Cooperative Learning Model Based On Rhythmical Movement Method To Embed The Operation Concept Of Whole Number

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Abstract. The purpose of this research is to develop cooperative learning model based on rhythmical movement method to help embed the operation concept of the whole number, then the development of this learning model can be utilized to give a variation of learning model and facilitate student’s understanding to increase student’s motivation and achievement. The method used in this research is case study and Quasi-Experiment. Case studies are used in the process of developing models and learning devices. The use of this case study is based on the thought of obtaining the necessary data in depth. While Quasi-Experiments are used to implement learning models in order to know the effectiveness. The research subjects are fourth-grade students of SDN Tamansari II Yogyakarta. The results of this study indicate that the cooperative learning model based on rhythmical movement method is feasible with Good criteria and get a positive response from students at 81.09%. In addition, this learning model also effectively to embed the operation concept of the whole number.

1. Introduction

Currently, the development of science and technology, has a very broad impact in all aspects of life, especially in the field of education including the development of learning methods in the world of education, especially in elementary schools which continue to be directed at improving student learning achievement [1]. Some research results on factors that influence student achievement obtained information that in addition to the basic abilities of students, the role of the teacher, by using appropriate teaching methods have a strong relationship with the learning experience which is the process of teaching and learning activities to achieve learning goals.

Based on the above expectations, of course, there are many aspects that must be considered in the scope of education. There are various learning problems that affect the quality of learning. Among them are methodological issues, namely those described in teaching, learning facilities, and the interaction between students and teachers in education.

Regarding the needs of students, mathematics subjects need to be given to all students starting from elementary schools to equip students with the ability to think logically, analytically, systematically, critically, and creatively, as well as the ability to cooperate. This competence is needed so that students can have the ability to obtain, manage, and utilize information to survive in a situation that is always changing, uncertain, and competitive [2].

At this time the world of education is faced with a paradigm of a competency-based curriculum. In accordance with the KTSP guidelines [3] the curriculum with competency-based practice in class involves a lot of activeness and creativity of both students and teachers in learning activities.
Interaction in a learning activity is directed to a multi-directional interaction model, namely teacher-students, students-teachers, students, and students-material [4]. Of course, the ability of students to express their knowledge or understand it becomes very important.

According to Marsigit [5], most mathematics teachers still implement traditional mathematics learning, namely learning mathematics by relying on a single expository method with a cycle: explaining, giving examples, asking questions and giving classical tasks. In learning with traditional mathematics learning approaches, student communication is still limited to short verbal answers to various questions posed by the teacher. This is due to teacher-centered learning. Students usually only listen, follow examples, and work on practice questions without being involved in constructing concepts, principles or structures based on their own thoughts. One other thing is the willingness of students to ask very little. Endurance in each of these learning activities will make students be closed. Finally, the habit continues and causes students not to be accustomed to being active in interacting with the teacher or with their friends, even being indifferent to the material being studied.

In line with the above conditions, the study results of the PLP Directorate in 2002 stated that despite the encouraging improvement in the quality of education, the learning and understanding of elementary students in some subject matter including mathematics showed unsatisfactory results. Learning tends to be textbook oriented. Learning seems abstract and with lecture methods so that academic concepts are difficult to understand. Meanwhile most teachers in teaching still lack attention to students' thinking skills, or in other words do not do meaningful teaching, the methods used are less varied, and as a result student learning motivation becomes difficult to grow and learning patterns tend to be memorized and mechanistic [6]. To help overcome the problems mentioned above, it is necessary to have an active, effective, creative, and fun learning atmosphere so that students are always active in learning mathematics. It is time for students to be given the widest opportunity to develop themselves. The teacher should be a facilitator for students so that the teacher helps students construct knowledge by directing social interaction and providing concept representations as expressed by Kauchack & Eggen [7]. This is relevant to the view of constructivism that students who must actively build their knowledge.

One of the mathematics learning strategies oriented to constructivism is cooperative learning. Bourne [8] suggests that constructivism in mathematics emphasizes knowing how namely learning is seen as an active person in constructing science by interacting with its environment. In line with this opinion in cooperative learning, students are not only required to individually try to achieve success or try to defeat their colleagues but are required to work together to achieve mutual results. In this learning, social aspects are very prominent, and students are required to be responsible for the success of their group. In cooperative learning, students learn in small groups that are heterogeneous in terms of gender, ethnicity, and academic ability to help one another in achieving common goals [9].

According to Slavin [9], research on cooperative learning is the most successful educational research.

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STAD is a popular learning strategy because of its wide application in various fields of study (including mathematics, reading, and social sciences and grade level), this is explained by Moore [10]. The STAD cooperative learning model includes the simplest learning model and is the best model for the beginning for new teachers using a cooperative approach as expressed by Slavin [9]. The simplicity of the method includes the presentation of material by the teacher by lecture or demonstration method which is still possible and the ability of students to communicate the results of work or the results of discussions through presentations to all classes that are gradually trained. The process of this activity is simple so that it can be done by elementary school students. The main idea of STAD is to motivate students to mutually support and help each other in mastering the abilities taught.
by the teacher, namely the material to understand the concepts of mathematics subject matter that requires the ability to cooperate, think critically, develop students' social attitudes in accordance with one of the goals of character education, and materials related to problem solving.

Learning methods that involve various facets of interventions including learning rhythm. Rhythm-based learning is a learning program created by class teachers by paying attention to the existence and needs of each student through the patterns of movement and rhythm in accordance with the physical, emotional, social and intellectual development of each student. The success of a teacher in overcoming learning difficulties by using interventions through patterns of motion and rhythm is a proof of competence that he has as a professional teaching staff. In the learning process, rhythmic motion serves as a learning tool that can improve physical fitness, health, movement skills, reasoning or intelligence, creative life, and social ability.

The main reason why the rhythmic motion is used as one of the interventions in learning in schools is that the patterns of motion and rhythm have an interest in the effort to develop the potential and ability of each learner to achieve his competence in a whole and whole way. Rhythm-based learning can improve students' psychomotor development.

In the fourth-grade elementary school mathematics material, it is stated that students' competency standards are summing and subtracting integers, with basic competencies sorting integers, summing integers, subtracting integers, and performing mixed counting operations. During the learning so far to embed the concept of integer operation methods used with conventional methods so that students tend to memorize the number counting operation process. So we need an appropriate learning model to embed the concept of integer count operations.

2. Method
2.1 Type of Research
This type of research is research on the development of prototypical studies with the aim of developing cooperative learning models based on rhythmic motion methods and their learning tools with valid, practical and effective quality.

The method used in this study is a case study and Quasi-Experiment. Case studies are used in the process of developing learning models and devices. The use of this case study is based on the thought of getting the data needed in depth. While Quasi-Experiment is used to implement learning models and devices in order to find out their effectiveness.

Research Procedures for the Development of Learning Models
In this development research only follows the first three phases of the four phases proposed by Plomp [12], namely front-end analysis, the prototyping phase, and the assessment phase. The dissemination phase is not included in this study given the limited time provided.

The front-end analysis is the preparation phase or context analysis. In this case the activities carried out are analyzing about: (1) KTSP curriculum especially content (material), process standards and indicators of achievement of each standard of competence or basic competencies to be achieved; (2) rhythmic motion patterns related to integer count operations; (3) learning theories and learning that are relevant to constructing the learning model to be developed; (4) the condition of students about the development of cognitive competencies that they have. The instruments used in this downstream, upstream analysis are documentation, interview guidelines, and tests. The results of the upstream-downstream analysis are in the form of a theoretical framework of learning models along with the initial draft of the learning tools (Teacher's Book, Student Book, Student Worksheet, Learning Plan and Evaluation Tool).

The prototype development phase is the development phase of the learning model along with the initial draft of the learning device that has been obtained in the downstream, upstream phase. Activities that will be carried out in this phase are: (a) designing and drafting the initial draft (Draft I) model and learning tools that will be developed; (b) validating by experts who are considered competent towards Draft I that has been compiled; (b) revise and formulate Draft I to Draft II; (c) train partner teachers and carry out trial I on a small group scale against Draft II; (d) revise and formulate Draft II to become Draft III. The instrument used in this phase consists of a validation sheet;
observation sheet; interview guidelines and portfolio. The collected data is analyzed and used as material to improve Draft I into Draft II. Thus the product of this development phase is Draft III. While the assessment phase is intended to determine the effectiveness of models and learning tools that have been developed. The activities that will be carried out in this phase are: (a) determine the trial subjects; (b) conducting trial II at the trial and summative assessment schools. This activity aims to improve the quality of products produced as well as an assessment or evaluation of the products produced. The research design used in this trial II is a quasi-experimental (Quasi-Experiment), and the data will be analyzed with Ananova. The summative evaluation focused on this phase is the effectiveness of the product produced (Draft III). While the instruments used are observation guidelines, interview guidelines, questionnaires, portfolio, and written tests. The results of this activity are expected to obtain a valid, practical and effective learning model along with its learning tools. The effectiveness criteria of the learning model developed are if: (1) the ability of the teacher to manage effective learning; (2) effective student activity; (3) students' response to the implementation of positive learning models, and (4) the learning model applied is quite effective in influencing student learning outcomes.

The ability of teachers to manage to learn is said to be effective if the average observer's assessment is above 2.50. While student activity is said to be effective if the type of student activity that supports (positive) learning model is more dominant (higher percentage level) than the type of activity that does not support the learning. Student responses are said to be positive if the student’s assessment of the implementation of the learning model for a rating scale of 7 to 10 (Good and Very Good) reaches a minimum of 70%. The learning model is said to be practical if the observer's assessment of the implementation of the learning model developed using the learning tool reaches a minimum level of adequacy. Furthermore, the effectiveness of the influence of the learning model applied to student learning outcomes is determined based on the inferential statistical analysis (Ananova).

2.2 Location and Time of Research
This research was conducted at SD Tamansari II because similar studies have not been conducted in this school. This research was conducted in August 2016.

2.3 Determination of Subjects and Research Objects
Subjects in this study were fourth-grade students of Tamansari II Elementary School. The subject of this study was selected based on purposive sampling technique. Initially by developing cooperative learning models based on the rhythm method and then testing the learning device products. The object of this research is the development of cooperative learning models based on the rhythm motion method to embed the concept of integer count operations.

2.4 Instruments and Data Collection Methods in the Development of Learning Models.
To collect data, in this study using questionnaires, documentation, and tests. The research instruments in this study are as follows.

2.4.1 Validation sheet
Validation sheets are used to obtain data about the quality of the learning model based on expert judgment. This validation sheet is for the learning model. While the motivation test and questionnaire were validated with a qualitative content validation sheet

2.4.2 Test
This test instrument is used to determine students' cognitive achievement before and after using cooperative learning models based on the rhythm motion method. The results of the analysis of these tests to determine the effectiveness of the learning model in the planting of the concept of integer count operations.

2.5 Data Analysis Techniques
2.5.1 Analysis of Validation Results Data Development of Learning Models
Validation sheets for each learning device consisting of learning models, tests, and motivation questionnaires, will be rated by the validator with a scale of 1-4.
Final Value | Category
---|---
1.0 – 1.5 | Kurang Baik
1.6 – 2.5 | Cukup Baik
2.6 – 3.5 | Baik
3.6 – 4.0 | Sangat Baik

2.5.2 Test Analysis
If the results of the validator’s assessment are obtained with an average score with a minimum category of “good enough” then the learning device is said to be valid. In this study, the test was not only validated by expert judgment but also construct validation was done by looking at the validity, reliability and item analysis. Test validation analysis is done using the following product moment correlation formula.

\[
r_{1,2} = \frac{N\Sigma X_1X_2 - (\Sigma X_1)(\Sigma X_2)}{\sqrt{(N\Sigma X_1^2 - (\Sigma X_1)^2)(N\Sigma X_2^2 - (\Sigma X_2)^2)}}
\]

Information:
\(r_{1,2}\): The correlation coefficient sought
\(N\): Number of subjects
\(X_1\): Score of the first test result
\(X_2\): Score of the second test result

Reliability analysis was performed using the following Cronbach Alpha formula.

\[
\alpha = \frac{k}{k-1} \left( \frac{s^2 x - \sum s^2 y_j}{s^2 x} \right)
\]

Information:
\(s^2 x\) is the subject score variance on the entire \(x\) test
\(s^2 y_j\) is the subject’s Variance score on the \(j\)th; \(j = 1,2,3 \ldots k\)
\(k\) is the number of parts

Test item analysis is done by calculating the level of difficulty of the item, the power of the different test items, and the effectiveness of the deceiver. According to Zainul and Nasoetion (1997: 160), namely: (1) difficult, with an index between 0.00 - 0.25, (2) medium, with an index between 0.26 - 0.75, (3) easy, with an index between 0.76 - 1.00. While according to Djemari Mardapi [11] a good item has a power index of more than 0.30. Distribution of answers to good deception, according to Djemari Mardapi [11] minimum has 5% distribution of answers to deceive. Furthermore, the item analysis will be carried out with the help of ITEMAN.

3. Results and Discussions
3.1. Learning Model Syntax
Before the research, the things that have been achieved include: First, the implementation of the needs analysis is the identification of competencies and competency standards for research. After going through the discussion of data collection carried out in an odd semester in class IV. Second, the implementation of the Needs Analysis for schools that will be used as research subjects, namely Tamansari II Elementary School. Among them is the potential of schools that will be used as open research in accepting learning innovations from other institutions. This elementary school also happened to have an MOU with Yogyakarta PGRI University. This also can overcome the problem so far about learning mathematics in local schools for integer material where students tend to be passive. Third, the implementation of the feasibility instrument for the validation of research instruments. This
instrument is used to assess the feasibility of validation sheets which will later be submitted to material experts and media experts for the purposes of research instrument validation. This feasibility instrument was made by a member of the researcher. Fourth, the implementation of the research instrument was made, including RPP, LKS, student response questionnaire, and the syntax of STAD cooperative learning model based on rhythmic motion method in mathematical subjects of integer matter. This instrument was prepared by the lead researcher.

For the syntax of STAD cooperative learning model based on rhythmic motion, method are as follows.

1. Students are formed in several groups with each group consisting of five students with different levels of ability.
2. Teachers convey the purpose of learning that is to add integers.
3. Through the brief lecture method and demonstration, the teacher gives an explanation of the material summing integers with rhythmic motion methods. The rhythmic motion method:
   a. Students are asked to stand right at the zero points facing right.
   b. If it encounters a positive number, then it goes forward, if the negative number goes backward. When carrying out the summing operation, it runs in the same direction, and if the reduction operation is carried out, the direction is reversed.

   Example:
   1) 2 + (-5) =
      Students stand facing right at the zero points. Students move 2 steps (showing number 2). In the same direction (showing the sum operation) the students retreat 5 steps (showing numbers -5). Pay attention to the location of the number when it stops. The number is the answer to the number operation.
   2) -6 - 4 =
      Students stand facing right at the zero points. Students step back 6 steps (showing numbers -6). Students turn around (showing a reduction operation) then students move four steps (showing number 4). Pay attention to the location of numbers when stopping.
      The number is the answer to the number operation.
4. One representative from two or three groups alternately presents the results of the group discussion and demonstrates the method of rhythmic motion and then writes the results on the board.
5. Teachers as facilitators ask other groups / students to respond to the presentation of one of the groups so that a class discussion takes place.
6. Teachers with students ask questions to correct a misunderstanding and provide reinforcement.
7. Students complete individual quiz questions given by the teacher.
8. Together with students, the teacher gives rewards or rewards through calculation of points obtained by each group by adding up the points earned by the students in the group and then calculating the mean and then based on the average determined the awards of each group.
9. Students conclude the results of the group discussion and class discussion then record the conclusions.

3.2. Discussion
Prior to the field test, a study was conducted on 6 students. From the tests, 78.88% responded positively, indicating that most students responded positively to the learning model experiment. After field testing, the results obtained 81.09% positive response.
Using the Paired T-Test test obtained a significance value <0.05, which indicates that there are differences between the pretest and posttest scores. The data also shows that the posttest value is better than the pretest value. Thus it can be concluded that the cooperative learning
model based on the rhythmic motion method is effective to embed the concept of integer count operations.

4. Conclusion
In this final report, it can be concluded that the model of rhythmic motion-based learning is useful to embed the concept of integer count operations.
To help to understand the concepts of addition and subtraction of integers that are good, the teacher is expected to apply to learn with the method of rhythmic motion not only in addition and subtraction material but in multiplication and division material.

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