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Experimentation of Interactive Setting Cooperative Learning Model (PSIK) and Course Review Horey (CRH) on The Material Geometry Flat Side Reviewed from Student Intelligence in The SMP N in Demak Regency

Muhamad Asif Cahya Aji Nugroho[1], Budiyono[2], Isnandar Slamet[3]

[1,2]Department of Mathematics, FMIPA Universitas Sebelas Maret Surakarta

Corresponding Author: asifnugroho@gmail.com[1]

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Abstrak

The purpose of this study is to find out from each model of learning mathematics, which provides better mathematics learning achievement, students who have the type of logical intelligence mathematics, visual, kinesthetic, or interpersonal. This research method of this study is quasi-experimental research or pre-experimental research with research design using 3 x 4 factorial designs. The population in this study is the entire students VIII grade SMP N in Demak Regency. Sampling was conduct with stratified cluster random sampling techniques. Instruments used to collect data are a questionnaire of multiple intelligences and mathematics learning achievement test. The prerequisite test includes the population normality test using the Lilliefors method and the homogeneity test of population variance using the Bartlett method. With α = 0, 05. Hypothesis testing of the study are analysis of variance with unequal cell. Based on the results of hypothesis testing, obtained the conclusion that. There is interaction of learning model on mathematics learning achievement in each category of students' multiple intelligence.

Keywords: CRH; students' multiple intelligence; conventional; PISK; mathematics learning achievement

INTRODUCTION

Mathematics as one of the basic sciences plays an important role in various disciplines. In addition, mathematics learning can inspire in providing the skills of its application in everyday life as well as in studying various sciences. One important characteristic of mathematics is to have an abstract object. Something abstract generally has a high level of understanding, thus causing many students have difficulty in learning mathematics. However, as a teacher, should try to reduce the abstract nature by always innovating to facilitate students capture the material provided.

Data in Trends in International Mathematics and Science Study (TIMMS) on 2011 grade students' mathematics achievement and students science achievement of 8th grade, Indonesian mathematics achievement is ranked 38th out of 42 countries (UNESCO). This shows the low mathematical achievement in Indonesia.

In the mathematics learning that is the basis of thinking is that the students enter the classroom with knowledge, ability, and motivation so diverse that the learning activities need a model of learning that empowers students actively in accordance with the type of intelligence they have. Good learning activities, if the teacher preparing well-planned

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planning of the completeness of learning tools such as learning materials and the use of appropriate learning models are used so as to improve learning outcomes.

Mathematics learning, although it can't be said for all subject matter, is still a lot of learning in schools that use conventional models. According Kusnandar (2007), the nature of conventional learning is more centered on the teacher so that the implementation less attention to the overall learning situation. In addition, students do not participate directly in a learning, students become less focused, bored during the lesson. Under these conditions, teachers are required to be more creative in developing learning models so that students do not feel bored and feel happy in following the lesson. One of the alternatives to solve the problem there is, in the implementation of cooperative learning model in students' participation and collaboration in a small group of heterogeneous to solve a problem. This is in line with Stahl›s explanation (Solihatin and Raharjo, 2007) that cooperative learning model, students as part of a system of collaboration by achieving an optimal outcome in learning. According to Dyson Dan Grineski (Atte and Baker, 2007) states that classes that use cooperative learning with heterogeneous teams are able to encourage students in positive interactions to achieve team goals. Cooperative learning model proved to be better than conventional learning this is supported by research conducted by Ling, Ghazali and Raman (2016) stated that the learning with cooperative learning strategy more improve mathematics achievement than the learning without using cooperative learning strategy.

Some models of cooperative learning that emphasize students› participation and teachers to deliver lesson material can use collaboration: between interactive setting learning of cooperative and Course Review Horay (CRH). According to Ratumanan (2002), the result of model modification of cooperative learning that emphasizes the student›s broad interaction, there is students (Student-Student = S-S), student-learning materials (Student-Learning Material-Student = S-LM) teachers (Student-Teacher = S-T), Student-Learning Material-Student (S-LM-S), and Student-Learning Material-Teacher (S-LM-T)).

This interaction is essential efforts for knowledge construction and enhancement of academic and social skills. According to Devidson (Baroody, 1993), student interactions are used to construct mathematical knowledge, develop problem solving and thinking competitions, encourage trust, and gain social skills.

One of the other lessons is the Course Review Horay. Course Review Horay (CRH) is a cooperative learning method that uses a box filled with questions and numbered to write down the answer and shout horay if it is true (Shoimin, 2014). In this learning model students are invited to play and work together to solve problems, so that learning will be more fun. This supported by research conducted by the daughter, Salim and Sunardi (2017) which states that the Course Review Horay (CRH) is very effective in improving the calculating mathematic ability of the fourth grade mental retardation of SLB Surakarta.

The model of PISK and CRH empowerment emphasizes student interaction. In the PISK model students actively engage in activities, actively think, conceptualize, and give meaning to the things be studied. In CRH model, student interaction is done by fun method and not boring through yells. The function of the teacher provides a limited explanation in the form of questions that stimulate students› thinking and can lead the students there problem solving faced, so that the mathematical concepts are found by the students themselves.

To improve the learning of mathematics not only seen in the learning model that used but also can seen from the more dominant student intelligence. Gardner and Hatch (1998) stated that in the person having 8 intelligences but in certain people have a more prominent intelligence. In this study the researcher only drawn four multiple students intelligences, namely logical mathematic intelligence, visual kinesthetic or interpersonal. This is viewed from the eight multiple intelligences, the four intelligences are the dominant intelligence that students have when studying mathematics. Although some students at that

stage may learn by using a combination of these four intelligences, most students will be more likely to be in one of the four. Learning activities must tailored to the students› intelligence, because students who can adjust their intelligence with the learning done will be easier in receiving and processing information and using in learning, so that learning objectives will be accomplished in accordance with the expected.

Seeing these problems, the authors are interested to conducting research on the application of PISK, CRH, and conventional models on mathematics learning in terms of students› multiple intelligence, which this research has not done before and this research was expect to contribute to improving student learning achievement.

The purpose of this research is to know for each model of mathematics learning, which provides better mathematics learning achievement, students with logical, visual, kinesthetic or interpersonal logical intelligence types.

RESEARCH METHODS

This study consists of free variables, there are learning model of mathematics and student learning activities. The dependent variable is learning mathematics achievement. The design of this research is quasi-experimental research with the planning factorial research with 3 x 4. The research design will describe in the following Table 1.

The operational definitions and indicators of each variable are: *Mathematics learning achievement of students*. Learning achievement is the result achieved by someone in a learning effort as stated in report cards. The indicators in the assessment are in the form of tests of students' mathematics learning achievement on the subject matter. Build flat side spaces.

Learning Model is a plan or pattern that is arranged systematically and contains strategies and syntax of learning. Indicators of learning activities are carried out according to the syntax.

Compound Intelligence of students is a multiple intelligence ability to solve a problem faced in life. The indicator used is the intelligence questionnaire score that students have. which is divided into several aspects of multiple intelligence.

Logical Mathematical Intelligence is the ability to make mathematical calculations, inductive and deuctive reasoning, build logical relationships, produce hypotheses, solve problems, make critical thinking and understand numbers in the form of geometric and abstract symbols. Indicators used work with numbers, solve problems, analyze situations, Understand how things work, Show accuracy in problem solving, Work with gradual directions.

Visual intelligence is the ability for spatial repetition of individual thoughts or forming an imagination, thinking with images, shapes and lines, observing and understanding three-dimensional objects. Indicators used Scribbling, painting or drawing, creating a three-dimensional look, observing and creating maps and diagrams, unpacking and rearranging items.

Interpersonal intelligence is the most important type of intelligence in everyday life, which allows oneself to possess knowledge and take responsibility for his own life. Indicators used Glad to make lots of friends, lead, share, and mediate, love to build interactions, become effective team members.

Kinesthetic intelligence is the capacity

Tabel 1. Research Plans

Model of Learning Mathematics (A)	Student Multiple Intelligence (B)			
	Logical Mathematics (b_1)	Visual (b_2)	Kinesthetic (b_3)	Interpersonal (b_4)
Pembelajaran Interaktif Setting Kooperatif (PISK) (a_1)	$(ab)_{11}$	$(ab)_{12}$	$(ab)_{13}$	$(ab)_{14}$
Course Review Horay (*CRH*) (a_2)	$(ab)_{21}$	$(ab)_{22}$	$(ab)_{23}$	$(ab)_{24}$
Konvensional (a_3)	$(ab)_{31}$	$(ab)_{32}$	$(ab)_{33}$	$(ab)_{34}$

to express oneself with movements, gestures and facial expressions, using effective coordination of the brain and body. The indicators used are solving problems with body movements, mastering one type of sporting activity, being able to manage objects, respond and reflex, feeling bored when silent for a long time.

The population in this research is all of the students in VIII grade at SMP N in Demak Regency. In this research, the researcher used stratified random sampling technique. The result of the calculations for sampling is three of SMP N. The high category is SMP N 3 Mranggen. The medium category is SMP N 1 Karangawen, and the low category is SMP N 1 Guntur. The sample in this research around 263 students, with details of 172 students in the experimental class consisting of 85 students on the PISK model and 87 students on the CRH model and 91 students in the control class.

The techniques to collecting data in this research are documentation, questionnaires, and test on April until May on the subjects' geometry flat side in the even semester of the academic year 2017/2018. The documentation method is the technique that is used to collecting students ability. Questionnaire is method to collect data of students multiple intelligence. The test will be used to collecting mathematics students' achievement. The test pieces of the test instrument include content validation, the lurch, distinguishing power, and reliability.

Trials of compound intelligence questionnaires include content validity, internal consistency, and reliability. A valid instrument according to content validity if the content of the instrument has been a representative sample of the overall contents of the measured thing (Budiyono, 2015). An instrument is called reliable if the measurement results with the instrument remain the same if the measurements are carried out on the same person at different times or in different people (but have the same condition) at the same time or at different times (Budiyono, 2015). Budiyono (2015) suggests that an instrument is said to be reliable if the reliability coefficient is 0.70 or more. Reliability test results get Alpha Cronbac'h coefficient of more than 0.7 on all variables so declared reliable (Sugiyono, 2010). The results of reliability of logical mathematic variable obtained alpha value 0.702, visual variable 0.714, kinesthetic 0.797 and interpersonal 0.707. From these results can be concluded that all the instruments of the four reliable variables or trusted as a data collection tool in research.

Before doing the experiment, first conducted a test of balance on the students' mathematical ability early in the experimental class and the control class. This balance test to test the similarity of the initial ability average. Before the balance test is carried out, a prerequisite test is conducted which includes the population normality test using the Lilliefors method and a test of population variance homogeneity using the Bartlett method with $\alpha = 0{,}05$.

The prerequisite test includes the population normality test using the Lilliefors method and the homogeneity test of population variance using the Bartlett method. With $\alpha = 0, 05$, the conclusion is obtained that the sample from a population with a normal concentration and has a homogeneous variance. Balance test for data on the initial mathematical ability using a variance analysis of one cell different path, with a significance level of 0.05. Data obtained F_{obs} 2,2417 < $F_{0,05;2;279}$ 3,02 so that $F_{obs} \notin DK$ concluded that the experimental class and the control class had a balanced mathematical initial abilities. A balance test of early mathematical ability data using a variance analysis of one cell path is not the same as the conclusion that the experimental and control classes have a balanced initial mathematical ability. Hypothesis testing uses analysis variance two path with different cell and multiple comparison tests with the Scheffe method if the result shows that H_o rejected.

RESULT AND DISCUSSION

The study conducted in stages with 16 meetings in each sample subjected to treatment. From the study data obtained that the average student achievement compared to the learning model and multiple intelligence categories, in the PISK learning model had a marginal mean of 73.0753, 69.4624 and Con-

ventional CRH models 66.127. On multiple intelligences students of mathematical logical intelligence have a marginal mean of 66.7273, visual intelligence 74.7119, kinesthetic intelligence 66.6301 and interpersonal 68.5538. From these data, it can be see that the learning model has a relationship with students' multiple intelligences towards student learning achievement.

To prove this connection, a two-way variant analysis test was use, along with the results of the research data. The Analysis Variations will be describing in the following table 2.

From the data above, the results are that Fobs 4,339 > 2,14 with the decision of the H_o test are rejected, this means that there is an interaction between the learning model and multiple intelligence of students towards mathematics learning achievement.

In the results of the two-way analysis of variance, the results of H_o rejected, the study continued by a multiple comparison test to find out where the relationship between the learning model and multiple intelligence students is located.

The results of the same double line comparison test were obtain only $\mu_{1.} = \mu_{3.}$ with F_{obs}12,9 > F_{table}6,06 and the decision of the H_o test rejected, this means that only the PISK model is related to the conventional model, and when viewed from a marginal average, the decision that the PISK model is better than the conventional model. In multiple comparative test data in the multiple intelligence column of students, data obtained from mathematical and visual intelligence F_{obs}8,42 > F_{table}7,92, then visual and kinesthetic intelligence F_{obs}12,9 > F_{table}6,06, with the decision of the H_o rejected, this means that logical mathematical intelligence related to visual intelligence and kinesthetic visual intelligence. When viewed from the marginal average data visual intelligence is better than logical mathematical and kinesthetic intelligence.

On the results of the comparative test between cells on the same line, between students multiple learning and intelligence models. The data were obtained that only in the PISK model with logical mathematical and visual intelligence with results F_{obs}90,98 > F_{table}20,1, and the decision show H_o rejected, this meant only logical mathematical and visual intelligence had an interaction with the PISK model of student learning achievement. The Comparative test result will describe in the following Table 3.

Based on the comparative test results obtained the following points. From the results of comparative test between cells on the same line obtained the following things. In students who subjected to PISK model, students' mathematics learning achievement on visual intelligence is better than mathematical logical intelligence. It is inversely proportional to the Lestari (2015) stating that on LBC, student learning model with logical mathematical intelligence has learned that accomplishment as good as visual intelligence. This result is caused by the stages in the PISK model is more dominant using the image so that students with visual intelligence tends to better understand the problem compared with students who have logical mathematical intelligence. It is in accordance with statement of Gardner (2013) in Yalmanci and Candidate (2013) which states that students with visual intelligence has the ability to form a stretch of the imagination, be able to think in images and form a three-dimensional object. In logi-

Tabel 2. Summary Analysis Variations

Sumber	*JK*	*dk*	*RK*	F_{obs}	F_{α}	Keputusan Uji
Line (A)	3111,2684	2	1555,6342	6,8749	3,03	H_0 rejected
Colum (B)	2478,8606	3	826,2869	3,6517	2,64	H_0 rejected
Interaction (AB)	5890,9493	6	918,8249	4,339	2,14	H_0 rejected
Error (G)	56795,52	251	231,9951	-	-	-
Total	682763,6	262	-	-	-	-

cal mathematical intelligence, kinesthetic and interpersonal have the same learning achievement as a result of individual unit tests, forcing students with their respective categories of intelligence to expand interaction, explore as much knowledge as possible and participate in maximal discussion activities.

Table 3.6 Comparative test results between cells on the same line.

H_0	F_{obs}	F_{tabel}	Decision result
$\mu_{11}=\mu_{12}$	20,98	20,1	H_o rejected
$\mu_{11}=\mu_{13}$	0,54	20,1	H_o not rejected
$\mu_{11}=\mu_{14}$	14,48	20,1	H_o not rejected
$\mu_{12}=\mu_{13}$	4,16	20,1	H_o not rejected
$\mu_{12}=\mu_{14}$	6,85	20,1	H_o not rejected
$\mu_{13}=\mu_{14}$	3,42	20,1	H_o not rejected
$\mu_{21}=\mu_{22}$	0,06	20,1	H_o not rejected
$\mu_{21}=\mu_{23}$	2,09	20,1	H_o not rejected
$\mu_{21}=\mu_{24}$	3,01	20,1	H_o not rejected
$\mu_{22}=\mu_{23}$	2,55	20,1	H_o not rejected
$\mu_{22}=\mu_{24}$	1,75	20,1	H_o not rejected
$\mu_{23}=\mu_{24}$	0,01	20,1	H_o not rejected
$\mu_{31}=\mu_{32}$	0,58	20,1	H_o not rejected
$\mu_{31}=\mu_{33}$	5,60	20,1	H_o not rejected
$\mu_{31}=\mu_{34}$	2,72	20,1	H_o not rejected
$\mu_{32}=\mu_{33}$	0,35	20,1	H_o not rejected
$\mu_{32}=\mu_{34}$	0,03	20,1	H_o not rejected
$\mu_{33}=\mu_{34}$	4,98	20,1	H_o not rejected

To the students who are the model of the CRH, the achievements of students learning math with the logical mathematical intelligence, visual, kinesthetic, interpersonal and has the same good study achievements. The research results obtained on this hypothesis does not fit with the theory, but the same with research results obtained by Pradana (2014) that states there is no difference between learning achievements that have logical mathematical intelligence, visual and interpersonal. The lack of contributions from students with logical mathematical and visual intelligence in collaboration can be a major obstacle to cooperative learning. It is because students with logical mathematical and visual intelligence tend to have a quiet character and rarely communicate, unlike the case with students who have kinesthetic and interpersonal intelligence are active in establishing communication with members of the group. This will lead to a lack of students' interaction and responsibilities of individuals in the group who has also resulted in student achievement.

On students who are of the conventional model, students learn math achievement with logical mathematical intelligence, visual, kinesthetic and interpersonal has the same learning achievement. That is because the learning centered on the teacher, so that learning becomes boring, and makes students less motivated to learn. Different case with cooperative learning was more variety in the implementation that can affect any intelligence of students.

CONCLUSIONS AND SUGESTION

Based on the results of research and discussion, obtained the following conclusions. Students' mathematics learning achievement that is model on PISK learning model is better than the achievement of conventional model. In addition, students 'mathematics learning achievement that is model on CRH is as good as students' mathematics learning achievement that is subject to PISK and conventional models.

Mathematics learning achievement of students who have visual intelligence is better than mathematics learning achievement of students who have logical mathematical and kinesthetic intelligence. In addition, mathematics learning achievement of students with interpersonal intelligence has the same achievement as mathematical intelligence, visual and kinesthetic.

PISK model students with visual intelligence have better student achievement than students with logical mathematical intelligence, whereas students with visual intelligence have good learning achievement with students who have kinesthetic and interpersonal intelligence, and students with visual intelligence have learning achievement which is just as good as students who have kinesthetic and interpersonal intelligence. Then students with kinesthetic intelligence have as good learning achievement as those with interpersonal intelligence.

In order to contribute ideas and insights related to the improvement of mathematics learning achievement, the authors provide

some of the following suggestions. To teachers of mathematics subjects should be motivated to apply this model of learning so that the learning process is more able to improve the students' order in the process of learning activities. In the learning process, teachers should pay more attention to the learning techniques tailored to the subjects. In addition, teachers should pay more attention to differences in characteristics of students' intelligence, because each student character in the learning process has an effect on student achievement.

To the researchers should be able to conduct further research by deepening and expanding the scope of this research, namely by developing a more innovative learning model by adding independent variables that also affect student achievement.

REFERENCES

Arikunto, S. (2010). *Prosedur Penelitian Suatu Pendekatan Praktek*. Jakarta: Rineka Cipta

Attle, S. dan Baker, B. (2007). Cooperative Learning In a Competitive Environtment: Classrom Applications. *International Journal of Teaching and Learning in Higher Education*, 19(1), 77-83.

Baroody, M. F. (1993). *Interaksi sosial dan multi intelegensi.* Malang: P3T IKIP Malang.

Budiyono. (2015). *Penilaian Hasil Belajar*. Surakarta: UNS Press.

Gardner, H and Thomas, H. (1989). Multiple Intellegence go to school Educational Implications of the theory of Multiple intellegence. *Journal Educational Reseacher,*18(8), 4-10.

Kusnandar, (2007). *Guru Profesional Edisi Revisi.* Jakarta: Rajagrafindo Persada.

Lestari, S.I .(2015). Eksperimentasi Model Pembelajaran Problem Based Learning (PBL), Discovery Learning (Dl), Dan Problem Possing (PP) Ditinjau Dari Kecerdasan Majemuk Siswa Pada Materi Kubus Dan Balok Smp Negeri Kabupaten Demak Tahun Ajaran 2014/2015. *Jurnal Elektronik Pembelajaran Matematika Universitas Negeri Sebelas Maret, 3*(8), 811-823.

Ling, W. N., Ghazali ,M. I., Raman, A. (2016). The Effectiveness Of Student Teams-Achievement Division (STAD) Cooperative Learning On Mathematics Achievement Among School Students In Sarikei District, Sarawak . *International Journal of Advanced Research and Development, 1*(3), 17-21.

Pradana, L N. 2014. *Eksperimentasi Model Pembelajaran Kooperatif Tipe Numbered Heads Together dengan Pendekatan Contextual Teaching and Learning pada Materi Pokok Bangun Ruang Sisi Datar Ditinjau dari Kecerdasan Majemuk Siswa SMP Negeri Kelas VIII Sekota Madiun*. Surakarta: (DOCTORAL DISSERTATION). PPs: UNS Surakarta.

Putri, N.D.A., Salim, A., Sunardi.(2017). The Effectiveness Of The Use Of Course Review Horay (CRH) Methods To Improve Numeracy Division Skill Of Children With Mild Mental Retardation In SLB Negeri Surakarta, Indonesia Year 2016/2017. *European Journal of Special Education Research*, *2*.

Ratumanan, T.G.(2002). Pengenalan Model Pembelajaran Interaktif dengan Setting Kooperatif. *Buletin Pendidikan Matematika, 4*(1), 27-39.

Shoimin, A. (2014). *Model – Model Pembelajaran Inovatif dalam Kurikulum 2013.* Jakarta: Rineka Cipta.

Sugiyono. (2010). *Statistika Untuk Penelitian.* Bandung: Alfabeta

Solihatin dan Raharjo. (2007). *Model-Model Pembelajaran Matematika Sekolah*. Disampaikan pada Seminar Pengembangan Model-Model Pembelajaran Matematika Sekolah di Universitas Negeri Yogyakarta.