The colour Lego media for mathematics in elementary school

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Abstract. This study aims to determine the increase in student mathematics learning outcomes in integer addition material. The subjects of this study were students at SDN Bluru Kidul 2 Sidoarjo. This research used class action research design. Data collecting technique that use it, they are observation and test. Data that have collected will be analyzed by using descriptive quantitative analysis technique. Research result showed that by applying color LEGO media it increased student learning result with classical completeness that obtained on first cycle as big as 64%, second cycle as big as 88%. Beside it, from the research result it also show that there is an improvement on teacher activity on first cycle with percentage as big as 71,15% and on second cycle 95,19%, also improvement on student activity on first cycle with percentage as big as 71,59% and second cycle with percentage 94,89%. Because of that, It was concluded that teaching material of totaling number can be taught by using increase Lego color media.

1. Introduction

In elementary school students, mathematics learning is learning that useful in the interests of living in their environment and developing their mindset. An elementary school teacher will have difficulty in determining how to teach a mathematical material to students if they do not understand everything that is an indication of the readiness.

In accordance with the results of observations, found several problems relating to the learning process. In mathematics learning activities researchers see (1) students are less able to understand how to solve problems related to the sum of integers, (2) concepts obtained from teachers are not mature enough, so students cannot develop their knowledge to the fullest, (3) teachers still become the main character in the learning process, (4) the teacher is not utilizing the learning media, (5) the teacher teaches by drawing a number line on the board, the activeness of students in learning is less noticed.

Evidenced by the learning outcomes measured by the results of the evaluation on the material sum of integers with student success rates only reached 40% of 25 students while 60% of the other 25 students did not succeed in meeting the KKM standards set by the school.

Essentially, mathematics is a concrete science so good reasoning skills are needed to understand it while elementary school students who have less reasoning abilities need good facilities to help students understand and learn mathematics. This is in line with [1] saying that in abstract mathematics learning, students need tools in the form of media, and teaching aids that can clarify what will be conveyed by the teacher so that students can understand and understand it faster.
The constructivist theory that is developing now changes the pattern of learning from teacher center to student center, that is, students can construct their own knowledge so that the knowledge gained becomes more meaningful. Students become more understanding of mathematical concepts and their application in daily life. This is in line with [2] that one of the most important principles in educational psychology is that teachers do not merely provide students' knowledge. Students must build their own knowledge in their minds, the teacher can provide convenience for this process, by giving students the opportunity to find or apply their own ideas.

Active student involvement is needed in concretising the concept of adding integers using the appropriate learning media. Because the process of active student involvement with the use of appropriate learning media can help students in understanding formulas / concepts. This is in accordance with the statement of [3] that the purpose of using media in the learning process is to streamline and streamline the learning process itself.

The learning media used in this study are in the form of color lego media made of block-shaped plastic that can be dismantled and installed so that it can be arranged in stages. The researcher chooses to use this color lego media because it is innovative and appealing to students according to the characteristics of grade IV students who are still in a concrete operational period, where grade IV students will more easily understand if real examples are used in explaining a concept or understanding. This color Lego media can assist students in improving student learning outcomes in arithmetic operations of integers.

By conducting research on learning the addition of integers using lego color media is expected to provide benefits for students, teachers, and schools. The expected benefits obtained by students are that they can gain a new, contextual, and fun mathematics learning experience so that it can improve students' understanding of the sum of integers through lego color media. For teachers to develop scientific insights and improve teacher skills and innovation in the use of instructional media in the learning process and provide information for teachers about the use of lego-colored media in mathematics learning. For schools to improve the quality of schools so they can print quality students, and as an input for schools to further enhance the varied learning of mathematics.

Learning outcomes can be explained by understanding the two words that make up the results and learning. According to [4] learning outcomes are abilities obtained by children after going through learning activities. Understanding the results refers to an acquisition due to an activity or process. So that it can be said the learning outcome is something that is obtained after making the process of understanding something. Changes will occur in every individual who conducts learning activities, these changes in the form of knowledge, attitudes, and skills. Children who succeed in learning are children who succeed in achieving learning goals. According to [4] learning outcomes include cognitive, affective, and psychomotor abilities. Cognitive value is obtained by doing a written test while affective and psychomotor scores are obtained through a process of observation conducted by the teacher of students in each learning activity. Based on the opinions above. It can be concluded that the notion of results is a change in human behavior that covers all aspects as a whole, not just one aspect of potential possessed by humans.

[5] defines that mathematics is a science of deductive, axiomatic, formal, hierarchical, abstract, symbolic language that is full of meaning and so on. So it takes the special ability of a teacher to bridge between the world of children who have not thought deductively to be able to understand the world of mathematics that is deductive. Plato in [6] argues that mathematics is identical with philosophy for thinkers, even though they say that mathematics must be learned for other purposes. While

In mathematics, every abstract concept that is just understood by students needs to be immediately strengthened so that it settles and lasts long in the student's memory, so that it will cling to the thought patterns and action patterns. For this purpose it is necessary to learn through understanding, not just memorizing or remembering facts, because this will be easily forgotten by students.
All negative numbers, 0 and all positive numbers are called integers. Examples of integers are ... -3, -2, -1, 0, 1, 2, 3 ... and so on. According to [8] say that: Number 3 is the only number that if added -3 produces 0, -1000 is the only number that if added 1000 produces 0. In general, -k is the only number the biloa plus k produces 0. For k is a natural number. The -k number is called the inverse of the sum of k, the additive inverse of k, versus k, minus k, or negative k. Furthermore, a set is formed which is a combination of (..., -k, -4, -3, -2, -1), the set of natural numbers and (0). This set is called a set of integers. Thus, the set of integers can be written as (..., -4, -3, -2, -1, 0, 1, 2, 3 ...). The set of natural numbers as part of a set of integers is called a set of positive integers, written (1, 2, 3, ... ) or (+1, +2, +3, ...). While (..., - 3, -2, -1) is called the set of negative integers.

The integer sum operation is one of the integer operations. The sum of integers is the sum of integers by adding up the sum of the sums. According to [6] introduces the concept of arithmetic operations on integer systems can be done through three stages, namely (1) concrete concept recognition stage, (2) semi-concrete or semi-abstract concept recognition stage, (3) stage abstract introduction of concepts. In learning the addition of integers is needed learning media so that it can more easily understand mathematical concepts.

Learning media are various types of components in the student environment that can stimulate them to learn. Gagne in line with the statement of [3] that in terms of the learning process as a communication process, the function of the media is as a carrier of information from the source (teacher) to the recipient (students).

The types of learning media are audio media, visual media, audio visual media, objects, humans, and environmental resources. According to [7] media objects consist of tangible / concrete objects, and mock-ups.

Concrete objects are real objects that can be held, seen or visualized. The advantage of concrete objects is that it is easier for teachers to convey learning, students can interact directly with the learning media used, and their real nature can be presented in the classroom when learning.

Researchers use color lego media in learning the addition of integers. Lego is a kind of small block shaped plastic game tool. These blocks can be arranged into any model according to the wishes of the child. In this study Lego is used as a symbol of positive numbers and negative numbers. Lego color media including teaching aids or direct media, where props directly use the actual object used to explain the material by demonstrating / showing it to students.

The use of this media is in accordance with the characteristics of elementary school students who still like to play, like to move, like to work in groups, and like to feel and do activities directly. So by using this lego color media students can play, work in groups and can feel or do something directly. In addition, because the color of the lego colors is colorful and interesting so students can be more interested and their attention is focused on the instructional media conveyed by the teacher.

Determination of the solution to the use of color lego media to improve student learning outcomes in learning operations to calculate integer sums conducted by the researcher is reasonable because the researcher considers that this color lego media is in accordance with the characteristics of grade IV students who are still in a concrete operational period, where grade IV students it will be easier to understand if real examples are used in explaining a concept or understanding. Lego color media is also able to help students understand the concepts of positive numbers and negative numbers in integer addition operations. Lego color media as a solution is also done by considering several criteria, according to the selection criteria of learning media and its media excellence. This lego color media was chosen because of several factors that fit the criteria and its superiority.

2. Method
This type of research used in this study is Classroom Action Research. The research method used in this study is a quantitative descriptive method that explains the research results clearly and concluded in the form of numbers.

The subjects of this class action research were students of class IV SDN Bluru Kidul 2. With 25 students, 8 female students and 17 male students. The location of this classroom action research was
conducted at SDN Waung, Krembung, Sidoarjo. Openness of schools to be willing to accept and cooperate in the implementation of Classroom Action Research (CAR) in order to improve the quality of lessons. In addition, the researchers were alumni of Waung Elementary School, Krembung, Sidoarjo.

The technique used in data collection in this study is the observation technique and test technique to measure the increase in student learning outcomes in the sum of integers using the media Lego color as a learning medium. The description of the data collection techniques of this study are observation techniques and test techniques. The observation technique used to obtain data in the form of teacher activity and student activity, while the test technique is used to collect data in the form of student learning test results.

Data obtained by the learning process will be described according to the situation in the learning process. The analysis process starts with analyzing the data as a whole, doing data reduction, arranging it in units and categorizing it. The data described are: (1) observations of teacher activities; (2) the results of observations of student activities; (3) test student learning outcomes towards learning.

3. Result and Discussion

Researchers conducted 2 cycles of research by preparing a learning kit consisting of Syllabus, Learning Implementation Plan, questions grid, teaching material, media, Student Worksheets and Assessment Sheets. The research results in each cycle are as follows:

Cycle I

In the first cycle, it was planned that two meetings would be held in 2 x 35 minutes. This research was conducted when school lessons were participated by 25 fourth grade students. The material used in cycle one is to add integers. The media used in this research is Lego color media. Observation activities during the mathematics learning process of the material sum of integers using lego color media and carried out by observers and colleagues. On the data observations of teacher activity, overall got a score of 37 from an ideal score of 52 with a percentage of 71.15%, but this cannot be categorized as complete because it has not reached ≥ 80% in accordance with the targets determined by researchers.

Seen from the teacher activity data obtained in cycle I from observers I and II. The teacher preparing the class for learning gets a score of 3. The teacher doing apperception with questions and answers with students about the lessons to be taught on that day gets a score of 2.75. The teacher gives motivation to the students by using Ice Breaking gets a score of 3. The teacher conveys the learning objectives achieved score 2.75. The teacher demonstrating knowledge through learning media scored 3.25. The teacher uses appropriate learning media and engages students in using media gets a score of 2.5. The teacher gives the opportunity to other students to ask questions about material that are not understood to get a score of 3. The teacher organizes students in heterogeneous groups to get a score of 2.25. The teacher guides students in group discussions to get a score of 2.5. The teacher guides students in the presentation of the results of group work to get a score of 3. The teacher guides the assessment process gets a score of 3. The teacher carries out conclusions and engages students in making conclusions getting a score of 3.25. The teacher closes the learning score 2.75.

The results of observations of student activities, overall received a score of 31.5 from an ideal score of 44 with a percentage of 71.59%, but this cannot be categorized as complete because it has not reached ≥ 80% in accordance with the targets set by the researchers.

Students making preparations to start learning get a score of 2.5. Students proposing a learning contract score 3. Students respond to the aprespsi of the teacher in the form of questions as a stimulus gets a score of 3.25. Students doing Ice Breaking get a score of 2.75. Students listening to the teacher demonstrating complete knowledge about integers score 3.25. Students forming heterogeneous groups of 4-5 people get a score of 2.5. Students discussing / collaborating in groups get a score of 3. Students presenting group work in front of the class get a score of 2.5. Students working on the assessment questions scored 3.25. Students daring to conclude learning material got a score of 2.5 from the ideal score 4. Students listening to the teacher close the lesson got a score of 3.
Here are the results of student learning in cycle I.

![Cycle I Learning Outcomes]

Based on the above table student learning outcomes data in the first cycle above can be known KKM Mathematics learning outcomes are ≥ 71. From the evaluation test results it appears that 9 students or 36% have not yet reached KKM while 16 students or 64% have achieved or exceeded the KKM. There should be ≥ 80% of students must reach or exceed the Minimum Mastery Criteria (KKM). So, it was concluded that learning improvement was needed in the next cycle, namely in cycle II.

Cycle II

Based on the results of reflection in the first cycle, at this stage the researcher made preparations to carry out the learning process in the second cycle, namely learning in the second cycle is planned for two meetings per meeting held within 2 x 35 minutes. This research was conducted when school lessons were participated by 25 fourth grade students.

Based on data observations of teacher activity in the second cycle of meetings I and II. Overall got a score of 49.5 from an ideal score of 52 with a percentage of 95.15%, this can be categorized as complete because it has reached ≥ 80%. The teacher prepares the class as the beginning of learning gets a score of 3.5. The teacher apperception with questions and answers with students about the lessons to be taught on that day to get a score of 3.75 from the ideal score 4. The teacher motivates students with Ice Breakin to get a score of 3.75. The teacher conveyed the learning objectives achieved received a score of 4 from an ideal score of 4. The teacher demonstrating knowledge through learning media received a score of 3.75. The teacher uses appropriate learning media and engages students in using media gets a score of 4. The teacher gives the opportunity for other students to ask questions that have not been understood to get a score 4. The teacher organizes students in heterogeneous groups to get a score of 3.75. The teacher guides the students in terms of group discussions to get a score of 4. The teacher guides the students in the presentation of the work of the group gets a score of 4. The teacher guides the assessment process gets a score of 3.75. The teacher carries out conclusions and engages students in making conclusions getting a score of 4. The teacher closes learning gets a score of 4.

Students in the second cycle of meetings I and II. Overall got a score of 41.75 from an ideal score of 44 with a percentage of 94.89%, this can be categorized as complete because it has reached ≥ 80% in accordance with the target set by the researcher. Students making preparations to start learning get a score of 4. Students submit a proposed learning contract to get a score of 4. Students responding to apresception from teachers in the form of questions as a stimulus gets a score of 3.5. Students doing Ice Breaking get a score of 3.75. Students listening to the teacher demonstrating complete knowledge about integers gets a score of 4. Students forming a heterogeneous group of 4-5 people get a score of 4 from the ideal score 4. Students discussing / cooperating in groups get a score of 3.75. Students presenting the results of group work in front of the class got a score of 4. Students working on the assessment questions got a score of 3.75 from the ideal score 4. Students dared to conclude learning material got a score 4. Students listening to the teacher close the lesson got a score of 3.5.
Here are the results of student learning in cycle II.

From the diagram, the student learning outcomes data obtained in the second cycle above can be known Minimum Completeness Criteria (KKM) Mathematics learning outcomes are ≥ 71. From the evaluation test results it appears that 3 students or 12% have not reached KKM while 22 students or 88% has reached or exceeds the Minimum completeness Criteria (KKM). This result can already be categorized as complete because it has reached what the researchers expected is ≥ 80%. Furthermore, the results of the first cycle and second cycle research will be compared more clearly in the summary of student learning outcomes in learning the addition of integers using the media of lego color. Based on data obtained at the time of the study using lego color media showed an increase in teacher and student activities and learning outcomes of each cycle.

The activities of students in the first cycle with a percentage of 71.59%. While in the second cycle the aspects that are lacking are corrected, students very well convey the learning process. Data obtained classically from observations about student activities during learning in the first cycle get a percentage of 71.59%, and the second cycle to get a percentage of 94.89%. An increase of 23.3% from cycle I to cycle II. Students have reached the target in the learning process that is ≥ 80%, so the research is considered successful and not continued in the next research cycle. The following is an analysis of student learning outcomes data in cycle I and cycle II:

Based on the diagram above the increase that occurs in student learning outcomes after participating in the learning process using lego color media. Based on preliminary data mining observations, student learning outcomes only reach 40%. With initial data findings that more than 50% of students did not achieve completeness, the researchers decided to use lego color media to improve student learning outcomes in accordance with the target researchers.

After the researchers took action in the first cycle, student learning outcomes increased to 64%. Because it is not yet complete, the implementation of the action is continued to the second cycle with 88% results. Based on research in cycle II student learning outcomes increased and exceeded the target set of ≥ 80%, so the research was considered successful and not continued in the next research cycle.

Overall learning activities with the use of lego color media as a learning resource show an increase in teacher activity, student activities and student learning outcomes in the form of a reduction in integers have reached the research target so that it can be concluded that the use of lego color media can improve student learning outcomes in grade IV SDN Bluru Kidul 2.
4. Conclusion

Based on the results of the research that has been done, it can be concluded as follows (1) The use of lego color media in Mathematics learning in grade IV SDN Waung, Krembung, Sidoarjo can increase teacher activity. This can be seen from the activities of teachers in the first cycle with a percentage of 71.15% and in the second cycle increased with a percentage of 95.19%. In cycle II the teacher's activity has reached the indicator of success set by the researcher, namely ≥ 80%, (2) The use of lego color media in Mathematics learning in grade IV SDN Waung, Krembung, Sidoarjo can increase student activity. Seen from the activities of students in the first cycle with a percentage of 71.59% and in the second cycle increased with a percentage of 94.88%. In the second cycle the students' activities had reached the indicators of success determined by the researchers, namely ≥ 80%, (3) The use of lego color media in Mathematics learning in grade IV SDN Waung, Krembung, Sidoarjo could improve student learning outcomes. Visible student learning outcomes in the first cycle with 64% classical completeness and in the second cycle increased with 88% classical completeness. In cycle II student learning outcomes have reached the indicators of success set by researchers that is ≥ 80%.

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