Proceeding International Webinar Series – Educational Revolution in Post Covid Era
"Teaching and Evaluation for Children in Covid Era"
Faculty of Education, Universitas Negeri Malang
ISBN: 978-602-5445-13-2

EFFECTIVENESS OF JIGSAW AND TWO STAY TWO STRAY (TSTS) MODELS IN FPB AND KPK MATERIALS IN CLASS IV

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Abstract: This study aims to overcome the difficulties of students studying FPB and KPK material. This type of research is quasi-experimental, consisting of experimental classes 1 and 2. The research design is two groups, pretest-posttest design by taking total sampling. Prerequisite tests include tests of normality and homogeneity. The hypothesis test states that there is no difference in the effectiveness of the use of the jigsaw model and two stays two strays on the mathematical content of FPB and KPK material in class IV of SDN Bendo 1.

Keywords: learning outcomes; FPB; KPK; jigsaw model; model two stay two stray

INTRODUCTION

Mathematical learning is done by building creativity and students' way of thinking, namely mastery of the material by constructing their new knowledge (Susanto, 2016). This means learning mathematics, prioritizing students' understanding of learning a material. According to Susanto (2015: 184) "mathematics is called an exact science or is related to reason in Dutch". In looking for relationships of material learned in mathematics, the teacher helps students create mindsets that use reasoning in solving problems.

Mathematical learning activities that want children to understand the material provided and are active in learning activities, is a challenge for teachers in making learning plans. The learning design is expected to make children happy in learning, by means of the teacher choosing the right learning model, one of them is the Jigsaw or Two Stay Two Stray models. These models are models that emphasize group learning systems with the aim that students can cooperate with each other in solving problems related to the tasks given by the teacher, train responsibility so that students encourage each other to excel

The results of observations carried out in class IVA and IVB SDN 1 Bendo on Wednesday, November 21, 2018 were the number of students in IVA and IVB classes respectively 23 students. Class IVA consists of 13 male students and 10 female students, while class IVB is 12 male students and 11 female students. The students' seats are arranged in groups to form 5 groups. Learning activities include students reading books, questions and answers, group assignments, group discussions, delivery of discussion results, and explanations by the teacher. The data above, also

supported by the results of interviews conducted on Wednesday, November 21, 2018 namely interviews with class teachers and students selected at random. The teacher explains that the mathematics KKM value applied is 70. In the learning process the teacher has used a jigsaw learning model but has never used the two stay two stray learning model. Learning methods commonly used by teachers are question and answer, lectures and assignments. In learning FPB and KPK, the difficulty usually experienced by students is the error in writing answers because they lack understanding of how to look for prime factors and factors, and lack of mastery of division and multiplication. The teacher's way to overcome the student's difficulties is the teacher often repeats the explanation of the material and gives a lot of practice questions. While the results of student interviews chosen randomly were students who liked learning mathematics, especially FPB and KPK material, but there were some who did not like it. The difficulty that is commonly encountered by students related to this material is that it is difficult to distinguish between FPB and KPK questions. While in the way of learning, there are students who like learning individually because it makes it easy to concentrate on work while students who like to study in groups because this material is difficult so it is easier to solve problems by way of discussion. Overall, in the learning activities there are still students who are less enthusiastic in learning, regardless of the teacher's explanations chatting with his friends, and there are students who look bored.

Jigsaw learning model is a cooperative learning model consisting of four to six students. This model has advantages including making the learning atmosphere harmonious and developing creativity, ability, and problem solving power according to the students' own will (Shoimin, 2014). The steps of Jigsaw learning activities are students forming large groups, with each member of the large group referred to as an expert. An expert from a large group will gather with experts from another large group and form a small group to be tasked with understanding a subject matter. After discussing with the small group, all the experts returned to the large group again to present the results of the small group discussion to members of the large group. Then the teacher clarifies learning (Shoimin, 2014).

The Two Stay Two Stray learning model is a model that emphasizes group learning systems with the aim that students can cooperate with each other in solving problems related to the assignment given by the teacher, train responsibility so that students encourage each other to excel (Huda, 2013). The steps according to Fahurrohman (2015) are students divided into groups of four to five heterogeneous students. Students' assignments are divided into 2 students staying in groups to explain their group material to other group members who visit their groups while 2-3 other members go to other groups to receive information or discussion results from other groups, until all groups have been visited. Then the teacher clarifies learning.

Students who will be examined in this study are students of class IVA and IVB with the number of each class is 23 students. The subjects chosen in this study were mathematics with FPB and KPK material. While the model to be applied is Jigsaw and Two Stay Two Stray, where the Jigsaw model will be applied in class IVA as experimental group 1 and the Two Stay Two Stray model will be applied in class IVB as experimental group 2. The sampling technique used is total side and the research design is Two Group, Pretest Posttest Design. Based on the description above, the researcher wants to conduct research to find out whether there are differences in the effectiveness of the Jigsaw and TSTS models on FPB and KPK material in class IV Bendo SDN

Previous studies using the Two Stay Two Stray and Jigsaw models were conducted by Lutfi Awaliyah Soleha (2015) on the concept of the digestive system concept at SMA Negeri 16 West Jakarta. The results of his study indicate that there are differences in learning outcomes between students who use the Two Stay Two Stray and Jigsaw learning methods. Based on this research, it shows that student learning outcomes using Jigsaw learning methods are better than student learning outcomes using Two Stay Two Stray learning methods. However, the two models have never been applied to FPB and KPK material in class IV SDN Bendo 1.

Based on the description above, a study was conducted to determine whether there were differences in the effectiveness of the Jigsaw and Two Stay Two Stray models on FPB and KPK material in class IV SDN Bendo 1. The title of the research was "The Effectiveness of the Jigsaw Model with Two Stay Two Strays on the Material of FPB and KPK in Class IV SDN Bendo 1 ".

METHOD

This study uses a quantitative approach. While the type of research used in this study is experimental research. The form of experimental research design taken was quasi experimental design. The research design used was Two Group, Pretest Postest Design. This design illustrates, the research will be formed into two groups namely experimental group 1 (class 4A) by being given a Jigsaw learning model treatment and experimental group 2 (class 4B) by being given a TSTS learning model treatment. Both groups will be given a pretest to find out the initial condition before being given treatment, while in the final stage will be given a posttest to find out the condition after being treated (Sugiyono, 2010).

Table 1. Research Design

Group	***Pretest***	**Treatment**	***Posttest***
Jigsaw class (Experiment 1)	O_1	X_1	O_2
Class Two Stay Two Stray (Experiment 2)	O_1	X_2	O_2

(Arikunto, 2010: 124)

Information:
O_1 = *Pretest*
O_2 = *Posttest*

X_1 = Treatment with the Jigsaw learning model
X_2 = Treatment with the Two Stay Two Stray learning model

The research was conducted at SDN Bendo 1, namely classes IVA and IVB, with 23 students in each class. Class IV A consists of 13 male students and 10 female students, while class IVB consists of 12 male students and 11 female students. SDN Bendo 1 is located at Jalan Cilieung No. 142 Kepanjen Kidul sub-district, Blitar city.

The population in this study were all students in grade IV SDN Bendo 1, amounting to 46 students. While the sampling technique is done by total sampling.

This study uses independent variables namely the learning model used, namely the Jigsaw (X1) and TSTS (X2) models. The dependent variable, namely student learning outcomes (Y). And the control variable is mathematics learning material, namely FPB and KPK as well as time allocation.

Data collection techniques used in this study were interviews and mathematics learning test results of FPB and KPK material. While the research instruments used were documentation, observation of teacher and student activities, and tests in the form of pretest and posttest questions.

Test instrument in the form of pretest and posttest questions will be tested for validity, reliability, different power and difficulty level. After that the test will be given to the sample to be tested. The results of the pretest and posttest tests will be described using descriptive and inferential analysis with SPSS 21 for Windows, namely the data normality test, homogeneity test, and hypothesis testing. To test the normality of the data used Kolmogorov-Smirnov, while the homogeneity test uses the Levene's test.

Hypothesis testing uses the formula of independent t test, namely t test with unpaired samples assisted with SPSS 21 for Windows significance level of 5% (0.05). Guidelines for decision making of research hypotheses (Gracia, 2018: 38) are as follows.

a) If the value of sig. (2-tailed) ≥ 0.05 and the mean value of experimental class 1 <experimental class 2, then H_0 is accepted meaning there is no difference in learning outcomes of grade IV SDN Bendo 1 students in FPB and KPK material taught using the Jigsaw learning model with Two Stay Two Stray .
b) If the value of sig. (2-tailed) <0.05 and the mean value of experimental class 1> experimental class 2, then H_a received means that there are differences in learning outcomes of grade IV SDN Bendo 1 students in FPB and KPK material taught using the Jigsaw learning model with Two Stay Two Strays.

RESULT AND DISCUSSION

Observation of teacher activities when learning activities carried out by class IV teachers. The results of observations of teacher activity in experimental classes 1 and 2 are as follows.

Table 2. Observation of Teacher Activity

Meeting	Class			
	Experiment 1		Experiment 2	
	Percentage of success	Success Category	Percentage of success	Success Category
1	80%	Good	80%	Good
2	89,47%	Good	88,8%	Good
3	89,47%	Good	88,8%	Good
4	90%	Very Good	90%	Very Good
Average	**87,23%**	**Good**	**86,9%**	**Good**

Observation of student activities when learning activities carried out by class IV teachers. The results of observations of student activities in experimental classes 1 and 2 are as follows.

Table 3. Observation of Student Activity

Meeting	Class			
	Experiment 1		Experiment 2	
	Percentage of success	Success Category	Percentage of success	Success Category
1	72,73%	Enough	77,27%	Enough
2	81,5%	Good	82,63%	Good
3	84%	Good	83,42%	Good
4	83,18%	Good	84,09%	Good
Average	**80,35%**	**Good**	**81,85%**	**Good**

The data from the study came from the experimental class 1 and experiment 2. The experimental class 1 was class 4A which was treated by the Jigsaw model and the experimental class 2 was class 4B which was treated by the Two Stay Two Stray (TSTS) model. The data collected comes from the results of the pretest-posttest. Data obtained from written tests with 8 items, namely question no. 1-4 is an aspect of knowledge and questions 5-8 are aspects of skills.

Table 4. Indicators of Knowledge Aspects

Question Number	Code	Indicator
1	A	Solve story problems related to daily life using the fellowship factor
2	B	Analyzing information in problems to solve problems using FPB
3	C	Solve story problems related to daily life by using multiples of fellowship
4	D	Analyzing information in a matter of stories relating to daily life using the KPK

Table 5. Indicators of Skills Aspects

Question Number	Code	Indicator
5	AA	Applying material alliance factors to solve story problems related to daily life
6	BB	Correcting answers to story problems related to daily life using FPB is true or false
7	CC	Applying material multiples of fellowship to solve story problems related to daily life
8	DD	Correcting answers to story problems related to daily life using the Corruption Eradication Commission is true or false

Following are the learning outcomes data of FPB and KPK materials in experimental classes 1 and 2 obtained from the results of the pretest and posttest given before and after treatment.

Table 6. Pretest-Posttest Results for Each Experiment Class Indicator 1

Indicator Code	Max Score	Average		Percentage (%)	
		Pretest	*Posttest*	*Pretest*	*Posttest*
A	20	13,25	14,95	66	75
B	30	18,8	23,65	63	79
C	20	12,55	15,15	63	76
D	30	18,5	21	62	70

Table 7. Recapitulation of Experiment Grade Skills Value 1

		Criteria			
		Very Good (4)	Good (3)	Less (2)	Need Guidance (1)
Pretest	**Total Students**	**0**	**18**	**2**	**0**
Posttest	**Total Students**	**4**	**16**	**0**	**0**

Table 8. Pretest-Posttest Results for Each Experiment Class Indicator 2

Indicator Code	Max Score	Average		Percentage (%)	
		Pretest	*Posttest*	*Pretest*	*Posttest*
A	20	12,95	14,3	65	72
B	30	19,75	24,15	66	81
C	20	12,05	15,45	60	77
D	30	17,3	22,15	58	74

Table 9. Recapitulation of Experiment Grade Skills Value 2

		Criteria			
		Very Good (4)	Good (3)	Less (2)	Need Guidance (1)
Pretest	**Total Student**	**0**	**17**	**3**	**0**
Posttest	**Total Student**	**3**	**17**	**0**	**0**

N Gain Score is used to determine the effectiveness of the use of learning models by being made percent (%). The N Gain Score test is described in the following table 10.

Table 10. Calculation Results for the N-Gain Score Test

Category	Experiment 1		Experiment 2	
	N	%	N	%
Ineffective	13	65	9	45
Less effective	7	35	11	55
Effective enough	-	-	-	-
Effective	-	-	-	-
Average (%)	30,03	-	35,51	-

Data analyzed were student learning outcomes before being treated (pretest) and after being given treatment (posttest). Data analysis uses parametric statistics because the data is normally distributed and homogeneous. The following description of the normality test results of the pretest in table 11

Table 11. Normality Test Results Pretest

Data	Experiment Class 1			Experiment Class 2		
	Significance		Information	Significance		Information
	Kolmogorov-Smirnov[a]	Shapiro-Wilk		Kolmogorov-Smirnov[a]	Shapiro-Wilk	
Pretest	0,130	0,484	Normal	0,200	0,564	Normal

Sig value pretest data of experimental class 1 and 2 in table 4.15 are normally distributed. This can be seen from the sig value of each data> 0.05. The description of the homogeneity test of the pretest and posttest results in table 12 is as follows.

Table 12. Homogeneity Test Using the Levene's test

Data	Sig	Information
Pretest	0,081	homogeneous

The significance value of the homogeneity test above is 0.081> 0.05. Thus it can be concluded that the data above is homogeneous. The description of the pretest and posttest hypothesis test results in table 13 is as follows.

Table 13. Hypothesis Test

Data	Df	Sig. (2-tailed)	Information
Pretest	38	0,708	H_0 accepted

The results of calculation of the hypothesis with the help of SPSS 21 for Windows shows the value of sig. (2-tailed) is 0.708> 0.05 with a confidence level of 95%, so H_0 is accepted. Thus, it can be concluded that there is no difference in the effectiveness of the use of Jigsaw learning models compared to TSTS on learning outcomes of FPB and KPK material in fourth grade students of SDN Bendo 1. The following description of the normality test results pretest and posttest in table 14.

Table 14. Test Normality of Pretest and Posttest Results

Data	Experiment Class 1			Experiment Class 2		
	Significance		Information	Significance		Information
	Kolmogorov-Smirnov[a]	Shapiro-Wilk		Kolmogorov-Smirnov[a]	Shapiro-Wilk	
Posttest	0,200	0,462	Normal	0,200	0,303	Normal

Sig value pretest, posttest experimental class 1 and 2 in table 14 are normally distributed. This can be seen from the sig value of each data> 0.05. The description of the homogeneity test of the pretest and posttest results in table 15 is as follows.

Table 15. Homogeneity Test Using the Levene's test

Data	Sig	Information
Posttest	0,535	Homogeneous

The significance value of the homogeneity test above is 0.535> 0.05. Thus it can be concluded that the data above is homogeneous. The hypothesis was then tested using an independent t test (t test with unpaired samples) assisted with SPSS 21 for Windows, a significance level of 5% (0.05). The description of the pretest and posttest hypothesis test results in table 16 is as follows.

Table 16. Hypothesis Test

Data	Df	Sig. (2-tailed)	Information
Posttest	38	0,570	H_0 accepted

The results of calculation of the hypothesis with the help of SPSS 21 for Windows shows the value of sig. (2-tailed) is 0.570> 0.05 with a confidence level of 95%, so H_0 is accepted. Thus, it can be concluded that there is no difference in the effectiveness of the use of Jigsaw learning models compared to TSTS on learning outcomes of FPB and KPK material in fourth grade students of SDN Bendo 1.

The learning model implemented by the teacher is in accordance with the stages of the Jigsaw learning model, which consists of initial, core, and closing activities. However, before the implementation of the Jigsaw model students were given a pretest beforehand to find out the initial ability and at the end of the meeting were given a posttest to find out the learning outcomes after the Jigsaw model was applied.

In the initial activity, the learning process begins with the teacher with greetings and prayers. Followed by attendance, apperception and delivery of learning objectives, aspects to be assessed, activities to be carried out.

At the exploratory stage the teacher gives questions to students about the material being studied, then gives instructions to students to make 4 groups and gather with the group (this group is called the home group namely groups 1, 2, 3, and 4). Afterwards, the teacher instructs one student from each group to take the letter card provided by the teacher (the letter card consists of letters A, B, C, D and E) and distribute it to each group member so that each child who got the same card gathered.

In the elaboration stage the teacher distributes handouts of material to each expert team A, B, C, D, and E for them to discuss together. Afterwards they returned to their original group, groups 1, 2, 3, and 4, to explain the material they had obtained from the expert team to members of the original group. In this step the home group pays attention to the expert when explaining.

At the confirmation stage the teacher explains material that is not yet known to students (reinforcement). And the last stage is the closing activity consisting of evaluation, drawing conclusions, reflection, follow-up, and closed with greetings and prayers.

The results of observations of teacher activities in carrying out learning activities, at meeting 1 reached 80% in the good category, increased to 89.47% in meetings 2 and 3 in the good category, and the final meeting reached 90% in the very good category. While the results of observations of student activities, the percentage of success at the first meeting was 72.73% with enough categories, increased to a good category that is 81.5% at meeting 2, increased again at meeting 3 which became 84% and the fourth meeting reached 83.18 %.

The learning outcomes of experimental class 1 that apply the Jigsaw model on the pretest results of knowledge aspects have an average of 63.10 with a minimum value of 40 and a maximum value of 79, while the posttest results have an average of 74.75 with a minimum value of 61 and a maximum of 85. Whereas in the aspect of experimental class 1 skills at the time of the pretest that

got good grades there were 18 students and less grades there were 2 students. Whereas at the time of the posttest the number of students who got very good grades there were 4 students and 16 students got good grades.

Learning outcomes in this study differ from the results of Lutfi Awaliyah Soleha's (2015) study which states that the average value of pretest is 56,485 and posttest is 89,303. In addition, the results of research with Niken Setia Pratiwi (2015) are also different. This is because, the average yield of 52.63 pretest and 79.05 posttest.

The implementation of the model applied by the teacher is in accordance with the stages of the Two Stay Two Stray learning model, which consists of initial, core, and closing activities. However, before applying the Two Stay Two Stray model students are given a pretest beforehand to find out the initial ability and at the end of the meeting a posttest is given to find out the learning outcomes after the application of the Two Stay Two Stray model.

In the initial activity, the learning process begins with the teacher with greetings and prayers. Followed by attendance, apperception and delivery of learning objectives, aspects to be assessed, activities to be carried out.

At the exploration stage the teacher gives questions to students about the material being studied, then gives instructions to students to make 4 groups and gather with the group (this group is called a large group, namely groups 1, 2, 3, and 4).

At the elaboration stage the teacher distributes the material handouts to the large groups namely groups 1, 2, 3, 4, and 5 for them to discuss and understand together. When the group is having a discussion, the teacher guides the group to understand it. Next, the teacher instructs each group to appoint 2 students to remain in the group while the other members go around to the other groups one by one. The task of students in the group is to explain the material in the group to each other group members who come to the group. Whereas group members who go to other groups have the task of understanding and recording material from other groups. After completing their respective tasks, each group member returned to his large group to explain the membership of the other large groups.

At the confirmation stage the teacher explains material that is not yet known to students (reinforcement). And the last stage is the closing activity consisting of evaluation, drawing conclusions, reflection, follow-up, and closed with greetings and prayers.

The results of observations of teacher activities in carrying out learning activities, at meeting 1 reached 80% in the good category, increased to 88.8% in meetings 2 and 3 in the good category, and the final meeting reached 90% in the very good category. While the results of observations of student activities, the percentage of success at the first meeting was 77.27% with enough categories, increased to a good category that is 82.63% at meeting 2, increased again at meeting 3 which was 83.42% and the fourth meeting reached 84 09%.

Learning outcomes in this study differ from the results of the research of Niken Setya Pratiwi (2015) which states that the average value of pretest 54.52 and posttest 60.50. In addition, the results of research with Lutfi Awaliyah Soleha (2015) are also different. This is because, the average yield of 53 pretest and 82.39 posttest.

The results of hypothesis testing with the help of SPSS 21 for Windows concluded that there was no difference in the effectiveness of the use of Jigsaw and Two Stay Two Stray learning models on learning outcomes of FPB and KPK material in fourth grade students of SDN Bendo 1. This is seen from the processing of pretest data which states that the data are normally distributed and homogeneous. While the results of hypothesis testing with sig. (2-tailed) is 0.708. Because the results of the hypothesis test stated the significance value> 0.05, it was continued with posttest data testing. The results of posttest data processing also mentioned that the data were normally distributed and homogeneous. While the results of hypothesis testing with sig. (2-tailed) is 0.57. From the results of the pretest-posttest data processing, it can be concluded that there is no difference in the effectiveness of the use of Jigsaw and Two Stay Two Stray learning models on learning outcomes of FPB and KPK material in Grade IV SDN Bendo 1 students.

The conclusion of the pretest-posttest data test results is supported by the results of the N Gain Score which states that both classes are included in the ineffective category because the experimental class 1 gets an average value of 30.03% ie 65% of students are in the ineffective category and 35% students fall into the less effective category. while in the experimental class 2 got an average value of 35.51% which is the value of 45% of students in the ineffective category and the value of 55% of students in the less effective category.

The results of the study which stated that there is no difference in the effectiveness of the Jigsaw model with Two Stay Two Stray is because the two models have in common, both of them are cooperative models where the learning activities are student-centered, and have similar learning steps (Soleha, 2015). The results of this study differ from the results of previous studies namely Soleha (2015) and Pratiwi (2015) which states that the learning outcomes of the Jigsaw model are better than the Two Stay Two Stray model.

CONCLUSION

Based on the formulation of the problem and the research results described in the previous chapter, the research results can be concluded as follows.

The experimental class learning outcomes 1, namely the pretest results of knowledge aspects have an average of 63.10 with a minimum value of 40 and a maximum value of 79, while the posttest results have an average of 74.75 with a minimum value of 61 and a maximum of 85. While in the aspect of skills experimental class 1 at the time of the pretest that got good grades there were 18

students and less grades there were 2 students. Whereas at the time of the posttest the number of students who got very good grades there were 4 students and 16 students got good grades.

The experimental class 2 learning outcomes, namely the pretest results of knowledge aspects have an average of 62.05 with a minimum value of 49 and a maximum value of 75, while the posttest results have an average of 76.05 with a minimum value of 68 and a maximum of 88. While in the aspect of skills experimental class 2 at the time of the pretest that got good grades there were 17 students and less value there were 3 students. Whereas at the time of the posttest the number of students who got very good grades there were 3 students and 17 students got good grades.

There is no difference in the effectiveness of the use of Jigsaw and Two Stay Two Stray learning models on learning outcomes of FPB and KPK material in fourth grade students of SDN Bendo 1. This can be seen from the results of hypothesis testing on pretests that get sig. (2-tailed) is 0.708 and posttest sig. (2-tailed) 0.57, ie significance> 0.05 with a 95% confidence level. In addition, it can also be seen from the calculation results of the N Gain Score which states that the two classes are included in the ineffective category because the experimental class 1 gets an average value of 30.03% ie 65% of students are in the ineffective category and the value of 35% of students is in the category less effective. while in the experimental class 2 got an average value of 35.51% ie the value of 45% of students included in the ineffective category and the value of 55% of students entered the category of ineffective.

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