

# Effect of Learning Model and Cognitive Style on Ability to Solve Problems Stories Least Common Multiple

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**ABSTRACT:** *This research is quasi-experimental research and 2 x 2 factorial research design. The population in this research is all students in fifth grade which is in the public elementary schools in Wonosegoro district Boyolali regency on 2016/ 2017 academic year. Sample taken with the cluster sampling. The technique of collecting data test for measuring ability to solve problems stories. Besides there standardized tests for sorting students cognitive style. Test validity is using expert judgment assessment. Test for normality is using the Liliefors method and homogeneity test using Bartlett formula. The analysis of the data by using a two way analysis of variance (Anova).*

**Keyword:** *Learning Model, Ability To Solve Problems Stories Least Common Multiple, Cognitive Style.*

## 1. INTRODUCTION

Teaching and learning process in elementary school cannot be separated with curriculum. One of the curriculums implemented nowadays is competency-based level curriculum based on national standard of education or Kurikulum Tingkat Satuan Pendidikan (KTSP). Furthermore, throughout this research this curriculum called KTSP. This curriculum is operational education curriculum that is constructed and implemented by each school in Indonesia. Juridical regulation of KTSP is stated in Regulation No. 20 year 2003 about national education system and Regulation No. 19 year 2005 about National standard of education. KTSP has been implemented since academic year 2007/2008 based on content standard (SI) and graduate competence standard (SKL) for primary and secondary school. Furthermore, KTSP is also implemented based on Ministry of Education Regulation No. 22 Year 2006 and No. 23 Year 2006, it is also based on development guide of KTSP published by Badan Standar Nasional Pendidikan (BSNP).

The implementation of KTSP in teaching and learning process in the classroom does not always run smoothly. A range of learning constraints commonly experienced. Many students who have high score in subject matter but they have laced ability to apply their knowledge, skill, and attitude in their daily life. Besides, there are many students who have

high score in non-exact subjects but they have various problems in studying exact subjects. In general, exact science is perceived rigidly by students, especially mathematics.

Aisyah (2007: 217) explained that most of people do not like mathematics, involving students in primary school. They perceive that mathematics is difficult to be learned and the teacher is uninteresting, boring, and killer. These perceptions cause them become afraid to learn mathematics. In order to overcome this problem, the mastery of basic concept should be instilled to the students. The ability to solve the words problem in math can be overcome by implementing an appropriate teaching model. When the learning model implemented is not relevant, the basic concept mastery can be maximally achieved.

There are 31 primary schools in district Wonosegoro, Boyolali and the number of students in 5<sup>th</sup> grade is 645. The result of preliminary research conducted on Monday, 25 January 2016 found that mid semester score achieved by 5<sup>th</sup> grade students was 61.98 in academic year 2015/2016, meanwhile the minimum scored should be reached (KKM) was 65 for mathematics. It means that mean score of 5<sup>th</sup> grade students in district Wonosegoro do not reach KKM yet. Furthermore, the result of interview directed to the teachers of 5<sup>th</sup> grade of primary school in district Wonosegoro obtained that most of teachers do not implement innovative teaching model in mathematics.

Teaching solving problem is different with the implementation of problem solving as a teaching model. Teaching solving problem is teaching how students can solve the problem, such as solving mathematics problem, meanwhile problem solving as teaching method is technique used to help students understanding and mastering learning materials. Problem solving learning model is considered as an effective approach to teach students' high order thinking to facilitate student in processing information that available in their mind, and then construct their own knowledge about the social world and their environment (Trianto, 2011: 92). In addition, quantum learning is one of the learning models that maximize the students' ability (Sugiyanto, 2008: 65).

Cognitive style reflects one's analysis path in doing interaction with their environment dealing with one's path to accept and process the

information. Cognitive style is an approach that explains about how individual learn or the way in which each person employed to concentrate on the process and controls the difficult information, then through a different perception. In general, cognitive style is assumed to refer to the personality, beliefs, preferences, and behaviors that are used by individuals to assist their learning in a determined situation (Ghufron, 2012: 42).

Based on the explanation above, the research problems can be formulated as follow: (1) which teaching models provides better mathematics achievement, students who are taught using problem based learning or quantum learning? (2) which cognitive style provides better mathematics achievement, students who have field dependence cognitive style or field independence cognitive style? (3) which provides better mathematics achievement for each teaching model, students who have field dependence cognitive style or field independence cognitive style? (4) which provides better mathematics achievement for each cognitive style, students who are taught using problem based learning or quantum learning?

Problem based learning is teaching model that activate student in solving problem by using their capability. Furthermore, it aims are to enable students become autonomous learner and enhance their self-confident. Rufaida (2010) found that there was improvement in students' basic writing skill after taught using quantum learning. It can be seen from students' mean score in pretreatment that was 62.5 with classical exhaustiveness 53.3%. The improvement happened along with the treatment employed in cycle I, II, and III. Mean score achieved in cycle I was 66.2 with classical exhaustiveness 68.9%. In cycle II, mean score gained was 70.7 with classical exhaustiveness 71.1%. In the last cycle, cycle III mean score improved become 73.7 with classical exhaustiveness 82.2%. In conclusion, after quantum learning implemented to taught 2<sup>th</sup> grade students of SD N Karangasem 1 Laweyan Surakarta academic year 2009/2010 students' basic writing was improve, that was mean score 73.7 with classical exhaustiveness 82.2%. Furthermore, the result of this research is relevant with the current research due to its similarity study about the implementation of quantum learning to solve learning problem.

Moreover, quantum learning is learning model that provides tricks, strategies, and all learning process that enable students to sharpen their understanding, memory, and also use the principle that learning is interesting and meaningful process. By implementing quantum learning, students' learning achievement can be improved and students also enjoy doing learning activity. In Indonesian context, in implementing of quantum learning, TANDUR concept is introduced. TANDUR is the acronym of Tumbuhkan (cultivate), Alami (do), Namai (name), Demonstrasikan (demonstrate),

Ulangi (repeat), and Rayakan (celebrate). Saputro (2011) found that there was a significant relation between solving problem ability in mathematics with implementing Polya's stages. In pretreatment, students' mean score was 59.5 with classical exhaustiveness 60.33%. This condition was improve after treatment implemented in cycle I, and cycle II. In cycle I, students' mean score obtained 65.33% with classical exhaustiveness 88.46%. Furthermore, in cycle II the students' mean score was 76.5 with classical exhaustiveness 88.46%. In sum, there is a relation between mathematical solving problem ability with the implementation of Polya's stages. Hence, the result of this research is relevant with the current research because they have similarity in focusing the study on the influence of cognitive style in learning activity.

Furthermore, the hypotheses of this research involve: (1) learners are taught using problem based learning model ability to solve problems story Least Common Multiple better than students taught using quantum learning model; (2) learners who have field independence cognitive styles ability to solve problems story Least Common Multiple better than students who have field dependence cognitive style; (3) on learning with problem based learning model, students who have the field dependence cognitive style mathematics achievement as well as students who have the field independence cognitive style. While on learning with quantum learning model, students with field independence cognitive style better mathematics learning achievement than students with field dependence cognitive style; (4) in the category of field dependence cognitive style, students with problem based learning model mathematics learning achievement better than students with quantum learning model. While in the category of field independence cognitive style, students with problem based learning model mathematics learning achievement as well as students with quantum learning model.

## **2. METHOD**

This research was conducted at primary state school (SD Negeri) in district Wonosegoro, Boyolali. The subject of this research was 31 state primary schools in district Wonosegoro, Boyolali. Then only three state primary schools were selected as sample of the research. This research conducted for seven months involving planning, doing research, writing report, and thesis examination.

This research was categorized into quasi experimental. The aims of this research are to examine and to prove the hypotheses dealing with the difference of problem based learning (PBL) and quantum learning (QL) toward students' ability to solve mathematical word problems story viewed from students' cognitive learning styles, field dependence style and field independence style.

Furthermore, the research design used in this research was factorial design 2x2.

Research variable examined in this research consisted of two variables, independent and dependent variable. Independent variable included manipulative independent variable and attributive independent variable. Manipulative independent variable consisted of PBL, and QL. Attributive independent variable was cognitive styles involving field dependence and field independence. Meanwhile, dependent variable was students' ability to solve mathematics word problems story.

The population of this research was all 5<sup>th</sup> grade of state primary school in distric Wonosegoro, Boyolali academic year 2016/2017. The number of population was 645 students in 31 state primary schools. Technique to collect the sample was grouping sampling. State primary schools in Wonosegoro were grouped into three categories become high quality, average quality and low quality. The high quality state primary school consisted of 10 state primary schools; average quality covered 11 state primary schools; and low quality includes 10 state primary schools. Furthermore, in order to get sample of experimental group one school from high quality was selected, one school from average quality was selected as control group, and one school from low quality was selected as test group.

### 3. RESULT

The first test was solving word problems story Least Common Multiple. Furthermore, the validity measured by using content validity with the expert validity. Product moment formula from Karl person was used to measure correlation. Reliability was measured using *Kuder-Richardson's (KR-20)* formula. The second test was test of students' cognitive style. Validity was measured using content validity with the expert validity. Reliability was measured using Alpha formula. The data was analyzed using Anava. Meanwhile, normality was measured using Liliefors method and homogeneity was measures using Bartlett formula. Furthermore, Post-Anava test also employed.

Two-way Analysis of Variance with Different Cell

Source	JK	dk	RK	F <sub>obs</sub>	F <sub>a</sub>	Test Conclusion
Learning Model (A)	67	1	67	4.6	4.0	H0 rejected
Cognitive Style (B)	5529	1	5529	37	4.0	H0 rejected
Interaction (AB)	526	1	526	4.5	4.0	H0 rejected
Galat	8393	57	147	-	-	-
<b>Total</b>	<b>14517</b>	<b>60</b>	-	-	-	-

Average Value of Ability To Solve Problems Story of Each Cell

Learning Model (A)	Cognitive Style (B)		Marginal Mean
	FD (B1)	FI (B2)	
PBL (A1)	71.21	71.94	71.60
QL (A2)	62.18	71.95	68.48
<b>Marginal Mean</b>	67.24	71.94	

Comparison between cells in Learning Same

multiple comparison between cells in the same column in PBL class				
Comparison	RKG	F <sub>obs</sub>	F Table	Test Conclusion
(A1B1) with (A1B2)	212.62	0.0184	4.2	H0 be accepted

multiple comparison between cells in the same column in QL class				
Comparison	RKG	F <sub>obs</sub>	F Table	Test Conclusion
(A2B1) with (A2B2)	78.73	8.6011	4.18	H0 rejected

Comparison between cells in the Same Cognitive Style

multiple comparison between cells in the same row FD cognitive style				
Comparison	RKG	F <sub>obs</sub>	F Table	Test Conclusion
(A1B1) with (A2B1)	140.87	4.5676	4.28	H0 rejected

multiple comparison between cells in the same row FI cognitive style				
Comparison	RKG	F <sub>obs</sub>	F Table	Test Conclusion
(A1B2) with (A2B2)	151.59	0.000009	4.134	H0 be accepted

### 4. DISCUSSION

From this research, it can be conclude that (1) learners are taught using problem based learning model ability to solve problems story Least Common Multiple better than students taught using quantum learning model. Mean score gained by students who taught using PBL is 71.60 while students who taught

using QL obtain mean score 68.48; (2) learners who have field independence cognitive styles ability to solve problems story Least Common Multiple better than students who have field dependence cognitive style. Mean score gained by students who have field dependence cognitive style is 67.24 while students who have field independence cognitive style obtain mean score 71,94; (3) in learning using PBL, students who have field dependence cognitive style have good mathematic achievement as well as students who have filled independence cognitive style. Mean score of students who have field dependence cognitive style is 71,21 meanwhile students who have field independence cognitive style obtain 71,94. In learning using QL students who have field independence cognitive style have better mathematics achievement than students who have field dependence cognitive style. Mean score of students who have field dependence cognitive style is 62,18 meanwhile students who have field independence cognitive style obtain 71,95; (4) In field dependence cognitive style group, students who taught using PBL have higher mathematic score than students who taught using QL. Mean score gained by students who taught using PBL is 71,21 while students who taught using QL obtain mean score 62,18. In field independence cognitive style students who taught using PBL have good mathematic score as well as students who taught using QL. Mean score gained by students who taught using PBL is 71,94 while students who taught using QL obtain mean score 71,95.

## 5. CONCLUSSION

From this research, it can be conclude that (1) learners are taught using problem based learning model ability to solve problems story Least Common Multiple better than students taught using quantum learning model; (2) learners who have field independence cognitive styles ability to solve problems story Least Common Multiple better than students who have field dependence cognitive style; (3) in learning using PBL, students who have field dependence cognitive style have good mathematic achievement as well as students who have filled independence cognitive style. In learning using QL students who have field independence cognitive style have better mathematics achievement than students who have field dependence cognitive style; (4) In field dependence cognitive style group, students who taught using PBL have higher mathematic score than students who taught using QL. In field independence cognitive style students who taught using PBL have good mathematic score as well as students who taught using QL.

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