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## **INFORMING THE PRACTICE OF MATHEMATICS TEACHING IN THE UPPER PRIMARY CLASSES**

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**ABSTRACT:** In a nationwide study conducted in Brunei Darussalam, a survey was given to 322 Mathematics teachers teaching upper primary classes in all government primary schools. One of the aims of the study was to examine the professional practice of teachers in relation to the teaching of Mathematics including the teachers' understanding of the curriculum and their sense of preparedness in the teaching of primary Mathematics topics. From the findings, 44.3% of teachers recorded a high understanding of the new reformed curriculum goals. However, only 20.2% indicated their degrees of success in the implementation. In relation to the teachers' sense of preparedness, the primary Mathematics teachers rated themselves as well prepared in teaching majority of the topic areas listed under Number and Operations, Measurement, Geometry and Statistics (between 83% to 96%). While the teachers' preparedness to teach Algebra (77.0%) and Mathematical Thinking and Problem Solving (65.2%) were not as encouraging.

**Key words:** Mathematics Teaching; Upper Primary, Newly Reformed Education Curriculum; Teachers' Preparedness, Brunei Darussalam

### **INTRODUCTION**

The primary years are important in laying the foundations for the development of children's numeracy skills. Students who complete primary schooling with strong numeracy skills are more likely to be successful in secondary school, and to continue on to further education and training so that they acquire the knowledge and skills that will enable them to be productive in the workplace. It has been observed that the abilities to analyse and problem-solve depend on a firm command of the basic enabling skills of literacy and numeracy (Masters, 2009). Numeracy skills are essential to prepare students to meet with the academic demands of schooling, and for future success in the workplace. In addition, numeracy skills are also important for life in the home and community as both print and digital texts play an increasing role in the activities of daily life.

The rationale for the focus on teachers and teaching draws from the fact that teachers play an important role in enabling students to acquire numeracy skills through the implementation of the newly reformed national education curriculum, *Sistem Pendidikan Negara Abad ke-21* (hereafter referred to as SPN21 or the 21<sup>st</sup> Century National Education System), and the delivery of programmes and other initiatives aimed at improving learning outcomes in Mathematics. Furthermore, the rationale to focus on the upper primary levels of schooling draws from prior research that highlight these levels of schooling as important in terms of the transitions students have

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to make in terms of curricular demands. Students who fail are at risk of failure in the later years (Croninger et al., 2012). It has been noted that the key to improving learning in primary schools is through improving the quality of classroom teaching (Masters, 2009). Barber and Mourshed (2009) observe that students placed with high performing teachers' progress faster than those placed with low-performing teachers. A major factor in students' learning of numeracy, therefore, is the quality of the teaching of numeracy that they experience in primary school.

The mode of language instruction for the teaching of Mathematics in the lower primary school levels started with the use of Malay Language. It was only in 2008 that Mathematics was then taught in English Language across all the primary levels in schools in Brunei Darussalam. This study encompassed the entire population of teachers for Mathematics for upper primary classes in government schools in Brunei Darussalam. The national survey was administered in relation to the entire cohort of this teaching force. Respondents were informed that all data obtained would be confidential and anonymity was ensured. The aims of this nationwide study were to:

- ✓ Develop a profile of the contexts of teaching in schools.
- ✓ Examine the professional practice of teachers in relation to the teaching of Mathematics including the use of teaching strategies in the delivery of curriculum specifications for this subject.
- ✓ Profile teachers' professional learning by way of their participation in and need for continuing professional development, as well as teachers' perceptions of changes in their practice.

## **METHODS**

This nationwide survey on teachers and the teaching of Mathematics which was conducted in 2013 focused on the following dimensions: Teacher demographics; Aspects of teaching in relation to the respondent's school; the professional practices of respondents; Practices in relation to the teaching of Mathematics; and Professional development experiences and beliefs of teacher respondents (Shahrill et al., 2014). In this paper, we will only report on the findings comprising of the dimensions in relation to the teacher practices in the teaching of Mathematics that is 'Teacher Knowledge and Preparedness'.

In developing the questionnaire, relevant literature were reviewed (e.g. IAEEA, 2005; 2007; Mullis et al., 1999; OECD, 2009; Poet et al., 2010; Richards et al., 2001; Wray et al., 2013) on the teaching and the professional development of teachers to identify dimensions which would impact students' learning including with regards targeted subject areas. A pilot study was conducted with a sample of 53 upper primary teachers of Mathematics from private primary schools in the nation. The pilot results of the instrument showed that the instrument could be applied in the Bruneian government primary school context and the scales were found to have an acceptable level of reliability which was 0.96 of the Cronbach Alpha. The purpose of the pilot was to examine if the questions actually elicited the intended information for the study and to ensure that the terminology used was understood by each respondent. Suggestions were solicited from the respondents and modifications were made to the questionnaire where several items had to be reworded and mistakes and misinterpretations found were rectified.

For the main study, the questionnaires were administered in 120 government primary schools in all the four districts in Brunei Darussalam to Years 4 to 6 subject teachers of Mathematics (in total 322 teachers). A total number of 310 questionnaires were returned, a 95% return rate in relation to the questionnaires which were distributed. However, only 287 respondents' survey scripts were viably used for further analyses. Codes were developed for questionnaire items for the keying in of data. The quantitative analysis was computed using the IBM SPSS Version 21 software. The basic analysis of the survey data involved frequencies, percentages and some cross-tabulations. Table 1 below represents the demographics of upper primary teacher respondents.

**Table 1. The Demographics for the Upper Primary Mathematics Teachers (N = 287)**

Description	Frequency	%	
Gender	Male	49	17.1
	Female	238	82.9
Age	Below 20	2	0.7
	21-30	72	25.1
	31-40	131	45.6
	41-50	56	19.5
	51-60	26	9.1
Highest Qualification*	BC GCE O Level (Year 11 equivalent)	10	3.5
	BC GCE A Level (Year 13 equivalent)	16	5.6
	HNC, NC, NC or Certificates	33	11.5
	HND, ND, OND, or Diplomas	66	23.0
	Bachelor Degree	132	46.0
	Master Degree	28	9.8
Number of years as a Mathematics teacher**	PhD	1	0.3
	0-5	86	30.0
	6-10	105	36.6
	11-15	38	13.2
	16-20	27	9.4
	21-25	10	3.5
	26-30	10	3.5
	31-35	7	2.4
36 years and above	1	0.3	

Note: \* One with no response. \*\* Three with missing responses.

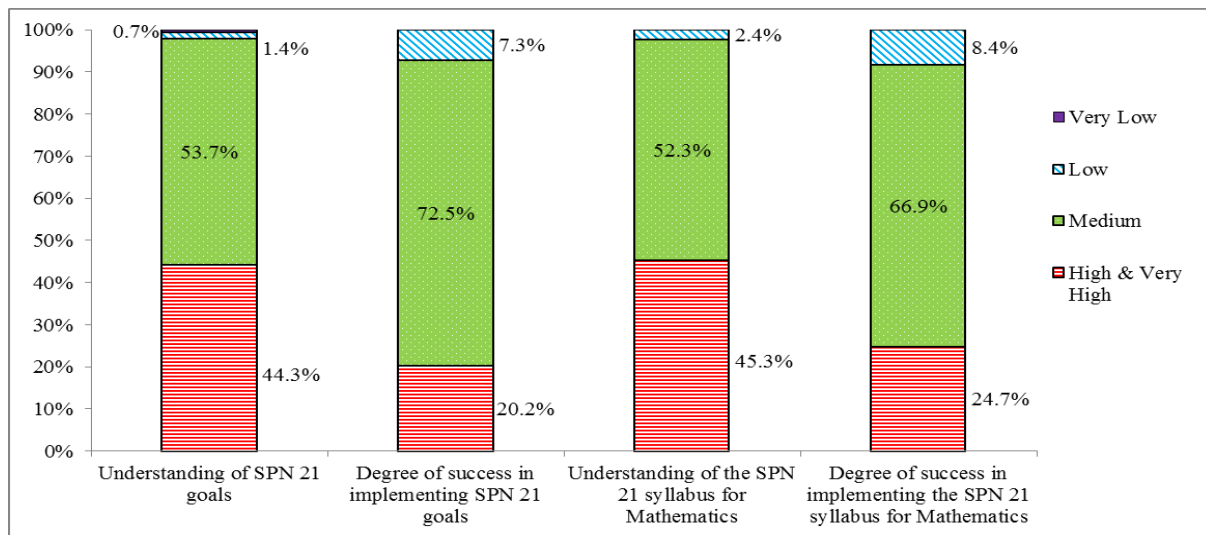
## RESULTS

### Teaching Mathematics in Upper Primary Classes

In teaching Mathematics in primary classes, teachers may draw from a wide repertoire of practices to develop pedagogical routines and teaching practices in relation to the aspects of mathematical learning stipulated in the national curriculum for Mathematics. Informing the practice of teaching Mathematics in Bruneian upper primary classes are the teacher’s understanding of the curriculum, and a sense of preparedness in relation to the teaching of the subject.

#### Teacher Knowledge of the Curriculum

The national curriculum is realised through the teaching that takes place in schools. Vital to its effective enactment is teachers’ understanding of the broad curriculum goals, as well as subject specific aims and objectives. In one of the survey items, the teachers were asked to report on their understanding of the goals of SPN21 and the Mathematics syllabus, as well as their degrees of success in implementing these curriculum frameworks. The results in the Figure 1 below indicated that 44.3% of teachers recorded a high to a very high understanding of the SPN21 goals. However, only 20.2% indicated their degrees of success in implementing the SPN21 goals. Here we also raise questions about factors that may have impeded the effective implementation of the curriculum. The largest proportion of teachers saw themselves as having a moderate understanding of curriculum goals (53.7%) with a similar degree success in putting them into practice (72.5%).



**Figure 1. Teachers' Understanding and Perceived Success in Implementing the Curriculum**

From Figure 1, the Mathematics primary teachers indicated a relatively higher proportion (45.3%) in understanding the SPN21 syllabus for Mathematics. However, about a quarter (24.7%) of the teacher sample rated themselves as very successfully having implemented the syllabus through their teaching. Just over half of the teacher sample (52.3%) indicated a moderate understanding of the Mathematics syllabus and a much higher sample (66.9%) reported having moderate success in implementing the SPN21 syllabus for Mathematics.

In relation to the findings of the cross tabulations between the number of years as a Mathematics teacher and this survey item overall, we anticipated that many of the beginning teachers (between 0 to 11 years of teaching experience as a Mathematics teacher) would have indicated high or very high understanding of the SPN21 goals or the SPN21 syllabus for Mathematics. However, these were not the case. Many of them reported a medium level of understanding. In contrast, those who had indicated a high to very high proportion in understanding, we anticipated that they will be able to successfully implement the SPN21 goals or the SPN21 syllabus for Mathematics to a higher degree of implementation. Again, these do not appear to be. The number of teachers decreased, across the range of the number of teaching years in regard to the success in implementing.

### *Preparedness to Teach Mathematics*

We also probed teachers' sense of preparedness in relation to teaching the specific topic areas in the primary Mathematics syllabus. There are several areas in relation to the main topics listed, which are Number and Operations, Measurement, Geometry, Statistics and, Algebra or Pattern and Relation. The results are given below in Table 2. The overall results indicated that the primary Mathematics teachers rated themselves as well prepared and very well prepared in teaching majority of the topic areas listed (between 83% to 96%), with the exception of topic areas in Rates (74.8%), Algebra (77.0%) and Mathematical Thinking and Problem Solving (65.2%).

**Table 2. Teachers' Preparedness to Teach the Mathematics Topic Areas**

Mathematics topics and sub-topics		Percentage (%)			
		Not prepared at all	Not well prepared	Somewhat prepared	Well prepared & Very well prepared
Number & Operations	Whole Numbers	0.0	0.0	3.1	96.9
	Order of Operations	0.0	0.0	3.5	96.5
	Multiplication and Division	0.0	0.0	8.4	91.6
	Fractions	0.0	0.7	15.4	83.9
	Decimals	0.0	0.7	9.8	89.5
	Percentages	0.0	1.4	15.1	83.5
	Rates	0.7	3.9	20.6	74.8
	Mental Computation	0.0	1.7	15.7	82.6
Measurement	Time	0.0	0.7	10.2	89.1
	Perimeter and Area	0.0	0.0	6.6	93.4
	Length, Mass and Volume	0.0	0.7	7.0	92.3
	Volume and capacity	0.4	0.7	8.9	90.1
	Surface area of solids	0.4	1.4	13.1	85.2
	Volume of solids	0.4	1.1	11.7	86.8
Geometry	Lines and Angles	0.0	0.0	4.2	95.8
	Angles and Triangles	0.0	0.0	4.2	95.8
	Tessellations	0.4	1.4	14.4	83.8
	Quadrilaterals	0.0	0.0	8.4	91.6
	Position and Direction	0.4	0.7	12.1	86.9
	Nets of solids	0.4	0.4	14.2	85.1
Statistics	Collect Data in the Form of Table	0.0	1.0	11.5	87.5
	Read, Interpret, and Draw Simple Bar Graphs and Pictograms	0.0	0.3	10.5	89.2
	Read, Interpret, and Draw Simple Bar Graphs and Pictograms	0.0	0.3	10.5	89.2
	Line Graphs	0.7	1.4	10.6	87.3
	Average	0.7	1.4	12.7	85.2
Algebra / Pattern & Relation	Algebra	1.1	2.1	19.9	77.0
	Mathematical Thinking and Problem Solving	0.3	4.2	30.3	65.2

## CONCLUSION and RECOMMENDATIONS

According to Mullis et al. (1999), teachers' familiarity with the intended curriculum documents can influence the teachers' planning as well as the content delivered and the the kinds of instructional methods to be used. From our findings, the upper primary Mathematics teachers' understanding and their perceived success in implementing the curriculum was not encouraging. This suggests the need for a continuous professional development series if teachers are to realise their full potential as competent practitioners capable of successfully

delivering the syllabus. Teachers' understanding of both the national curriculum and the Mathematics syllabus are critical as these documents articulate goals and provide frameworks for practice, which shapes students' learning. Further findings also revealed that the teacher respondents relied heavily on the use of workbooks (96.5%), followed by the category labelled as 'others' (78.2%) and textbooks (67.8%) as the resources used in their Mathematics lessons. These are expected findings because in Mathematics lessons, teachers are dependent on the readily available textbooks and workbooks as their main sources of references or teaching materials. In the 'others' category, majority of the responses given from the submitted questionnaires were worksheets taken from other resources listed such as from other primary mathematics textbooks, the internet and also sourced from own or other teachers' previous collections. Many have also listed the past year examination papers as the resources used by the students in their lessons.

In relation to the teachers' preparedness to teach Algebra (77.0%) and Mathematical Thinking and Problem Solving (65.2%), the results shown are not as promising. This may not be surprising as these topic areas typically involve the mathematical numbers and symbols that students may not be familiar with, although they may often encounter mathematical word problems in their classwork and/or homework exercises, tests or exam questions. Previous findings by local researchers in Brunei Darussalam (Gurung, 2003; Raimah, 2001; Saman, 2000) found that students may be having difficulties in solving word problems because the questions are set in English. However, there have been contradicting findings that suggested their level of English competency does not influence students' performance in doing mathematics word problems significantly (Pungut & Shahrill, 2014; Yusof, 2003). In addition to that, in these topic areas especially in Mathematical Thinking and Problem Solving, teachers need to have clear understanding of the processes involved in solving non-routine problems. Peker (2009) found that pre-service primary teachers have less anxiety in teaching mathematics when they have conceptual knowledge on problem solving strategies as compared to learning to do problem solving questions using textbook where they read the problem, decide the methods, solve and check their answers. In a different study, one of the suggested effective practices evident from the 20 successful schools surveyed was to implement problem solving with the use of real-life contexts (Ofsted, 2011). Perhaps, teachers may need to explore further to what extent they are willing to make the link of the mathematics taught and to connect real life experiences and the everyday contexts; as well as the application of mathematics for students' future and promoting mathematics as a relevant and interesting subject.

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## REFERENCES

- Barber, M., & Mourshed, M. (2007). *How the world's best-performing school systems come out on top*. McKinsey & Co.
- Croninger, R. G., Valli, L., & Chambliss, M. J. (2012). Researching quality in teaching: Enduring and emerging challenges. *Teachers College Record*, 114(4), 1-15.
- Gurung, C. (2003). A comparative study of performance in arithmetic word problems in English language between Bruneian and Ghurkha students. Unpublished M.Ed. Dissertation, Universiti Brunei Darussalam, Brunei Darussalam.
- IAEEA (2005). *Progress in International Reading Literacy Study (PIRLS 2006): Teacher questionnaire*. IEA Publishing.
- IAEEA (2007). *Trends in International Mathematics and Science Study (TIMSS 2007): Teacher questionnaire*. IEA Publishing.
- Masters, G. N. (2009). *A shared challenge: Improving literacy, numeracy and science learning in Queensland primary schools*. Australian Council for Educational Research.
- Mullis, I. V. A., Martin, M. O., Beaton, A. E., Gonzalez, E. J., Kelly, D. L., & Smith, T. A. (1997). *Mathematics achievement in the primary school years: IEA's Third International Mathematics and Science Study (TIMSS)*. IEA Publishing.
- OECD (2009). *Creating effective teaching and learning environments: First results from TALIS*. OECD Publications.
- Ofsted (2011). *Good practice in primary mathematics: Evidence from 20 successful schools*. Manchester, UK: Corwin.
- Peker, M. (2009). The effects of an instruction using Problem Solving strategies in mathematics on the teaching anxiety level of the pre-service primary school teachers. *The New Educational Review*, 119(3-4), 95-114.
- Poet, H., Rudd, P., & Kelly, J. (2010). *Survey of teachers 2010: Support to improve teaching practice*. General Teaching Council for England.

- Pungut, M. H. A., & Shahrill, M. (2014). Students' English Language abilities in solving mathematics word problems. *Mathematics Education Trends and Research* [Online], 1-11. Available: <http://www.ispacs.com/journals/metr/2014/metr-00048/>
- Raimah, M. (2001). An investigation of errors made by primary six pupils on word problems involving fractions. Unpublished M.Ed. Dissertation, Universiti Brunei Darussalam, Brunei Darussalam.
- Richards, J. C., Gallo, P. B., & Renandya, W. A. (2001). Exploring teachers' beliefs and the processes of change. *PAC Journal*, 1.1, 41-58.
- Saman, A. (2000). Investigating understanding by primary six pupils of word problems involving multiplication and division. Unpublished M.Ed. Dissertation, Universiti Brunei Darussalam, Brunei Darussalam.
- Shahrill, M., Abdullah, N. A., & Yusof, J. (2014). Teachers and Teaching of Mathematics in Primary Schools in Brunei Darussalam. Ministry of Education, Brunei Darussalam.
- Wray, D., Medwell, J., Poulson, L., & Fox, R. (2013). *Teaching literacy effectively in the primary school*. London: Routledge.
- Yusof, J. (2003). Mathematical errors in fractions word: A longitudinal study of primary level pupils in Brunei. Unpublished Ph.D. Thesis, Curtin University of Technology, Perth, Australia.