

MATHEMATICS LESSON STUDY EFFECTS ON THE COMPETENCIES OF JUNIOR SECONDARY SCHOOL MATHEMATICS TEACHERS IN BANTUL, YOGYAKARTA SPECIAL TERRITORY, INDONESIA¹

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Abstract

This study was proposed to describe the effect of mathematics lesson study on teacher's pedagogical and professional competencies. The participants were mathematics teachers at junior secondary schools in Bantul, Province of Yogyakarta, a special territory in Indonesia. There were 28 participants from 28 public junior secondary schools which implemented the lesson study, and 40 mathematics teachers from a total of 40 public and private junior secondary schools which did not implement the lesson study. The pedagogical and professional competencies were measured by a package of test administered by the Indonesian government. The T²-Hotelling test showed there were no significant difference in teachers' pedagogical and professional competencies between the teachers who implemented the lesson study and those who did not. This shows that the lesson study has yet no optimal effect on the improvement of teachers pedagogic and professional competencies.

Keywords: mathematics lesson study, teacher's pedagogical and professional competencies, juniors secondary schools

1. Introduction

A strategy to develop teacher's competency might be lesson study. Lesson study was initially promoted in Japan. The term of lesson study emerged from the Japanese term *jugyokenkyuu*, *jugyo* which means learning instruction (lesson) and *kenkyuu* which

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means study or research ¹. It can be defined that “*lesson study 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 methods*” ⁴. It is also asserted that *lesson study is a complex process, supported by collaborative goal setting, careful data collection on student learning and enable productive discussion of difficult issues* ⁵. The characteristics of lesson study are (1) *lesson study is centered around teachers*; (2) *lesson study is student focused*; (3) *lesson study has a research lesson*; (4) *lesson study is a reflective process*; (5) *lesson study is collaborative* ³.

Lesson study has been successful in Japan and therefore it is now being adopted by many countries. Particularly lesson study in mathematics has been tried in Thailand, North America, Philipina, Cambodia, Laos, Egypt, Kenya, Ghana, South Afrika, Honduras, as well as Indonesia. Some of these countries have been successful in implementing lesson study. For an example, in Thailand, lesson study was found to improve pedagogical competency and in Cambodia, it was informed that it can improve student’s problem solving skills. In Indonesia, the propose of lesson study is to improve mathematics skills in Primary and Secondary schools by teachers collaborating with lectures from Faculty of Education in universities as well as stakeholders.

The achievement of lesson study activity has been reported by Takaharu Komiya, as published by Isoda ⁴ “*lesson study is able to implement students’ mathematical activities and able to develop ideas to foster students’ basic mathematical skills*. As was found by Garfield ² that, “*lesson study is effective to increase the learning outcomes*”. In Indonesia, Sukirman ⁶ found that lesson study also improve teacher’s competency and student’s motivation during mathematics learning.

In Bantul, Yogyakarta, where this research was conducted, lesson study has been held since 2007. This lesson study is a collaboration between Yogyakarta State University and The local government of Bantul, Yogyakarta. This research was to investigate the influence of lesson study whether it can improve teaching skills, as found in other countries described above.

This experiment was specifically to examine if there is any difference of competency between teachers who implemented lesson study and did not implement lesson study. The competency was measured using a test package administered by the Government of

Indonesia. This test was call *Uji Kompetensi Guru* (Teacher Competency Test, known as an acronym of UKG) and has been completed in 2012 and 2013. The sample was all 202 mathematics teachers in Bantul. There were 113 teachers who implemented lesson study and 89 teachers who did not. Multivariate analysis was run after the data collection.

2. Main Body

2.1. Descriptive analaysis result

The data was grouped into two: Group 1 was for lesson study teachers and Group 2 was for non-lesson study teachers. The scores was averaged and are described in Table 2.1 below.

Table 2.1 Descriptive Statistics

	Treatment	Mean	Std. Deviation	N
Pedagogic	LS (Group 1)	56.71	15.56	113
	Not LS (Group 2)	52.43	13.54	89
	Total	54.83	14.83	202
Professional	LS (Group 1)	69.50	10.12	113
	Not LS (Group 2)	67.43	9.84	89
	Total	68.59	10.03	202

It can be seen from the table above that the mean scores for Group 1 (lesson study teachers) was higher than Group 2 (non-lesson study teachers) both for pedagogic and professional measure. The significances of the mean differences are reported in the following section.

2.2. Inferential analysis result

Homogeneity and normality tests were conducted before the main multivariate tests.

2.2.1. Homogeneity test result

Using a significant level of 0.05 and Levene test, it can be said that the data fulfill the homogeneity assumption. See table 2.2.

Table 2.2 Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Pedagogic	1.630	1	200	.203
Professional	.086	1	200	.770

2.2.2. Normality test

Using a significant level of 0.05 and Kolmogorov-Smirnov test, it can be said that the data fulfill the normality assumption See table 2.3.

Table 2.3. Tests of Normality

	treatment	Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
pedagogic	LS (Group 1)	,087	113	,035	,988	113	,389
	Not LS (Group 2)	,092	89	,063	,971	89	,042
profesional	LS (Group 1)	,093	113	,017	,971	113	,014
	No. LS (Group 2)	,110	89	,010	,946	89	,001

a. Lilliefors Significance Correction

2.2.3. Multivariate test

The hypothesis can be formulated as follows.

$$H_0 : \begin{matrix} \mu_{11} \\ \mu_{12} \end{matrix} = \begin{matrix} \mu_{21} \\ \mu_{22} \end{matrix}$$

$$H_1 : \begin{matrix} \mu_{11} \\ \mu_{12} \end{matrix} \neq \begin{matrix} \mu_{21} \\ \mu_{22} \end{matrix}$$

where:

μ_{11} = population mean score of pedagogic test of Group 1

μ_{12} = population mean score of profesional test of Group – 2

μ_{21} = population mean score of pedagogic test of Group – 2

μ_{22} = population mean score of profesional test of Group – 2

The hypothesis null, H_0 is rejected when the probability of significance was less than 0,05. If H_0 is rejected then a univariate test would be run.

The results was summarized in Table 2.4 found that and showed that the probability of significance was more than 0,05 so H_0 is not rejected. It mean, there was no significant different between both groups. In other words, there was no significant influence of involving in lesson study or not involving in lesson study on mathematics teachers'pedagogic and professional competencies..

Table 2.4 Multivariate Tests^a

Effect		Value	F	Hypot hesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ^c
Intercept	Pillai's Trace	.979	4655.751 ^b	2.000	199.000	.000	.979	9311.502	1.000
	Wilks' Lambda	.021	4655.751 ^b	2.000	199.000	.000	.979	9311.502	1.000
	Hotelling's Trace	46.791	4655.751 ^b	2.000	199.000	.000	.979	9311.502	1.000
	Roy's Largest Root	46.791	4655.751 ^b	2.000	199.000	.000	.979	9311.502	1.000
Treatment	Pillai's Trace	.021	2.150 ^b	2.000	199.000	.119	.021	4.300	.437
	Wilks' Lambda	.979	2.150 ^b	2.000	199.000	.119	.021	4.300	.437
	Hotelling's Trace	.022	2.150 ^b	2.000	199.000	.119	.021	4.300	.437
	Roy's Largest Root	.022	2.150 ^b	2.000	199.000	.119	.021	4.300	.437

a. Design: Intercept + Treatment

b. Exact statistic

c. Computed using alpha = .05

This finding did not in line with the previous report of the successful of lesson study, particularly in improving teachers' competencies. There might be some reasons to explain this, for an example the intensity of the involvement of teachers during lesson study was less than should be. Unfortunately, this data was not collected. It could also probable that the lesson study activity itself did not follow the recommended procedure. This research has not seek data about this, and therefore, based on this research, it is recommended that lesson study in Bantul, Yogyakarta needs proper monitoring and evaluation, as well as more improvement if lesson study was believed to facilitate teachers pedagogic and professional development.

3. References

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