International Education Trend Issues
Volume 2, Number 1, 2024
https://ijble.com/index.php/ieti

The Influence of Number Head Together Learning with Intelligent Puzzle on Mathematics Learning Out Comes

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ABSTRACT
This research aims to determine the influence of number heads together learning with intelligent puzzle on mathematics learning outcomes on grade IV students of Kepatihan Primary school Purworejo City. This research method is quasi experimental with Nonequivalent Group Pretest Posttest Design. Sample selected by using saturated sampling. The population of this research is all Grade IV students of Kepatihan Primary School Purworejo. Class IV A (21) as control class, and Class IV B (18) as experimental class. Data analysis includes validity, normality, homogeneity tests, and Mann-Whitney U tests with the help of the SPSS 23 program. The results of this research show there is an influence of number heads together learning with intelligent puzzles on mathematics learning outcomes for grade IV students at Kepatihan Primary School Purworejo. The result of this research shows Asymp.Sig (2-tailed) 0.001 < 0.05. Based on the results of the analysis and discussion, there is a difference in the mean score of learning outcomes between the experimental class (94.90) and the control (81.21).

Keywords:
Number Head Together, Learning Outcomes, Mathematics

INTRODUCTION

Learning outcomes very tightly connection with Study or learning process. When the learning process teach walk with Good so results Study will remember what you can seen from mark test or mark report. So that the learning process walk Good so required exists planning, fine planning materials, learning models and media used in learning (COOPERATIVE, 2017). One of learning that can be done made provisions life is learning mathematics. Mathematics very beneficial all challenge in Century front, apart That mathematics is provisions to student with pressure arrangement arrangement reason in application mathematics in life daily in the middle public Where public stay (Susanto, 2015). Whereas in reality eye lesson mathematics considered difficult for participants educate Because felt difficult for understandable and difficult understandable and difficult understandable.

According to Briggs (in Sumarto , 2017:148) results study oftencalled with the term "scholastic achievement" or "academic achievement" is all over skills and results achievedthrough the learning process teach at the stated school with numbers or values based on test results Study

Based on a number of the meanings above, can researchers conclude that the results Study mathematics is an ability possessed by students. Cognitive, affective, and psychomotor skills can be measured as results of the learning process in mathematics in the class. Activity process study teaches that we not only must look at the condition in the moment but also in the future. The learning process given to students was adjusted to their level of development. The learning process said to succeed if abilities and appearance of the student, after learning experience, change.

The learning process of mathematics is carried out with meaningful learning that will be easily understood by students, so that can increase quality education in Indonesia.

Teachers play a role direct in the learning process in the classroom. Teacher as educators, mentors, meditators, facilitators and evaluators should give something that can help participant educate in develop their abilitieshave (Sundari, 2017). Teachers are expected can create atmosphere class that can support successful learning process teach. Teachers have too very rolebig in management class because the teacher as underwriter answer activity Study teach in the class. As innovators, teachers must full initiative and creative in manage class Because the teacher is the one who knows in a way Certain situation and condition class especially circumstances students in the learning process (Daryanto & Muljo Rahardjo, 2012)

Learning outcomes mathematics is abilities possessed by studentsform cognitive, affective and psychomotor that can be be measured from the learning process mathematics in the class (Sari & Harini, 2015) Activity process Study teach No only must look at the condition moment This but also in the future come. The learning process given to students adjusted to the level development student. Learning process said succeed if abilities and appearance student after learning experience change become Better.

Related to results Study mathematics above, results observations that have been made carried out on Wednesday, November 28, 2018, with Desi's mother as the teacher eye lesson mathematics in class IV of Kepatihan State Elementary School. Kepatihan State Elementary School The address is Jl. Urip Sumoharjo No. 98, District Purworejo, Purworejo City, student Class IV of Kepatihan State Elementary School, totaling 18 students. Based on the results of the interview, a problem was discovered about the results of studying mathematics in class IV. A few students who have reached the criteria of minimum completeness (KKM) with percentage results study students who get a mark above KKM 6 (33.33%). Standard criteria for minimal completeness of the eye lesson mathematics are 76. Not yet a solution, meaning what was done by Desi Wulandari's mother for increased results, study students. Based on observations made, yes, a number of influencing things low results Study students like lack of motivation from parents and knowledgeless students are strong and interested. Study low student, background behind parents, as well as the learning process perceived teaching students not enough comfortable and enjoyable. Students may express a lack of enthusiasm for learning because the teacher has not used a variety of learning media as a tool to support learning. I am learning mathematics, but I cannot yet say I walk optimally because of the learning process. Still centered on the teacher (teacher center), as it should be centered on students (student center), in the learning process I still found lots of students alone and annoying other friends too. No one noticed what was conveyed by the teacher; on the other hand, there have not yet been significant efforts made by Mrs. Desi Wulandari to overcome existing problems.

Activity Study Teaching (KBM) on the eyes lesson mathematics in class IV at Kepatihan State Elementary School Subdistrict Purworejo owns it Lots constraint like results observation push researcher For help overcome obstacles that occur. Researcher discuss with collaborating teachers set alternative solution problem with using smart puzzle media via the NHT model. Use of varied media and learning models expected can give influence big on students ie capable increase results Study mathematics material wide square, square length and triangle that can be seen through results Study.

Use of intelligent puzzle media with the NHT learning model is a comprehensive program For teaching learning counting, in learning cooperative student given chance For communicate and interact social with her friend For reach objective learning while the teacher acts as a motivator and facilitator activity student. It means in learning This activity active with knowledge built themselves by students and them responsible answer on the learning.

Number Heads Together (NHT) is a more learning modelput forward to activity student in search, process, and report information from various final sourcepresented in front of class. NHT for the first time introduced by Spencer Kagan, et al. NHT models are part from the learning model cooperative structural, which emphasizes structures specially designedFor influence pattern interaction student (ZAHROK, 2018). Kagan's structure requires that students Work each other depends on the groupssmall in a way cooperative. Structure the developed as material alternative from structure class traditional like brandished hand moreover formerly For Then appointed by the teacher for answer question researcher. According to (Fathurrohman, 2015) Use teams cooperative For help the students learn ability understand possible readingapplied in a way wide. The NHT (Number Head Together) learning model, namely finish solution problem where is one member differentiate questions and discussions with group For make predictions or interpretation from fill questions and write solution continued problemswith presentation represented by onemember group.

Study against the NumberHead Together model as base delivery material Already studied by other researchers. So that from results study This can made as reference researcher For more confirm study. (Surya, 2018) research results state that percentage completeness learning in cycle I percentage completeness 54% with The average student score is 76 and the percentage in cycle II completeness reached 86% with the average student score is 89. With thereby implementing the Number Head Together model can increase activities and results Study student in social studies learning. Difference research conducted by Yeni Fitra Surya with study This located in the eye's lessons used. On research This use eye lesson mathematics.

Study from (Kistian, 2018) entitled " The influence of the number head together (NHT) learning model on results Study mathematics students in class IV of SD Negeri 4 Banda Aceh" concluded that type study This using true experience with design pre-test post-test control group design research , where sample usedin study totaling 30 students carried out with use simple random sampling technique. Analysis of the data used use analysis descriptive and inferential statistics. Based on results research and data analysis shows that results Study taught studentswith method lecture No experience improvement, results Study student taught with a learning model cooperative number of head together type experienced increase, so can concluded that there is influence positive and significant implementation learning with type number head together against results Study mathematics student class IV of SD Negeri 4 Banda Aceh.

Based on study relevant researchcan concluded that use learning cooperative number head together type with intelligent puzzle media to results Study

mathematics capable increase ability activeness in students, so results learning achieved by studentswill Better from previously.

Research result (Wahyuddin, 2017) stated that percentage completeness Study cycle I was 64.5%; in cycle II, it was 80%. Research results show that there is an enhancement in the quality of learning mathematics. Difference research conducted by Wahyuddinwith study This is located in the class used. On research This is used in fourth-grade elementary school. Based on the background behind the study above, the researcher will stage a study with the title "The Influence of the NHT (Number Head Together) Model with Smart Puzzle Media." regarding Learning Outcomes in Mathematics.".

METHOD

Design study This is done using the Nonequivalent Control Group Design model. Design used in the study This is a design study type experiment pseudo (quasi experimental design), which consists of two groups, namely group control and group experiment. Group control consists of all students in class VA, while group experiment consists of all students in class VB Kepatihan State Elementary School, Purworejo. The population under study This is student Class IV of Kepatihan State Elementary School Purworejo, which amounted to 39 students, consisting of 21 students in Class IV A and 18 students in Class IV B. The study included two class samples: IV A and IV B. Control class totaling 21 (IV A). Experimental class 18 (IV B).

The sampling technique used in the study This is a nonprobability.Sampling is a saturated sampling model. Very good data collection techniques are required in research because it refers to how the data is obtained. Deep data collection techniques: study This is the test used in the study. This namely pretest and posttest in form choice double to measure how much big influence learning number heads together with intelligent puzzle media to results Study mathematics with material circumference and area square, square long, and triangular. Before conducting tests on students, especially former researchers, test validity and reliability details. Testing the item question This is done so that you can determine whether or not the questions are worthy of being used as test results study.

Instruments used in this study, that is, question or test results, Test results Study is testing mastery because This measure measures student mastery of material taught by the teacher or studied by students.

RESULTS AND DISCUSSION

Materials used in study This is material circumference and area square, square long and triangular. Form question or test results learning usedis question choice double. Questions and tests results Study used For; measure aspect cognitive. Following assessment instrument grid cognitive.

Table 1 Instrument Grille Evaluation Cognitive

Material Tree	Indicator	Type Question	Realm Cognitive	Number question
	1.9.1 Count broad and and around rectangle.	Multiple Choice	C4	1, 2, 8, 9, 12, 14, 17, 22, 25 , 28
	1.9.2 Count area and circumference rectangle long	Multiple Choice	C4	3, 5, 6, 10, 15, 20, 23, 26, 30, 32
	1.9.3 Count area and circumference triangle	Multiple Choice	C4	4, 7, 11, 13, 16, 18, 21, 22, 25
	4.9.1 Solve problem everyday life involves circumference and area area (square, square long, triangular)	Multiple Choice	C5	19, 24, 27, 29, 31, 33, 34, 35, 36,
Amount				36

a. Research result

Deep data study This obtained researcher through method test use instrument question. Method test used researcher for know results Study mathematics student class IV at Kepatihan State Elementary School Purworejo.

a) Initial Data (Pretest)

Pretest was carried out for know the initial data on the class control and class experiment. The pretest was given to each of them class control and class experiment with amount students 39, total student class control 21 and sum student class experiment 18. Instruments usedin study This using 30 items question choice doubles that have been tested at level validity its reliability.

1. Control Class Pretest: Class pretest control given before treatment in class IV A with amount students 21 and count item question 36 on the material circumference and area square, square long and triangular. Pretest carried out in each class. The following is the pretest score data Study mathematics class control (IV A), can seen attached 7.
2. Experimental Class Pretest: Class pretest experiment given before treatment in class IVB with amount students 18 and count item question 36 on the material circumference and area square, square long. A pretest was given For know ability beginning students on the material circumference and area square, square long. Pretest carried out in each class, the following is the pretest score data Study mathematics class experiment (IV B), Distribution of data from class pretest results control and class experiment presented in the table following :

Table 2 Distribution of Pretest Data for Control Class and Experimental Class

Group	Amount Student	highest score	Lowest value	Average value
Pretest Experiment	18	97.22	47.22	69.90
Control *Pretest*	21	83.33	36.11	72.74

In table 2 you can seen that variable class experiment with the number of 18 students and from class control with total 21 students. Group experiment obtain results study pretest with mark lowest (minimum) 47.22. And value highest (maximum) 97.22 with an average of 69.90. Group control obtain results study pretest with mark lowest (minimum) 36.11 and value highest (maximum) 83.33 with an average of 72.74.

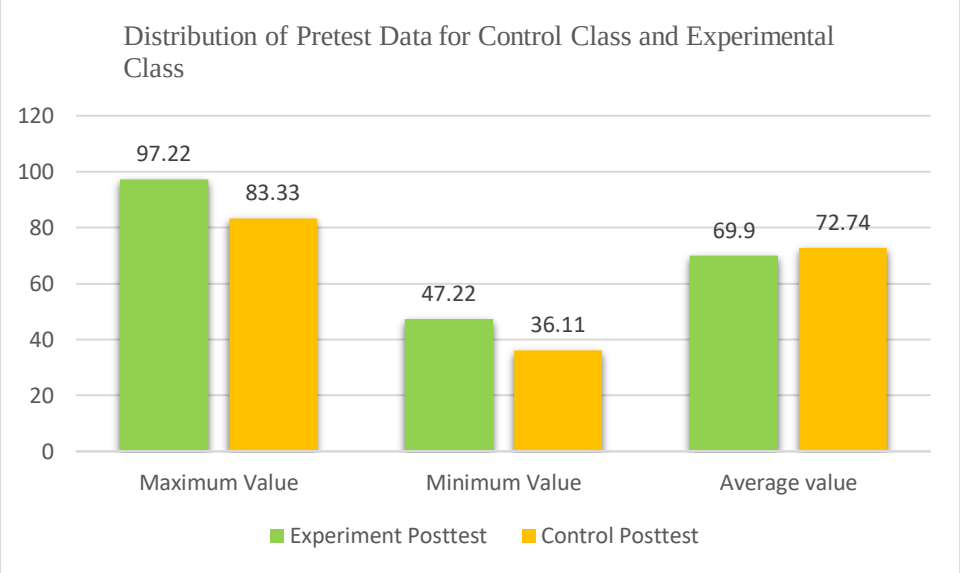

Figure. 1 Distribution of Pretest Data for Experimental Class and Control Class

Figure 2 shows that class pretest results are experiments, and classes control their own differences. However, it is not too significant. Experimental class results learn more overall compared to class control. This matter can be observed through the lowest and highest marks in each class. The experimental class's lowest mark was 47.22, and the highest value was 97.22, whereas the class control's lowest mark was 36.11 and the highest value was 83.33. In the figure, the average value for the two experimental classes is 69.90, while the average value for the control class is 72.74. Based on the average score of each class, the second class's difference in marks on the pretest was not significant. The control class is more valuable compared to the class experiment.

b) Treatment

After class control and class Each experimenter was given a pretest, stage next bye give treatment. Before give treatment done planning and manufacturing device learning. Difference treatment in class control and class experiment is If class control No given treatment special so on the contrary class experiment given treatment. Experimental class get learning number heads together with intelligent puzzle media (Putra et al., 2017).

1. Treatment Control class: Control class is class comparison, in matter This treatment in class control is without treatment special. Control class No given learning number heads together with intelligent puzzle media. The learning model applied in the classroom control is the usual learning model used daily by the class IV A teacher.
2. Experimental Class Treatment: Experimental class is class to be focus study. Giving treatment implemented after given a pretest. Stages after the pretest, the researcher plan and make device learning. Material learning in study This is the number head together model, the media used in study This is a smart puzzle. Treatment given used 6 times help with the number heads together learning model with intelligent puzzle media. Students are divided into 5 groups; each group consists of 3-5 students.

Use intelligent puzzle media together with model number heads together to help student understand circumference and area square, square long and triangular. Smart puzzle media Not only works as a learning medium but also as refreshment for students, there are games in intelligent puzzle media. Students get sheet Work group for worked out and discussed together later results discussion group presented and so on is student given sheet Work individual for made evaluation. Students get reinforcement and reward from the teacher because already follow learning with kind, enthusiastic and cheerful.

c) Final Data (Posttest)

Posttest was carried out For find out the final data on the class control and class experiment (Devi et al., 2022). The posttest is given to each class control and class experiment with amount students 39, total student class control 21, sum class experiment 18. Instruments questions usedin the same posttest with the question instrument used in the pretest ie 36 items question choice double.

1. Control Class Posttest: Control class No get treatment special However still given the posttest because used as comparison class experiment. Posttest is used for measure ability end students on the material circumference and area square, square long and triangular. Posttest is used for knowing results Study mathematics student. The following is the data on the posttest results Study mathematics student class control (IV A), can seen in attachment 7.
2. Experimental Class Posttest: Posttest in class experiment held after get treatment using the number head together model with medi intelligent puzzle. The posttest is used for measure ability end students on the material

circumference and area square, square long and triangular. Posttest is used for knowing results Study mathematics student. The following is the class posttest score data experiment (VB), distribution of class posttest data results control and experiment presented in table 3 as follows:

Table 3
Distribution of Posttest Results Data for Control Class and Experimental Class

Group	Amount Student	highest score	Lowest value	Average value
Experiment *Posttest*	18	100.00	83.33	94.90
Control *Posttest*	21	88.88	44.44	81.21

In table 3 you can see that variable class experiment with the number of 18 students and from class control with total 21 students. Group experiment results study posttest with mark lowest (minimum) 83.33 and value highest (maximum) 100 with an average of 94.90. Group control obtain results study posttest with mark lowest (minimum) 44.44 and value highest (maximum) 88.88 with an average of 81.21.

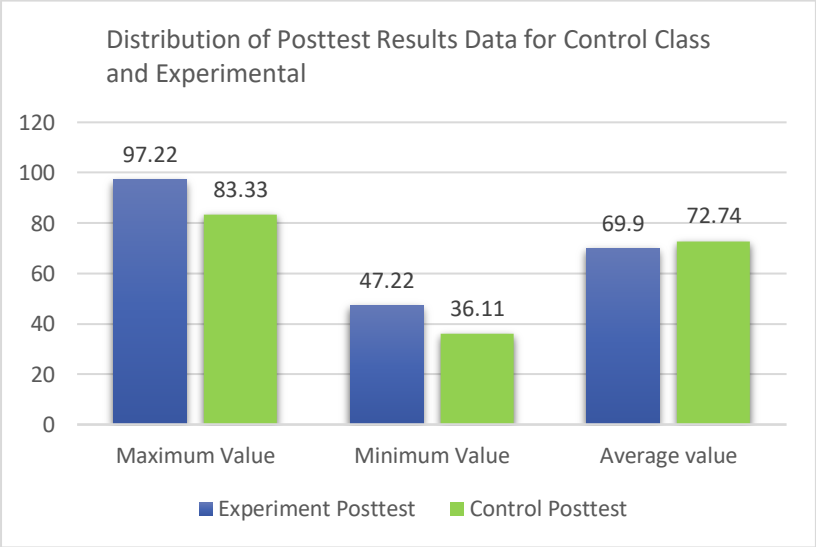

Figure. 2 Distribution of Class Posttest Data Experiment and Control Class

Figure 3 shows that class posttest results experiments and classes control own difference. Experimental class own results learn moretall compared to with class control. This matter can be observed through mark lowest and value highest in each class. Experimental class own mark lowest 83.33 and value the highest is 100.00 while class control own mark lowest 44.44 and value highest 88.88. In the picture 3 classes experiment own the average value is 94.90 whereas class control own average value 81.21. Based on average score of each class, second class own difference posttest score. Experimental class own more

valuetall compared to with class control, means that mark results Study mathematics class experiment increase.

d) Prerequisite Test Analysis

Test prerequisites analyst on research This covers data normality, and homogeneity test variance (Usmadi, 2020). Researcher use SPSS 23 for Windows program help for carry out prerequisite tests analysis the. Based on description results from each test precondition analysis:

1. Normality test

   Normality test carried out on class pretest and posttest data control and class experiment. Normality test aims for test distribution of the data normally distributed or distributed free. Analysis statistics usedin study This is the Kolmogrov - Smirnov test. (Azis et al., 2021)

   Researchers use the value parameter probability (sig) as guidelines with provision If mark probability (sig) ≥ 0.05 then the data normally distributed, if mark probability (sig) ≤ 0.05 then the data distribute free or no distribute normally. Following pretest and posttest normality test results, available seen in the table 4:

Table 4 Normality Test Results

Tests of Normality							
		Kolmogorov-Smirnov [a]			Shapiro-Wilk		
	Class	Statistics	Df	Sig.	Statistics	df	Sig.
Preliminary data	Experiment	.137	18	,200 *	,959	18	,588
	Control	,243	21	,002 *	,803	21	,001
final_data	Experiment	,319	18	,000 *	,788	18	,001
	Control	,236	21	.003 *	,712	21	,000
*. This is a lower bound of the true significance.							
a. Lilliefors Significance Correction							

Based on table 9, the results of the Kolmogrov - Smirnov test are evident that mark significance of class pretest experiment 0.200 and value significance class control 0.002. Significant value class experiment more of 0.05 which means class pretest scores experiment originate from a normally distributed population, then a similarity test was carried out two mean (t-test) through two party using non- parametric statistical tests that is with the Mann-Whitney U test.

On the posttest, value significance class experiment 0.000 and value significance class control 0.003. Significant value class experiment not enough of 0.05 which means class posttest scores experiment No originate from normally distributed population. Significant value class control not enough of 0.05 which means class posttest scores control No originate from normally distributed population. Second mark significance class experiments and classes control minus 0.05 which is significant second class No originate from a normally distributed population, then a similarity test was carried out two mean (t test) through two party using non- parametric statistical tests that is with the Maan - Whitney U test.

2. Homogeneity Test

The homogeneity test done for know is variance of data from analyzed sampleshomogeneous or No. Researcher using the value parameter probability (sig) as with provision If mark probability (sig) ≥ 0.05 then the data own the same variance (homogeneous). If value probability (sig) ≤ 0.05 then the data No own equal variance (nohomogeneous). Following homogeneity test results, available seen table following:

	Test of Homogeneity of Variances			
	Levene Statistics	df1	df2	Sig.
Preliminary data	4,073	1	37	,051
final_data	0.713	1	37	,404

Based on table the, shows that in the pretest data values significance of more than 0.051 of 0.05 so the pretest data has the same variant or homogeneous. In Nilsi's posttest data significance of more than 0.404 of 0.05 so the posttest data has the same variant or homogeneous. Second mark significance class experiments and classes control more of 0.05 which means the pretest data and posttest data have the same variant or homogeneous.

3. Testing Hypothesis

Based on normality test table and homogeneity test, because the data is distributed not normal but the data is homogeneous, then will used non-parametric statistics, namely the Mann- Whitny test use SPSS 23 for Windows program help.

Hypothesis in study This is:

- Ho : No there is influence Number Head Together learning with smart puzzle media to results Study mathematics student class IV at Kepatihan State Elementary School Purworejo
- Ha : Yes, influence Number Head Together learning with smart puzzle media to results Study mathematics student class IV at Kepatihan State Elementary School Purworejo

Testing hypothesis done with use Mann-Whitney U test analysis, because the data is not normally distributed. Mann-Whitney U test analysis show difference results Study between second class control and experiment after treatment. Ha will reject If mark probability (sig) ≥ 0.05, however if Ha value probability (sig) ≤ 0.05 then Ha is accepted. The following is the data from the calculation test results mann - Whitney U, can seen in the table following:

Table 6 Mann-Whitney U Test Results

Test Statistics [a]		
	Preliminary data	final_data
Mann-Whitney U	172,000	59,500
Wilcoxon W	343,000	230,500
Z	-485	-3,268
Asymp. Sig. (2-tailed)	,628	,001
Exact Sig. [2*(1-tailed Sig.)]	.646 [b]	,000 [b]
a. Grouping Variable: Class		
b. Not corrected for ties.		

Based on table the, shows that pretest in class experiment and control No own significant differences are shownwith mark Asymp. Sig. (2-tailed) of 0.628. Bigger from 0.05. Ability beginning class experiments and classes control No own difference.

Based on table Accordingly, the results of the Mann-Whitney U test show Asymp. Sig. (2-tailed) ,000 < 0.05, final data is known own mark more significancesmall of 0.05 ie of.001 or.001 ≤ 0.05. This means that Ho is rejected, and Ha is accepted so there is significant differencebetween results Study students who use the number head together learning model with intelligent puzzle media. Zcount -3.268 < -485 (Ztable) p the means the number head together learning model with intelligent puzzle media there is difference influence to results Study mathematics student.

b. Discussion

Study This aim for know use of the number heads together model against results Study mathematics student. Basicallyresults Study is proof success that has been achieved somebody in the learning process That Alone. Learning outcomes No only useful For know indicator success in field studies certain, but also as indicator quality institution education. Result of the use of the number head together model provides disturber to results Study student especially on the eyes lesson mathematics (Hau et al., 2023).

Analysis usedin study This is non-parametric statistical analysis. Use analysis This on results testing normality and homogeneity of data between group control with experiment. The results are shown in tables 8 and 9 with average mark post test class experiments 94.90 and class control 81.21. Enhancement mark post test group experiment taller compared to enhancement mark post test group control.

Proof that You can use the number head together model increase results Study fourth grade elementary school students are exists enhancement results Study mathematics before use of the number head together model with after use of the number head together model. Study This show that You can use the number head together model increase results Study mathematics fourth grade elementary school students. However Thus, improvement results Study mathematics possibly also influenced other thing.

Learning models and learning media required in mathematics is a capable learning model become intermediary or distributor information Study from abstract to concrete between teacher and student. Number head together learning model with intelligent puzzle media can make student become active as well as can develop intellectual child and capable finish problem learning abstract mathematics. So that student can own logical reasoning. Enhancement I think that's it maximum because of the learning process walk in accordance as planned and allfollow learning with full Spirit so that objective implementation use of number heads together with intelligent puzzle media can achieved.

You can use the number head together model increase results Study student. Statement is supportedresults study (Wahyuddin, 2017) proves it that You can use the number head together model increase results Study student. Learning outcomes in action cycle 1 ie Power absorb classical 64.50 % where in cycle 1 only 8 students completedlearning, while in cycle II experiencing increase to 10 students with acquisition score results Study by 80%. Learning outcomes show that exists enhancement results Study student Class V of SD Negeri 75 Ujung Pero Subdistrict Sabangparu Regency Wajo on the eyes lesson Mathematics. Results of research conducted by Wahaddin not Far different with results research conducted by (Kistian, 2018) proves it that use of the model number head togrther can increase results Study student. Average value of results Study students getstill belowThe KKM value, namely 45-60, increases over time given treatmentusing the number heads together model increases to 81.23. Research result This show that exists enhancement results Study mathematics student fourth grade elementary school.

Study This capable grow Spirit learn on your own student Because activity Learning is supported by creative and interesting learning models and media. Study This practice ability student in collaborate, discuss with his group for solve problem. Accepting studentslearning using a number head model with intelligent puzzle media more understand learning Because create atmosphere class become festive and fun in the learning process teach. However Thus, teachers' must Can conditioning class with Good Because student tend crowded in learning process. Limitations research This is the use of the number head together model is less effective when used in large sample size. Large sample size makes class not enough conducive and very good teacher difficult conditioning class. Study This use relatively small sample So can concluded that learning number heads together with intelligent puzzle media Better rather than using the conventional model (lecture). This proven with rising mark post test students, meaning happen a process called the learning process so that give good influencefor results Study mathematics.

CONCLUSION

Based on the study, it can be concluded that there is an influence of Number Head Together learning with smart puzzle media on the results of study mathematics in class IV at Kepatihan State Elementary School, Purworejo. Application of the Numbered Heads Together learning model with intelligent puzzle media capable of increasing results Study mathematics class experiments and class control over the

material circumference and area square, square long, and triangular. Difference results Study mathematics showed with results of the Mann-Whitney U test against class posttest scores experiments and classes control that has a difference significant on value Asymp. Sig (2-tailed). Of 0,000. More significance value is small of 0.05, i.e., 0.000 or 0.000 ≤ 0.05. Jasi got it and concluded that there is a significant difference between results between study students who use the number head together learning model with smart puzzle media and those who don't use the number head together learning model with intelligent puzzle media.

Acknowledgment
The author would like to express sincere gratitude to all parties who have provided support and contributions in the writing of this article. Without their contributions and support, this article would not have become a reality. Thank you for the dedication and valuable assistance.

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