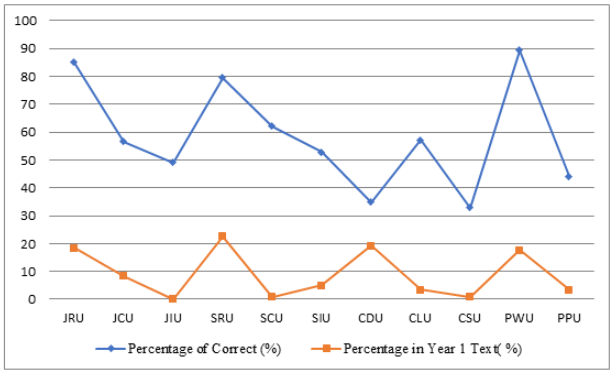
Comparison between Percentages of Pupils Correct Response with Word Problem Distribution for Each Category in Year 1 Text

Fig 1



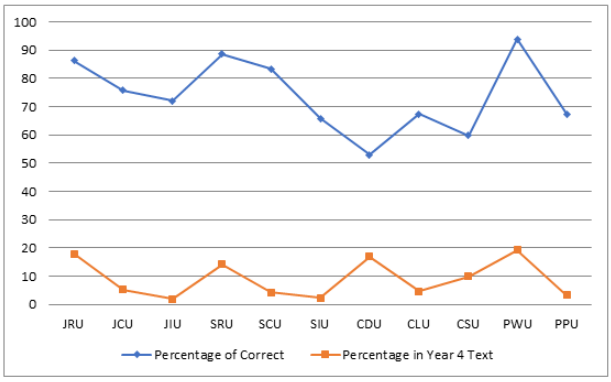
Comparison between Percentages of Pupils Correct Response with Word Problem Distribution for Each Category in Year 2 Text

Fig 2



Comparison between Percentages of Pupils Correct Response with Word Problem Distribution for each category ini Year 3 Text

Fig 3



Comparison between Percentages of Pupils Correct Response with Word Problem Distribution for each category ini Year 4 Text

Fig 4

Table 10 shows a moderately positive and correlation coefficient of r_s =.573 between the Word Problem Test achievement categories and the Mathematics Text's distribution categories in the Year 1 Text, however, this relationship is not significant (p= .066) at the 0.05 level. Similarly, these positive and moderate correlation coefficients prevailed among Year 2 Text (r_s =.487), Year 3 Text (r_s =.455) and Year 4 Text (r_s =.336) in a decline manner with no significant relationship among them.

Table 10. Relationship between Word Problem Test achievement categories and Mathematics Text's distribution categories across Grades

Spearman's rho		Text Year 1	Text Year 2	Text Year 3	Text Year 4
Word Problem Test	Spearman Correlation	.573	.487	.455	.336
	Sig. (2-tailed)	.066	.128	.160	.312
	N	11	11	11	11

However, the relationship between pupil's achievement in the WPT and the distribution of word problem in Mathematics Texts for Year 1, Year 2, Year 3 and Year 4 between each category were re-analysed when the outliers were removed as depicted in the visual representation from Figure 1 to Figure 4 (The rationale for this will be detailed in the next section under the discussion section). Table 11 shows the new correlation coefficient when the outliers were removed from each of the Mathematics Text namely Mathematics Texts for Year 1, Year 2, Year 3 and Year 4.

The analysis shows when the two outliers' categories, namely CDU and CLU were removed from the Year 1 text, a strong positive correlation of r_s =.833 was computed (refer Table 11). This relationship was significant at the 0.01 level. This simply means that 69.4% (r_{s2} = 0.694) of Year One pupils' achievement in the WPT can be explained by the Mathematics Text's distribution categories in the Year One Textbook. Similarly, for the Year 2 Text when the similar outliers (CDU and CLU) were removed, the analysis (refer Table 11) also shows a moderately strong positive relationship with a coefficient of r_s =.695 and this relationship is significant (p= .038) at the 0.05 level. It simply means that 48.3 % (r_{s2} = 0.483) of achievement in WPT categories among Year 2 pupils can be explained by their Text book categories distribution and vice versa. Similar, a moderately high and significant correlation coefficient was obtained among the Year 3 pupils and Year 4 Pupils with their Text book categories distribution when the outliers were removed. This yields a moderately high coefficient of .833 and .633 for Year 3 (SCU and CDU) and Year 4 (SCU and CDU) respectively. This shows that 69.4% (r_{s2}= 0.694) and 40.1% (r_{s2} = 0.401) of Year 3 and Year 4 pupils achievement in the WPT categories can be explained by their text book categories distribution and vice versa.

Table 11. Relationship between Word Problem Test achievement categories and Mathematics Text's distribution categories across Grades when outliers removed

Spearman's rho		Text Year 1	Text Year 2	Text Year 3	Text Year4
Word Problem Test	Spearman Correlation	.833**	.695*	.833	.633
	Sig. (2-tailed)	.005	.038	.005	.047
	N	9	9	9	9

Year 1-**CDU and CLU removed; *Year 2*-**CDU and CLU removed; *Year 3*-*SCU and CDU removed
Year 4-*SCU and CDU removed

4. Discussion and conclusion

The findings of the study depict that the type of word problems categorization based on Van de Walle's framework were not represented systematically in all the math text used in schools from Year 1 to Year 4. Furthermore, these representations were not in accordance with the cognitive growth demand across the four levels. For each grade level (Year 1, Year 2, Year 3 and Year 4), Separate Results Unknown (SRU) and Joint Results Unknown (JRU) categories have the highest representation in the mathematics text category.

SRU: *Amin membeli 27 batang pensel. Dia memberi 15 batang pensel kepada Vijay. Berapa batang pensel yang Amin ada sekarang*

JRU: *Hasni ada 12 kuntum bunga di dalam bakul. Sara memberi 6 kuntum bunga lagi kepada Hasni. Berapa kuntum bunga yang Hasni ada kesemuanya?*

On the other hand, the lowest representations were in the categories of JIU, SCU and CSU respectively.

JIU: *Lina ada beberapa biji gula-gula. Aishah memberinya 15 biji lagi. Sekarang Lina ada 33 biji gula-gula. Berapa biji gula-gula Lina ada pada mulanya?*

CSU: *Haifa ada 4 keping setem kurang daripada Lim. Lim ada 17 keping setem. Berapa keping setem yang ada pada Haifa?*

SCU: *Osman memancing 36 ekor ikan. Dia memberi beberapa ekor kepada Ahmad. Sekarang Osman ada 27 ekor ikan yang tinggal. Berapa ekor ikan Osman beri kepada Ahmad?*

Although the types of books used in this study (based on KSSR) were different from the study conducted by Parmjit (2006) which was based on KBSR, the outcomes were consistent, representation wise. Textbooks that do not include content knowledge in a systematic manner or do not expose pupils to different problem types tend to pose an inhibition on a pupil's content knowledge of mathematics learning (Greer, 1997; Peterson, Fennema & Carpenter, 1989). This implicitly implies that a pupil's ability in learning the various types of word problems in addition and subtraction operations meaningfully, is hampered. This finding suggests that no changes have taken place in the textbook content from the old Curriculum to the New KSSR. Why? This seems to suggest that Math curriculum developers are not reading research journals and articles to keep abreast with the latest findings in curriculum matters relating to the teaching and learning of mathematics. Thus, it is strongly recommended for curriculum developers, especially book writers to take into consideration Van de Walle (1998) frame-work categorization as guidelines to improve the content deficits for future textbooks in Malaysia.

As addition and subtraction are the most basic operations that should be mastered, the variation of the word problems as modelled in Van De Walle's model ought to be posed according to the level of difficulty. The less difficult category (JRU and SRU) ought to have greater representation in the early years (e.g. Year One and Year Two) of Mathematics Texts and gradually decrease in subsequent years while on the contrary, the more difficult categories (PPU, CDU, CSU/ JIU, SCU and CSU) should have a higher representation in Year Three and Year Four, and decrease in the early years. Pupils must be given enough exposure and experiences to all eleven categories in order to develop a rich and meaningful learning concept of addition and subtraction. This will be detrimental to the advances of cognitive growth of pupils in conceptualizing addition and subtraction development. Furthermore, this will also hinder the development of pupils' problem-solving skills as their learning will be based on isolation with disconnected procedural facts (Carpenter, Franke, and Levi, 2003).

In terms of categorical responses (correct and incorrect responses), the highest correct responses by Year One pupils were in the categories of JRU (57.4%) and SRU (41.2%) compared to Year Two, JRU (82.3%), SRU (67.4.3%). There were also similar highly correct responses for Year Three (JRU=85.1%, SRU= 79.5%) pupils and Year Four (JRU=86.4%, SRU= 88.6%) pupils. These findings were in tandem to the findings by previous researchers (Parmjit & Teoh, 2010; Olkun & Toluk, 2003). Their studies also revealed that the SRU and JRU categories were the easiest among Van De Walle's eleven categories while the JIU, SCU and CSU categories were the most difficult. Pupils were found to be at ease when solving questions which they have been exposed or familiar with in their classroom and vice versa.

The study found a moderately strong and significant relationship between the distribution of the word problem categories in Mathematics Texts and pupils' achievement across all grade levels after the outliers were removed (CDU, CLU for Year 1 & Year 2 and SCU and CDU for Year 3 & 4). The strength of the significant relationship between these two variables were: in Year One (r_s =.833, p= .005), Year Two (r_s=0.695, p=.038), Year Three (r_s = .833, p =.005) and Year Four (r_s =.633, p=.047). This simply means that for 69.4% (Year One), 48.3% (Year Two), 69.4% (Year Three) and 40.1% (Year Four) of pupils, achievements in the Word Problem Test can be explained by the distribution of the word problem categories in school mathematics texts and vice versa. In other words, pupils seemed

to have a high success rate in the categories that were overrepresented and a low success rate in categories that were underrepresented in the Mathematics Texts. These outcomes were similar with the previous studies of Olkun and Toluk (2003). Both mathematics texts and word problems are important in the learning process of mathematics, as elucidated by Ball and Cohen (1996) "curriculum materials could contribute to quality practice if they were created with closer attention to processes of curriculum enactment" (p. 7). The Malaysian Textbook Division could benefit from this study as it provides data of how well mathematics texts (Primary textbook and activity book) affect pupils in the content area of addition and subtraction word problem representations. As discussed in the literature, some of the word problem categories were insufficient and some were overrepresented. The unsystematic ration of categories in school textbooks should be an issue of concern for mathematics educators.

5. Implication and Recommendation

Textbooks play such an important role, and this is more so when teachers graduating from college with not much experience deal with school math. These books act as the initial source of knowledge especially for these novice teachers as it provides a sense of confidence and works in curbing anxiety when it comes to dealing with new content knowledge in classroom teaching. This was also elucidated by Ball and Feiman-Nemse (1988) depicting the role of textbook as a class organizer and guideline, especially for inexperienced teachers. A deep understanding of mathematics and of subject-specific content is crucial for teachers and for pupils learning of mathematics. If no action is taken by the Ministry of Education in examining the current content of the curriculum, pupils will be left behind as stated earlier and teachers will teach outdated material. This will have a direct negative impact on the quality of mathematics education. More professional development courses need to be held for teachers to keep abreast with current models of learning such as using Van de Walle (1998) framework. As mathematics syllabuses keep expanding and focus more on high order thinking skills among pupils, it is important to make sure that the sources are well prepared for the cause. Therefore, the curriculum and textbook developer should consider taking input from research to provide up to date information related to curriculum matters and in this case to the variety of word problem categories in ration that benefit pupils across levels.

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