

# **A comparison study of Bruneian primary mathematics teachers' perceived learning in Lesson Study.**

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## **Introduction**

Lesson study or *jogyokenkyu* in Japanese refers to a process in which teachers progressively strive to improve their teaching methods by working with other teachers to examine and critique one another's teaching techniques (Isoda, Stephens, Ohara & Miyakawa, 2007, p.2). In Japan, Japanese teachers use lesson study as the core process of professional learning to continually improve the quality of educational experiences they provide to their students (Iverson & Yoshida, 2005, p.3). Yoshida (2005) summarized lesson study as a teacher-led and on-going professional development, conducted with a common overarching goal, focused on subject content in the context of student thinking and 'informed' by outside expertise (through knowledgeable others).

The purpose of this paper is to compare the 2 cohorts of Bruneian primary mathematics teachers' perceived learning as a result of being involved in the National Lesson Study Project in 2010 and in 2012. A sudden increase in the number of primary schools mandated to be involved in the National Lesson Study Project within only four years of its introduction has caused concerns in regards to its effectiveness in developing the Bruneian primary mathematics teachers' pedagogical and content knowledge hence their abilities to implement the curriculum effectively. Lesson Study is one of the initiatives mentioned by the Ministry of Education, to facilitate the process of curriculum reforms (Ministry of education, 2012).

## **Methods**

A comparison will be made between 2 cohorts of lesson study practitioners, teachers who were involved in the National Lesson Study Project 2010 (cohort 1) and National Lesson Study Project 2012 (cohort 2). The 25 questionnaire items were adapted from the first author's previous research on the impact of lesson study on Brunei primary mathematics teachers in 2010. In 2010, a total of 28 lesson study practitioners who were involved in the National Lesson Study Project were surveyed. The 25 questionnaire items were also included in the teachers' questionnaire, which was piloted and distributed in 2014. The pilot study was conducted involving the distribution of a pilot lesson study teachers' questionnaire to 47 government primary schools. All lesson study practitioners from the 47 primary schools who were involved in the National Lesson Study Project in 2012 were asked to complete the questionnaire, however only 42 teachers' responses were collected, an 89% return rate.

## **Samples**

This study includes 2 cohorts of primary mathematics teachers who were directly involved in the National Lesson Study Project in 2010 and 2012 as the practitioners of Lesson Study. For the purpose of this paper, lesson study practitioners refer to the

primary mathematics teachers who were directly involved in the planning, teaching or re-teaching and reflecting of their research lessons. It is important to note that teachers who acted as facilitators or the knowledgeable others of the lesson study projects are not among the lesson study practitioners. No primary mathematics teacher from the 2010 cohort was involved in the 2012 National Lesson Study Project as a lesson study practitioner. Because of their previous experience with lesson study, all the lesson study practitioners from cohort 2010 were designated as facilitators or knowledgeable others in the 2012 National Lesson Study Project. Table 1 below represents the demographics of the two cohorts of lesson study practitioners.

*Table 1. Teachers demographics of the two cohorts of lesson study practitioners*

Description		Lesson study practitioners cohort 2010		Lesson study practitioners cohort 2012	
		N	%	N	%
Gender	Male	5	18	5	12
	Female	23	82	37	88
Age	18-25	5	18	0	0
	26-35	17	61	28	67
	36-45	6	21	11	26
	46 and above	0	0	3	7
Highest Qualification	Certificate or Diploma	15	54	17	40
	Bachelor Degree	13	46	20	48
	Masters' Degree	0	0	5	12
Number of years as a Mathematics teacher	0-5 years	12	43	12	29
	6-10 years	11	39	14	33
	11-15 years	5	18	10	24
	16 years and above	0	0	6	14

From the above table, it is important to note the obvious differences in terms of the 'quality' of the primary mathematics teachers who were involved in the lesson study projects of 2010 and 2012. Looking at the lesson study practitioners from cohort 1, it is evident only 46% of the practitioners were a Bachelor's or Master's degree holder compared to 60% in cohort 2. Also, 38% of the lesson study practitioners from cohort 2 had been teaching mathematics for more than 10 years (11-15 years and 16 years and above) compared to 18% from cohort 1. Their teaching experiences and their teaching qualification might have influenced to some extent the way they perceived their learning within the framework of lesson study.

## **Results**

### *Teachers' questionnaire*

In order to investigate Brunei primary mathematics teachers' perceptions of lesson study with regards to its impact on their knowledge, skills and abilities, the quantitative data was computed using IBM SPSS software. Independent T-test analysis was used to compare the means of all the items in the teachers' questionnaire between the two cohorts of lesson study practitioners. On the teachers' questionnaire, teachers were

asked to provide a rating for each item. The ratings were (1) Strongly Agree, (2) Agree, (3) Disagree and (4) Strongly Disagree. Entries in Table 2 and Table 3 compares teachers' perceptions of their learning within the lesson study framework.

Table 2. *Cohort 1 and Cohort 2 teachers' perceptions of the impact of lesson study*

	Cohort 1			Cohort 2		
	N	Mean	SD	N	Mean	SD
1. Planning together broadened my knowledge of the mathematics content/subject matter.	28	1.39	.497	42	1.52	.505
2. Planning and preparing to teach the topic we have chosen caused me to engage in mathematical reasoning and problem solving.	28	1.50	.577	42	1.76	.484
3. Planning together helped me to be aware of the new mathematics curriculum.	28	1.50	.509	42	1.81	.455
4. Planning together helped me understand more on students' way of thinking and learning mathematics concepts.	28	1.57	.504	42	1.71	.457
5. Planning in a group broadened my knowledge of mathematics teaching ideas and pedagogy.	28	1.46	.508	42	1.67	.477
6. The collaborative lesson planning is beneficial for me in order for me to be a better mathematics teacher.	28	1.39	.497	41	1.73	.549
7. Observing and analyzing others' lessons helped me think more deeply about mine.	28	1.50	.577	41	1.61	.542
8. Teaching and observing the research lessons made me more critical in choosing the right teaching activities that help students to understand and think mathematically.	28	1.43	.504	41	1.88	.458
9. The reflective comments made me more aware of my general weaknesses and strengths of my own mathematics teaching.	28	1.54	.576	39	1.67	.478
10. The comments and feedback can help me to be a better mathematics teacher.	28	1.50	.577	40	1.68	.474
11. My teaching has improved after taking part in the lesson study.	28	1.89	.416	42	2.02	.412
12. I have developed a deeper understanding of the subject matter.	28	1.71	.600	42	2.02	.348
13. I have become more conscious and sensitive to students' learning needs	28	1.61	.567	42	1.95	.439

and difficulties.						
14. I will change my mathematics instructional practices after the lesson study project.	28	1.71	.600	41	2.10	.436
15. The lesson study contributes to teachers' professional development.	28	1.52	.509	42	1.93	.463
16. The lesson study has improved my perceptions on collaborative work practices to design lessons that engage students with their learning.	28	1.61	.629	42	1.95	.379
17. The lesson study has improved my understanding of students' learning.	28	1.68	.548	42	2.00	.383
18. I learnt a better way to teach the topic.	28	1.39	.567	42	1.93	.407
19. I now have a deeper understanding of the mathematics content.	27	1.63	.565	41	2.00	.500
20. I have a deeper understanding of how students learn the mathematics content in the lessons.	28	1.61	.497	42	2.00	.383
21. I have a deeper understanding of the SPN21 mathematics curriculum.	28	1.75	.518	41	2.05	.498
22. I learnt that it is important to provide activities that encourage students to think critically and creatively.	28	1.39	.497	42	1.76	.484
23. I learnt that lesson study can be implemented and are sustained in my school.	28	1.68	.476	40	2.28	.506
24. The experiences and knowledge I gained during the lesson study is very valuable and important in order to make me a better mathematics teacher.	28	1.43	.573	42	1.86	.417
25. I am willing to take part in lesson study again.	28	1.86	.705	41	2.76	.734

From Table 2, it can be observed that teachers from the National Lesson Study Project 2010 (cohort 1) mostly responded positively to all 25 items in the questionnaire as all of the ratings for all of the items are between 1.0 and 2.0 where 1.89 was the highest score. Most teachers from cohort 1 agreed that by taking part and getting directly involved with the lesson study project, they have broadened their knowledge of mathematics content/subject ( $M=1.39$ ,  $SD= .497$ ), they have become a better mathematics teacher through collaborative lesson planning ( $M=1.39$ ,  $SD= .497$ ), they learned a better way of teaching a mathematics topic ( $M=1.39$ ,  $SD= .567$ ), they became aware of the importance of providing activities that encourage students to think critically and creatively ( $M=1.39$ ,  $SD= .497$ ). In addition, the teachers from cohort 1 felt that the process of teaching and observing research lessons has helped them to be more critical in choosing teaching activities that could help their students understand and think mathematically ( $M=1.43$ ,  $SD= .504$ ), and the valuable and important experiences

during the lesson study project have helped them become a better mathematics teacher ( $M=1.43$ ,  $SD=.573$ ).

It can be observed in Table 2 that the National Lesson Study Project 2012 (cohort 2) mostly responded fairly positively as the ratings for most of the items ( $N=20$ ) are between 1.0 and 2.0. Most of the teachers from the cohort believed that by taking part in the lesson study project, they have broadened their knowledge of the mathematics content/subject matter ( $M=1.52$ ,  $SD=.505$ ), they are now able to think deeply about their teaching through observing and analyzing others' lessons ( $M=1.61$ ,  $SD=.542$ ), they have broadened their knowledge of mathematics teaching ideas and pedagogy ( $M=1.67$ ,  $M=.477$ ), they have become aware of their general weaknesses and strengths of their own mathematics teaching ( $M=1.67$ ,  $SD=.478$ ) and the comments and feedbacks during the lesson study process have helped them become a better mathematics teacher ( $M=1.68$ ,  $SD=.474$ ). In addition, the process of planning together within the lesson study framework helped them to understand students' way of thinking and learning mathematics concepts ( $M=1.71$ ,  $SD=.457$ ).

It is worth noting that despite the fairly positive responses of the teachers from cohort 2, most of them were reluctant to take part in lesson study again as the mean score for item 25 in the questionnaire is quite high ( $M=2.76$ ,  $SD=.734$ ). In addition, they also fairly believed that lesson study can be implemented and sustained in their schools ( $M=2.28$ ,  $SD=.506$ ), and fairly agreed to change their instructional practices after their involvement in the lesson study project ( $M=2.10$ ,  $SD=.436$ ). Table 3 below shows the results of t-tests and descriptive statistics of all the items in the questionnaire for both cohorts.

*Table 3. Results of t-tests and descriptive statistics by cohort*

Item s	Group						95% CI for Mean Difference		t	df
	Cohort 1			Cohort 2						
	M	SD	n	M	SD	n				
1	1.39	.497	28	1.52	.505	42	-.375	.114	-1.069	68
2	1.50	.577	28	1.76	.484	42	-.527	.004	-1.980	50.902
3	1.50	.509	28	1.81	.455	42	-.548	-.071	-2.599*	53.399
4	1.57	.504	28	1.71	.457	42	-.380	.095	-1.205	54.047
5	1.46	.508	28	1.67	.477	42	-.441	.036	-1.694	68
6	1.39	.497	28	1.73	.549	41	-.598	-.080	-2.614*	67
7	1.50	.577	28	1.61	.542	41	-.382	.163	-.804	67
8	1.43	.504	28	1.88	.458	41	-.688	-.211	-3.774*	54.372
9	1.54	.576	28	1.67	.478	39	-.398	.136	-.984	51.329
10	1.50	.577	28	1.68	.474	40	-.441	.091	-1.322	50.706
11	1.89	.416	28	2.02	.412	42	-.333	.071	-1.296	68
12	1.71	.600	28	2.02	.348	42	-.563	-.056	-2.467*	39.204
13	1.61	.567	28	1.95	.439	42	-.600	-.090	-2.723*	47.870
14	1.71	.600	28	2.10	.436	41	-.649	-.117	-2.898*	45.974
15	1.52	.509	28	1.93	.463	42	-.653	-.167	-3.382*	51.712
16	1.61	.629	28	1.95	.379	42	-.613	-.077	-2.606*	40.142
17	1.68	.548	28	2.00	.383	42	-.562	-.081	-2.697*	44.315
18	1.39	.567	28	1.93	.407	42	-.786	-.286	-4.314*	45.210

19	1.63	.565	27	2.00	.500	41	-.639	-.102	-2.767*	50.937
20	1.61	.497	28	2.00	.383	42	-.616	-.170	-3.540*	47.620
21	1.75	.518	28	2.05	.498	41	-.549	-.048	-2.390*	56.567
22	1.39	.497	28	1.76	.484	42	-.607	-.131	-3.090*	68
23	1.68	.476	28	2.28	.506	40	-.839	-.354	-4.904*	66
24	1.43	.573	28	1.86	.417	42	-.682	-.175	-3.403*	45.728
25	1.86	.705	28	2.76	.734	41	-1.253	-.545	-5.074*	67

\* $p < .05$ .

It is evident from Table 3 that there are statistically significant differences, at the .05 level of significance, between teachers and cohort 1 (2010) and cohort 2 (2012) in the following questionnaire items 3, 6, 8, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24 and item 25.

### Conclusion

The sudden increase in the number of primary schools involved in the National Lesson Study Project does not match the improvements in teachers' perceptions and attitudes towards lesson study, and teachers' learning within the framework of lesson study. Even though the lesson study model that was adopted in Brunei primary schools shares several similarities with the Japanese model in terms of basic structures and processes, it is important to take account of the differences in teaching and the collaborative culture among teachers between the two countries in exploring its effectiveness with regards to developing teachers' content knowledge and pedagogical content knowledge.

Results from Table 3 show that cohort 1 teachers responded and reacted more positively towards all the items in the questionnaire. But no statistical differences exist between teachers in cohort 1 and cohort 2 in items 1, 2, 4, 5, 7, 9, 10 and item 11. A major issue that needed to be examined is that most of the cohort 2 teachers acknowledged the positive impact of lesson study on their professional development. However it was evident that more than half of the teachers responded negatively when they were asked to respond to a statement about their willingness to again be involved in the lesson study project.

One possible reason for this negative reaction is that the knowledge and skills teachers have gained during their participation in lesson study perhaps could not compensate for the commitment they have invested in the project. The sudden increase in the number of primary schools mandated to be involved in the lesson study project in 2012 have caused the ministry's inability to implement and monitor the process of lesson study effectively. As a result, the lesson study project was not effectively and properly implemented, and perhaps has led towards the implementation of 'incomplete' or on the 'surface' type of lesson study.

Another important factor that might bring about the observed reactions of cohort 2 teachers is the fact that most of the teachers in cohort 2 are more qualified and have more experience (evident in Table 1) in teaching mathematics compared to cohort 1 teachers. It is possible that because of their existing knowledge and skills, the impact of lesson study on their learning is less compared to cohort 1 teachers that consisted mostly of teachers who possessed lower academic degrees and had less experience. However further in-depth research, using both quantitative and qualitative research methodologies

are needed to investigate the extent of the impact of lesson study on teachers of different academic background and teaching experiences.

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