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Application of the Jigsaw Type Cooperative Learning Model to Improve Student Learning Outcomes in the Material of Addition Fraction in Elementary School

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Abstract

This research is a classroom action research which consists of several aspects of action and the main observation is increasing student learning outcomes by using the discussion method. The research was conducted at SDN Duyu involving 19 students enrolled in the 2020/2021 school year. Using the Kemmis and McTaggart research design. Taggart, which consists of two cycles. Where in each cycle two class meetings are held and each cycle consists of four stages, namely planning, implementing, observing, and reflecting. The results showed that in the first cycle of classical completeness measures, 51.58% was obtained and the classical absorption was 52.63%. In the action cycle II obtained 77.89% classical completeness and 89.47% classical absorption. This means that learning in cycle II has met the indicators of success with a minimum classical completeness value of 75% and a minimum classical absorption of 60%. Based on the average value of classical absorption and classical learning mastery in cycle II learning activities, it can be concluded that increasing learning with the Jigsaw cooperative learning model can improve fifth-grade student learning outcomes in the addition of fractions at SDN Duyu.

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Introduction

Important skills in the 21st century are relevant to the four pillars of life which include: *learning to know, learning to do, learning to be,* and *learning to live together,* which contain specific skills that must be empowered in learning activities, such as critical thinking skills, problem-solving, metacognition, communication skills, collaboration, innovation/ creation, information literacy, and various other skills by Johariah (2019). The achievement of 21st-century skills can be done by updating the quality of learning, helping students develop participation, adapting personalization of learning, emphasizing project/problem-based learning, encouraging collaboration and communication, increasing engagement and student motivation, cultivating creativity and innovation in learning, using the appropriate learning tools, designing learning activities that are relevant with empowers metacognition, and develops *student-centered* learning (Zubaidah, 2016).

Learning in the 2013 curriculum is based on character and competence through an integrative scientific and thematic approach. According to Rakhmawati et al. (2016) learning in the 2013 curriculum should involve students as much as possible so that they are able to explore to form competencies by exploring various potentials, and scientific truths. So that students who take part in learning have preparation and maturity in undergoing the development of life and science in this 21st century. Mathematics subjects need to be given to all students starting from elementary school to equip them with the ability to think logically, analytically, systematically, critically, and creatively and the ability to work together by Iriani (2019).

According to Basuki (2015) as it happens that mathematics is considered the most difficult and frightening subject for students among other subjects so students are not so interested in learning mathematics, students only follow the learning but do not instill and learn it seriously.

Really so that student activity does not appear in the learning process and learning outcomes are relatively low. Mathematics is the knowledge that has the characteristics of encouraging students to think logically, critically, diligently, and with initiative, so it is hoped that these characteristics can be found in students who study mathematics (Apandi, et al., (2014).

Related to this problem, has an impact on the results of learning mathematics at SD Negeri Duyu, especially in grade V, the mathematics scores of students in the first semester of 2019 are low, this is evidenced by the report on the learning outcomes of 27 students, students who achieved the Minimum Completion Criteria (KKM) 60 % only 12 students or 48%, with the KKM set by the school for the achievement of completeness in learning mathematics is 60% and classical completeness attainment is at least 85%. This means a number of 13 students or 52% of students stated that they did not reach the KKM.

The following is the form of student work in solving the problem about the sum of the pieces below the NF subject worked on questions 1 to 5 correctly and correctly. Problem number 1, NF directly adds up the numerator of the fractions with the same denominator. Problem number 2, NF first equates the denominators of the unequal denominators, then adds up the numerators. Problem number 3, NF immediately adds up the numbers of the mixed fraction because the denominators are the same. Problem number 4, NF equalizes the denominators of the mixed numbers and then adds up the numerators. Problem number 5, NF adds up the decimal fractions by means of continuous addition. There were 3 students (12%) who worked on questions like NF.

Based on the results of working on the FR subject in questions 1 and 3 the FR has added up correctly, but in questions 2 and 4 the FR answer is wrong, this error occurs because the FR immediately adds up the numerator without equating the denominator first so it still needs to be given an understanding more so to the FR so that they don't have misconceptions. There were 9 students (36%) who answered the questions as shown in the FC subject in question number 1 is correct, in question number 2 the FC error lies in the direct addition of fractions without equating the denominator, in questions 3 and 4 the FC error lies in the addition directly without changing the mixed fraction form first be an ordinary fraction, for question number 5 the answer to FC is not yet correct because FC only adds up the parallel numbers according to the digits after the decimal point without paying attention to the rules for the addition of decimal fractions, therefore there is still a need to give more understanding to FC. The number of students who worked on the questions as on the FC was 8 students (32%). While a number of 5 people or 20% did none of the questions that were right (all wrong).

Student learning outcomes based on student work prove that students in class V SDN Duyu need more interesting and fun learning techniques or approaches so that the achievement of understanding in solving questions can achieve the expected results, reaching a minimum of 60% KKM and 75% classical completeness. This is due to the learning activities of students still lacking, students are less activism f in working and discussion, they tend to be ego in learning without helping each other lazy, and less motivated in the following study.

Ther before, it is necessary to carry out a learning process that can increase student cooperation so that their learning activities increase, even tutor learning can be carried out. Learning that can be applied is the Jigsaw Type Cooperative learning model Jigsaw-type learning can encourage students' interest in understanding the material being taught and no longer have difficulty working on questions (Ati'ah, 2014).

According to Basuki (2015), cooperative learning is learning that emphasizes the activities of students in groups, including interaction with group friends, mathematics participation in answering discussion questions,]mathematics participation in solving group problems, and responsibility for group success as a result. learning that is carried out systematically.

For this reason, the learning model chosen is a learning model that can encourage student interest so that they can understand the material being taught and no longer experience difficulties when working on questions (Ati'ah, 2014). One of the learning models that can be applied to overcome the above problems is the jigsaw cooperative learning model Jigsaw is a variation of the cooperative learning model.

Slavin (2012) suggests that cooperative learning provides several advantages, namely: (a) Students work together in achieving goals by upholding group norms. (b) Students help each other and encourage mutual enthusiasm to succeed. (c) Actively act as peer speech to further increase the success of the group. (d) Interaction between students along with their increasing ability to express their opinions. (e) Interaction between

students can also foster the development of a non-conservative becoming a conservative.

According to Sumiati (2008), the type of jigsaw cooperative learning is: "A type of cooperative learning which consists of several members in a group who are responsible for mastery of learning material and are able to teach this part to other members of the group". Furthermore, it is said that the jigsaw type of cooperative learning model is a cooperative learning model with students learning in small groups consisting of 4-6 people heterogeneously and cooperating with positive interdependence and being responsible for the completeness of the part of the subject matter that must be studied and conveying the material to other group members.

1. Jigsaw learning steps consist of:
   1) Students are divided into heterogeneous groups of 4-5 people.
   2) Team members in the group/team are given different parts of the material.
   3) Members of different team teams who have studied the same section/subsection meet in a new group (expert group) to discuss their subsections.
   4) When the expert group finishes discussing its duties, then the group members return to their *home teams* to teach other members of the original group.
   5) Each group/team of experts presents the results of the discussion.
   6) The teacher provides an evaluation.
   7) Conclusion/closing

The relationship between the home group and the expert group is described as follows (Rusman, 2010).

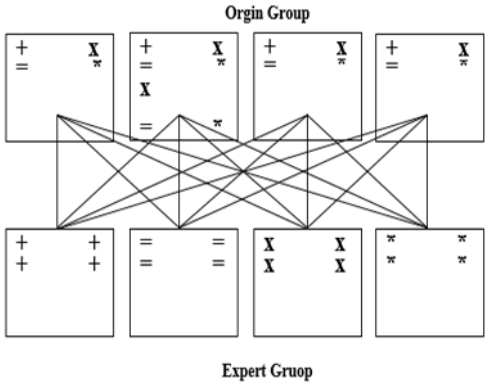

Figure 1. Illustration of a jigsaw group

He illustration image above can be explained that members from different home groups meet the same topic in expert groups to discuss and discuss the material assigned to each group member and help each other to learn their topic. After the member discussion is complete, the group members then return to the original group and teach their group friends what they have learned at the meeting in the expert group

According to Suprijono (2012) learning outcomes are changes in overall behavior, not just one aspect of human potential. The change in behavior experienced by students depends on what they have learned over a period of time. Output (results) obtained by students usually changes in behavior concerning cognitive, affective, and psychomotor aspects symbolized by numbers or values. In line with Winkel's (1996) opinion that these changes can be in the form of a new result or an improvement to the results that have been obtained. Learning, bringing about change; These changes include things that are internal, such as understanding and attitudes, and include things that are external, such as motor skills and speaking in foreign languages.

Learning outcomes are the same as learning achievement, which means that the assessment of learning outcomes is expressed in numbers, letters, or sentences that reflect the results achieved by students in a certain period. Syaripah (2017) states that learning outcomes are abilities (*performance*) that can be observed in a person and are also called capabilities. There are five categories of human capabilities, namely 1) *intellectual skills*; 2) cognitive strategy (*cognitive strategy*); 3)*verbal information*; 4) motor skills (*motor skills*); and 5) attitude (*attitude*).

All student activities must then be packaged based on a student-centered learning process. Therefore departing from the achievements of previous researchers who have successfully applied the Jigsaw type of cooperative learning model and are supported by the Jigsaw type of cooperative learning model theories, as a prospective researcher I hope that the application of the jigsaw type of cooperative learning model can be a solution to improve learning outcomes. Students on the material for adding fractions of grade V SD Negeri Duyu. The following is presented as the framework of the thought flow of this research in the form of a diagram in Figure 2.

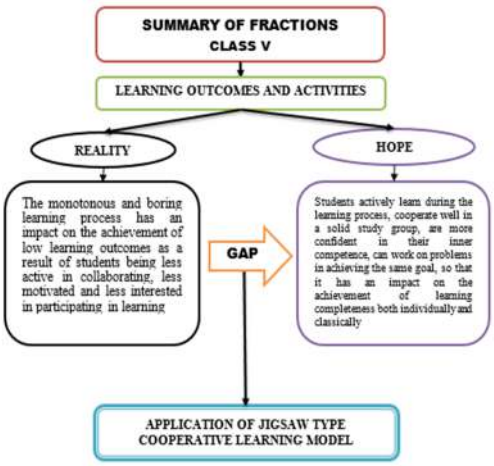

Figure 2. Flowchart of framework

Materials and Method

Research design

The research design refers to the PTK stage proposed by Muslich (2013) which consists of observation, introduction/planning, and implementation. The implementation of the action consists of several cycles. Each cycle consists of 4 components, namely (1) planning action, (2) giving action, (3) observation and (4) reflection. The research stages in each action occur repeatedly which eventually results in several actions in classroom action research. These steps form a spiral as shown in Figure 3.

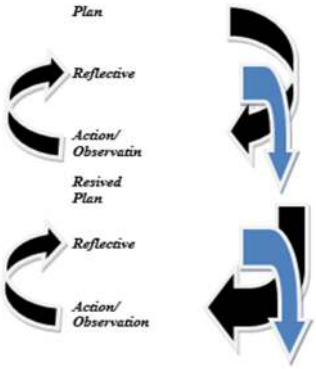

Figure 3. Hopkins model research flowchart (Muslich, 2013)

Place, subject and time of research

This research was conducted in class V SD Negeri Duyu. Subjek this study were all fifth grade students numbering 19 students, consisting of 10 students of women and 9 the male students are enrolled in the school year 2020/202 first, then selected informants 2 students who have ability high low based on test results. Plans research was conducted from July until Bulan August 2020.

Types of data and data collection methods

The type of data in this study is quantitative data in the form of student's ability to work on questions consisting of the results of the initial and final tests of each cycle, giving tests carried out at the second meeting. The type of qualitative data is the activity data of teachers and students in learning mathematics and data on the difficulties of students in understanding the material obtained through observation using observation sheets.

Data collection method

In this study, data collection was carried out by 1) giving tes, 2) interviews, 3) observation, and 4) field recording.

Data analysis technique

The qualitative data analysis technique was carried out in three stages, namely data reduction, data exposure, and inference. The quantitative data were obtained from the pre-test and the post-action test. The qualitative success indicators of learning are used in this study if, in the learning process, the results of observations of teacher and student activities are obtained based on the minimum average observation sheet in the good category. This study is said to be completed by an individual of at least 65%, averaging 65% absorption classical and classical learning completeness (CBC) of at least 85% of the number of students. This provision is in accordance with the Minimum Completeness Criteria (KKM) which is applied at SD Negeri Duyu.

Results and Discussion

1. Pre-action

Before carrying out the action, the researcher first carried out pre-action activities to determine the student's initial abilities. The researcher gave the pre-action preliminary test to the research subject, namely class V SD Negeri Duyu. The pre-action preliminary test results can be seen in the table below:

Table 1. Analysis of preliminary action test results

No.	Acquisition Aspect	Score	The number of students
1	*Highest score (person)*	*8*	*2*
2	*Medium Score (person)*	*2. 4 and 6*	*15*
2	*Lowest score (person)*	*0*	*2*
3	*Number of students (people)*	*19*	
4	*Number of students who completed (people)*	*6*	
5	*Percentage of classical absorption (%)*	*36.84*	
6	*Percentage of classical learning completeness (%)*	*31.58*	

2. Results of cycle I actions

After participating in learning activities, at the second meeting the teacher gave evaluation tests to students. Total 5 items with a score of 10. The analysis of student learning outcomes can be seen in Table 2.

Table 2. Analysis of cycle I test results

No.	Acquisition Aspect	Score	The number of students
1	*Highest score (person)*	*10*	*2*
2	*Medium Score (person)*	*4, 6 and 8*	*10*
2	*Lowest score (person)*	*2*	*7*
3	*Number of students (people)*	*19*	
4	*Number of students who completed (people)*	*10*	
5	*Percentage of classical absorption (%)*	*51.58*	
6	*Percentage of classical learning completeness (%)*	52.63	

The evaluation results with deficiencies can be seen in Table 3.

Table 3. Shortcomings and improvements in cycle I

No.	Deficiency in cycle I	Repair way
1	Teachers are less enthusiastic in opening lessons	The teacher must open the lesson with enthusiasm so that students are also excited about taking part in learning
2	Lack of student motivation in learning so that the learning process is still dominated by teachers.	The teacher creates fun learning so that students are motivated to be more active
3	Students do not understand the learning material, namely the sum of the fractions that are not the same	The teacher should provide an explanation that is easier for students to understand
4	Lack of a harmonious relationship between teachers and students	Teachers should build a harmonious relationships with students
5	In doing worksheets, it is only dominated by capable and smart students	The teacher must give advice to students who are able to share and provide opportunities for their less fortunate friends to actively work together in their groups.
6	The classroom atmosphere is not supportive when the learning takes place	The teacher must confirm the class teacher who holds sports activities so that during sports activities students are not too noisy

3. Results of cycle II actions

After participating in learning activities, at the second meeting, the teacher gave evaluation tests to students. Total 5 items with a score of 10. The analysis of student learning outcomes can be seen in Table 4.

Reflection on cycle II action

The implementation of cycle II which was described in two meetings shows the following trends; Actions/activities of teachers in implementing learning as a whole get an average percentage of 93.33% or in the very good category. The implementation of cycle II also shows an increase in student activity with the success of achieving 95.45% classical completeness in the very good category.

Table 4. Analysis of cycle II test results

No.	Acquisition Aspect	Score	The number of students
1	*Highest score (person)*	10	6
2	*Medium Score (person)*	6 and 8	11
3	*Lowest score (person)*	4	2
4	*Number of students (people)*	19	
5	*Number of students who completed (people)*	17	
6	*Percentage of classical absorption (%)*	77.89	
7	*Percentage of classical learning completeness (%)*	89.47	

Based on the field recording data, the researcher formulated a number of deficiencies that needed to be fixed in the second cycle of action. In addition to these advantages, other aspects that were successfully achieved in cycle II, such as enthusiasm, motivation, and student feelings of pleasure were maintained, even increasing, which was marked by a response to ask the teacher to extend the time allocation for presentations. This phenomenon suggests that in cycle II student acceptance in learning is getting better.

The results of the research that has been done provide information that the jigsaw cooperative learning model is a very effective model for improving student learning outcomes. This can be proven by increasing the ability of students to complete the evaluation according to the results of the research that has been carried out which can be explained as follows: Overall, the data from the analysis of observations on student and teacher activities, as well as evaluation tests to determine student learning outcomes understand and master mathematics learning by completing The questions assigned appeared to have increased in each learning indicator both in cycle I and cycle II.

1. Student activities

The increase occurred in cycle II because deficiencies can be minimized. This can also be seen in the analysis of the student's ability test cycle I, where there are still students who have a final score of 2 or there are 9 students who have not completed

it individually, and classical completeness has not reached the indicator. This is because the motivation of students in participating in learning is still lacking so students still look passive and do not have the courage to convey difficulties during learning. Apart from not having the courage to convey difficulties during the learning process, the habits of students who like to play affect the results of the tests given at the end of the action as a result, the students do not understand the material being taught.

The use of cooperative learning models in mathematics and science is very effective. The cooperative learning models that might be used to teach geometry include the Jigsaw cooperative learning model. The Jigsaw type of cooperative learning model was chosen because it was considered able to be used to teach the material. The topic can be divided into four independent sub-topics, meaning that each sub-topic is not a prerequisite for the others (a requirement for the Jigsaw cooperative learning model). Thus, it is hoped that through the Jigsaw-type cooperative learning model, learning will be more meaningful, thus increasing student understanding (Rosyidah, 2016).

In the second cycle, the percentage of the average value of student activity was in the very good category. The increase in student activity in cycle II was due to the fact that students were more motivated in participating in learning activities, this was seen when doing the assignments given by the teacher in answering the questions contained in the LKS. In addition, students become more aware of how to make decisions and conclude learning in accordance with learning objectives. There were 2 students who did not complete the cycle II, this was because these students often played during the learning process and liked to tell stories with their classmates so they did not pay attention to the material being taught.

According to Rokhis (2019) that this incompleteness problem is caused by a lack of demonstrations prepared by the teacher, the methods used are not quite right, the condition of students who are less active in learning, the lack of examples from the teacher, and inefficient use of time. In this case, a teacher in implementing mathematics learning must be able to make changes for the better. In addition, teachers must also be more able to motivate students to be more active in learning so that they can create active, creative, and enjoyable learning situations that they can get optimal results.

2. Teacher activity

The implementation of learning according to the observer in the first cycle is in a good category, this is because in the implementation of learning the teacher is less enthusiastic when opening lessons so students who are not used to this condition feel afraid and less enthusiastic about participating in learning activities carried out by the teacher but even so overall the management of learning carried out by the teacher is good. This means that the teacher has provided the best for students and is trying to improve optimal learning outcomes while improving the quality and achievement of students in the learning process. In cycle II, the percentage score of teacher activity increases and reaches the predetermined indicators. This is because the teacher has corrected the deficiencies that occurred in the reflection of cycle I. Based on the percentage of teacher activity in cycle I and cycle II, it shows a significant increase. The increase in teacher activity from cycle I to cycle II is due to the fact that the teacher continues to strive to increase motivation and guidance to students with various treatments so that students are active in learning activities. The implementation of active and fun learning is very much needed by elementary school students, fun learning can be seen when students work together in groups. In groups of students helping each other, students can easily understand the subject matter. This is in accordance with the opinion of Masril (2018) states that "Cooperative learning is based on the idea that students work together in groups and at the same time are responsible for the learning activities of group members, so that all group members can master the subject matter well".

3. Student learning outcomes

Student learning outcomes in cycle I and cycle II have increased. The classical comprehension achieved in the test of the ability to solve questions in the first cycle was 51.58% while the classical completeness was 52.63% or there were 10 students who completed out of 19 students. The percentage of classical completeness in cycle I show that it has not reached the indicator of learning success in general, namely 75%. So that the research continues at the next stage (cycle) and there are still some students who get very low scores.

The results obtained in cycle II are better than those of cycle I. This increase occurs because the deficiencies in cycle I can be minimized. Thus there was a significant increase in results, where classical absorption reached 77.89% and classical learning completeness reached 89.47% or there were 17 students completed out of 19 students who took the test. This means that the level of students' ability to solve problems on average is in the very good category. Because almost all students who took the exam were able to solve the questions well.

Using the jigsaw cooperative learning model in fraction addition learning, students are trained to be able to do activities in groups and improve student learning outcomes. Besides being useful for students, it can also improve teacher competence, develop skills and provide motivation to present new ideas in the learning process (Nurfitriyanti, 2017). This is according to the opinion of Nurfitriyanti (2017) that the selection of a learning model is very determined to attract and trigger the attention of students to participate actively in teaching and learning activities. One of the learning models that is thought to be able to involve students actively in learning is to use the learning model. cooperative. The cooperative learning model is one of the learning models that can improve student activity, interaction, and mastery of learners of the material. One of the cooperative models that can be applied is the Jigsaw Type Cooperative Learning model (Jumiati, et al. 2011). In this learning model, each student joins other group members who get the same problem (question), and after getting a solution, they are responsible for passing on their understanding to their peers in the initial group. The jigsaw cooperative learning model is a small group that works together in maximizing learning conditions to achieve learning goals and gain experience (Negaral, et al. 2015).

The results showed that the use of the jigsaw cooperative learning model can improve students' understanding of mathematics, especially the fraction addition material in class V SDN Duyu, this is in accordance with the opinion of Mulyani & Anditya (2016) who said that "In the model Jigsaw cooperative learning type students learn in groups that are grouped heterogeneously, namely with different backgrounds (race, religion, ability, gender, economy). Group members consist of students with different academic abilities, in group work students who are weak will be actively motivated to learn because each member of the study group is assigned a different task. In addition, students not only learn and master the material given but students are required to provide and teach the material to their group members. Thus all students will try and be responsible for learning the assigned material. Students are not only fixated on the explanation given by the teacher, but students learn together with their friends.

Conclusions

The results of the analysis of student learning tests in the first cycle classical absorption only reached 51.58% while classical learning completeness only reached 52.63%. The results of the analysis of student learning tests showed an increase in cycle II to 77.89% for classical absorption while classical learning completeness became 89.47%. There is a significant increase in the results of test analysis supported by the results of observations of student and teacher activities, where in cycle I student and teacher activities are still in the good category, d the average value of student activity is 75% and the average value of teacher activity is 78.33%. Then there was an increase in the observation data of students and teachers in cycle II, namely the average student activity was 95.45% and the average value of teacher activity was 93.33% with the very good category.

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