

Mathematical Tree Media-Assisted Talking Stick Learning for Elementary Students

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ABSTRACT

A teacher should develop and possess professional, pedagogical, personal and social competence equally and wholly. The actual practice of the curriculum in the learning requires teacher's activities, creativity, and prudence in engineering and orchestrating activities in accordance with the lesson plans created. This study is aimed to describe application of the Mathematical tree media-assisted talking stick learning to grade five of Negeri Kecil Palapi in the West Sulawesi province conducted in February 2017. The following were instructional steps carried out in the application of the talking stick: (1) Teacher prepared the sticks; (2) Teacher planned ahead the core content to be learned; (3) Teacher allowed groups of students to review the subject matter they had learned before; (4) Teacher assigned things to be discussed. The quick progressing students helped their peers to work on the questions together; (5) Students grabbed hold of the sticks after putting away the book; (6) While singing, students holding the sticks answered the written questions the teacher gave. Every student took turns getting each question; (7) Students and teacher made conclusion of the lesson; (8) Teacher asked students to make individual evaluation and wrapped up the lesson. This research employed descriptive research method. Based on the results, Students demonstrated critical thinking indicators during the lesson such as interpreting the problems, analyzing the facts, solving the problems, evaluating and making a conclusion. Based on the find, it is suggested that the application of the Mathematical tree media-assisted talking stick learning is necessary since it is instrumental in improving students' critical thinking skills of grade five students at Negeri Kecil Palapi in the West Sulawesi province.

Keywords: Talking stick, mathematical tree media, critical thinking

Introduction

The initial research conducted at SD Negeri Kecil Palapi, West Sulawesi Province in February 2017 reveals that teachers have employed the talking stick learning model. Yet, they have not completely and closely followed the steps of the systematic order set forth in the learning model for the teaching of integer arithmetic operation to students. Teachers are inclined to lecture on the very subject matter even though it does not really work out. It does not mean that lecturing in itself is wrong, but the lecture method is ineffectively delivered in the classroom learning (Purwanto, 2013: 77). Teacher provides an example of the problem and discussion and learners continue to work on exercises contained in the book which are problems to be solved. Students learned mathematics in the classroom in a comparatively less active manner as the teacher asks questions and gives ideas or answers to questions about the integer operation. The observation reveals that students demonstrate, to a certain extent, a critical thinking as in finding a solution to the problem to the close-ended

exercises. The close-ended problems lead the students to a state of less criticality in solving sample problems and exercises. The learning outcomes in terms of the integer arithmetic operation exercises show that out of 11 students, 6 women and 5 men, only 3 students are able to think critically or about 27% performing critical thinking skill. It is not easy for teachers to choose media which is integrated with the talking stick model in terms of the integer arithmetic operation. By using the appropriate model and media that have been selected students are expected to improve their critical thinking skills. This talking stick which is a typical cooperative learning method involves group learning where each person is willing to work together and has a cooperative skill to draw on (Prastowo, 2013: 78-79).

According to Subanji (2013: 158) the maximized outcome of the cooperative learning can be achieved if students receive help from adults with better proficiency than they are. It can be either teachers or those who have more experiences at their disposal. Teachers orchestrate and facilitate the learning activities in such a way that various interactions take place as a result of student-centered learning (Wahidmuini, 2010: 130). Talking stick constitutes a cooperative learning model used to deal with the critical thinking problems. This type of learning model focuses on the students' active engagement in solving problems, comprehending a subject matter quickly, and communicating the result to other students (Huda, 2013: 225). Talking stick is originally used by Native Americans to teach all people how to speak or express opinions in a forum of intertribal meeting (Huda, 2013: 224-225) with the following steps: 1) The teacher prepares a stick of ± 20 cm long ; 2) The teacher plans the subject matter to be studied; 3) The teacher gives the group the opportunity to review the lesson taught; 4) Teacher gives group assignment for discussion in which those having understood should help others to solve the problem together; 5) students close down the textbook; 6) The teacher takes the stick and passes it around among students; 7) while singing, students holding a stick take turns answering the questions and no one is spared; 8) teachers and students make a conclusion from the subject matter discussed; 9) The teacher does a written evaluation); 10) the lesson is closed. The fourth step in the talking stick order is that the teacher assigns the group task to be discussed. Those making progress faster help their teammates to solve problems together. Assigning group work using mathematical tree media can foster development of critical thinking skill. This media plays a huge role in accordance with Permendikbud No. 103 of 2013 on the framework of lesson plan which consists of several points including the media, tools and learning resources. The use of appropriate and effective media facilitates the learning process as it interests and helps students understand the material easily. The use of media is intended to streamline the communication between students and teachers (Smaldino, Lowter & Russell, 2011: 7). As a tool in the learning process (Sudjana, 2012: 99) the instructional media crafted to create an effective learning situation, should be in line with the objectives and content of teaching materials. It should be geared up for the interactive purpose in order to attract the attention of learners that help enhance students' critical thinking skills.

Mathematical tree media is deemed as instrumental in developing students' reasoning capacity in learning (Subanji, 2013: 141). In terms of the mathematical tree media, the teacher presents the tree as the subject, while the twigs serve as the answer or problem. If the twigs contain the answer, students need to construct the problem on the leaves. If twigs contain an open-ended problem, students should find all alternative answers for the leaves. The use of talking stick in cooperative learning with the assistance of mathematical tree media is ultimately expected to improve students' critical thinking skill in mathematics, particularly in terms of integer arithmetic operations. R. H Ennis (2011) defines critical thinking as the act of reflecting and reasoning in which decision-making is emphasized concerning what to believe or do. The purpose of critical thinking is to avoid making faulty and hasty decisions. Furthermore, Beyer (in Hassoubah, 2004: 87), stated that this critical

thinking ability encompasses various skills such as determining the credibility of a source, making distinction between relevancy and irrelevancy of things, distinguishing facts through the assessment conducted, identifying and evaluating the unuttered assumptions, biases, points of view, and the evidence given. Furthermore, Tyler (in Redhana, 2003: 13-14) argued that learning experiences that afford students opportunities to acquire problem solving skills give rises to critical thinking skill. Students' active engagement in the exchange of ideas in small groups calls students' attention and promote students' critical thinking. Cooperation allows students' involvement in the discussion, take ownership of the learning that they make critical thinkers (Totten in Gokhale 2002).

Discussion

Talking Stick Cooperative Learning Model and Mathematical Tree Media

Talking stick was originally used by Native Americans to teach everyone to speak or to express opinions in a forum at a tribal meeting (Huda, 2013: 224-225). The talking stick has been used by Indian tribes as a means of giving an impartial and fair hearing to a group of people for centuries. Talking stick is frequently used in a council meeting to see who has the right to speak. The stick will be held back when one is voicing his mind, and when it is finished, the stick is passed around until all people have their share to speak or express their opinion (Hogan, 2007: 209). Talking stick then used into education with steps as follows: 1) the teacher prepares a stick that is ± 20 cm in length; 2) teacher plans out the subject matter to be studied; 3) teacher allows students to read and study the subject matter in groups; 4) students discuss the issue in the context given; 5) students concludes the reading; 6) teacher takes the stick and passes it on to one of the students; 7) singing, students holding a stick need to answer questions the teacher gives, and the process continues until all have a chance to answer teacher's question; 8) students and teacher conclude the lesson; 9) teacher does an evaluation / assessment (written test); 10) teacher wraps up lessons. The fourth step of the talk-type cooperative type syntax is the teacher assigning the group task to be discussed. Members who have understood early help their group mates to solve common problems. To provide group tasks that can foster critical thinking skills of learners, teachers need to provide activities that can facilitate active learners in learning. Activities can be done with the use of math tree media (Subanji, 2013: 145).

As the mathematical tree media combines problem posing and open-ended approach, it can thus help students develop creativity (Herawati, 2013: 18). Problem posing and open-ended can be used to enhance the critical thinking skills because both approaches are typically to give learners room for free thinking expression. The problem solving approach shows the problems to be solved, whereas an open-ended approach reveals that solutions to problems are numerous and varies. Students should come up with logical and rational answers as alternatives to questions (Subanji, 2013: 140).

The advantages of cooperative learning model Talking Stick type with mathematical tree media assisted according to Huda (2013: 227) are: 1) Preparing the readiness of learners; 2) To practice the skills of reading and understanding the material quickly; 3) Train concentration to stay ready in any situation. But in certain conditions for learners who are not emotionally trained to speak in front of teachers, cooperative learning model type Talking stick is to be considered. While Djamalu (2013: 23) suggested the advantages of Talking Stick model are: 1) Testing students readiness; 2) Train reading and understanding quickly; 3) To be more active learning or learning first. While the lack of cooperative learning model type Talking Stick is: to make students restless and can cause noise in the classroom if not well controlled by the teacher.

Indicator Critical Thinking Skills

Indicators of critical thinking in practice can be unified or form a separate activity. Based on various sources of critical thinking Ennis and Richard Paul (Kusnawa, 2012), Facione (2016), and Wade (Filsaisme and Dennis, 2008), the indicators of critical thinking ability and the activities of each critical thinking indicator can be detailed as follows: 1) identifying problems, understanding problems, and identifying problems); 2) clarify (create and record important things that are known, and make hypotheses); 3) analyze facts (reveal facts of problems, test facts, find biases, give consideration); 4) solve problems (choose logical and accurate arguments, use effective strategies, apply concepts, use logical and systematic resolution steps); 5) evaluating (synthesizing, reflecting, arguing, linking concepts, developing requirements); and 6) infer and conclude (generalize, determine the effect of the declaration made as a final decision, find an analogy).

Mathematical Tree Media Assisted Talking Stick Cooperatif Learning Model with Indicator Critical Thinking Skills

The application of cooperative type learning model talking stick with mathematical tree media at SD Negeri Kecil Palapi, West Sulawesi Province of Indonesia has the following steps: 1) The teacher prepares a stick that is ± 20 cm in length; 2) The teacher prepares the subject matter to be studied; 3) The teacher gives the group the opportunity to review the lesson material that has been delivered; 4) Teacher gives group assignment for discussion, member who has understood early helps group friend to solve common problem (fourth step from cooperative type talk-talker model syntax is teacher give group assignment to discussed) Members who have understood early help group friend to solve common problems Provide group tasks that can foster students' critical thinking skills with the use of math tree media); 5) Learners close the textbook; 6) The teacher takes the stick and passes it to one of the learners. While singing a student holding a stick must answer the written question of the teacher, and so on until all learners have questions from the teacher; 7) Learners together with teachers conclude the subject matter; 8) The teacher conducts a written evaluation; 9) Closes lessons by conveying the benefits of learning and moral messages. The following figure 1 is the result of the learner’s work in the counting operation of the sum of the integers made in step four of this model.

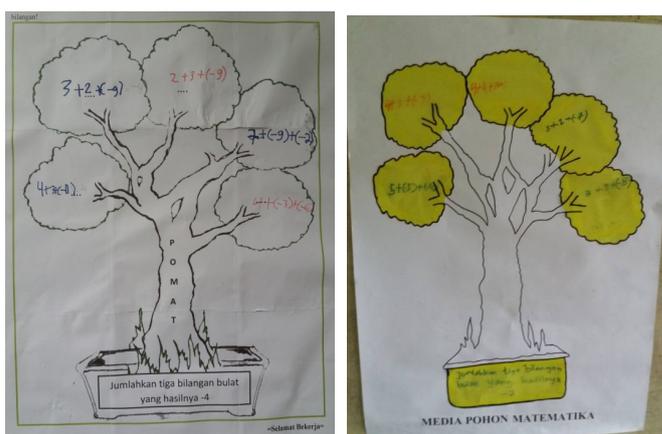


Figure 1. The result of the learner’s work in the sum arithmetic operation on the integer.

The mathematical tree of media the integer can direct the learners to construct the leaf by arranging the sum of three integers whose result is -4 like $4 + 3 + (- 11)$ and the result is -2 like $5 + (- 3) + (- 4)$. To construct the mathematical tree, learners must understand the concept of integers and their operations which are the prerequisites of the learner to answer the questions to be given next. In addition, learners should think more critically in relating

the concepts, problems, and answers that have been provided. Learners are not enough just to remember the procedure as exemplified by the teacher, but how learners know the interrelationship of concepts, problems, and answers to completion. The existence of this math tree media can develop the critical thinking ability of learners.

Description of The Implementation Mathematical Tree Media Assisted Talking Stick Learning at SD Negeri Kecil Palapi, West Sulawesi Province of Indonesia

The teacher conditions the classroom by preparing the learning tool. In pre-learning, teachers and learners enter the room in an orderly manner, give each other and answer the greetings, then the teacher invites students to read prayer before the learning begins, led by the chairman of the class. The next activity is absenteeism and apperception. Apperception occurs Dialogue 1 as below:

Teacher: "Who among you has ever played marbles?"

Learners: "I'm a teacher."

Teacher: "How many marbles have you had?"

Learners: "Students' answers can vary."

Teacher: "How many marbles have you given your friend?"

Learners: "Students' answers can vary."

Teacher: "Have you ever borrowed your friend marbles, to pay for defeat in the game because your marbles are not enough? "

Learners: "I'm a teacher."

Teacher: "How many marbles did you borrow?"

Learners: "Students' answers can vary."

Teacher: "Children let us state the number of marbles in the number line?"

Learners: 'Students' answers may vary.'

Teacher: "Good (to appreciate the less right and give the right compliment)."

Activity after dialogue 1 occurs, the teacher then conveys the materials and objectives to be studied. Master said *"Kids today we will study the sum of integers involving negative integers"*. Furthermore, *"Children of today's study expect you to operate the sum of integers involving negative integers in the number line and solve everyday problems involving the summing of round bilanagn with the help of the math tree media."* After the preliminary activity is completed, the teacher prepares media assisted by students as in figure 2 and learners to observe the media as the beginning of learning to enter the core activities.



Figure 2. The teacher prepares media assisted by students.

Prepare the stick and present the material. The core activity begins with preparing the stick and the teacher conveys the function of the stick in learning that in learning you will do a game called talking stick that learners who get a stick when singing and stop based on

teacher instruction on the learners then the students must answer questions from the teacher with how to solve the open ended problem, then the teacher presents the material about the sum arithmetic operation on the integer and the application of the count arithmetic to the integers in everyday life as in figure 3 below:



Figure 3. The teacher present of material

Learners read and re-examine the material and ask questions that have not been understood. This activity is carried out after the material is presented to learners about the sum arithmetic operation on integers and the application of the count arithmetic to the integers in everyday life. The material that the teacher has conveyed is reviewed by the learner and asks the unknown matter. In this step only one learner asks, as in the following Dialogue 2 below:

Dian: "Teacher! Is the sum of two equally negative integers the result is negative?"

Teacher: "Before Teacher answers Dian's question, is there any who can answered it? "

Fauzan: "The result is positive."

Raihan: "The result is negative."

Teacher: "How is the explanation of Fauzan and Raihan's answer? what's the other how? "

Student: (no answer)

Teacher: "Now consider that Master gave a case example, if $-2 + (-2)$ then How many results?"

Learners: "Zero Mr, -4 Mr!" (Students' answers vary but can not reveal the reason)

Teacher: "Re-explain material about counting operations related to sum Dian's question. "

Teacher: "If in the count operation the sum of two integers are equally negative then the result is negative. (while the teacher gives another example on whiteboard for example $-2 + (-5) = -8$, is different if the sum is two numbers round negative of the sum of three integers. Example: $-4 + (-9) + 15 = \dots$ and $-7 + (-9) + 2 = \dots$ Who can solve the above problem? "

Zahro: $-4 + (-9) + 15 = -28$ and $-7 + (-9) + 2 = -18$

Raihan: $-4 + (-9) + 15 = 2$ and $-7 + (-9) + 2 = -14$

Teacher: "Which of your two friends is right?"

Students: (Answer varies) there is a justify answer Raihan there is also Zahro's answer.

Teacher: "So what is true is the work of Raihan. If the sum is two negative integers of the sum of three integers and numbers the positive

round is higher in value than the sum of the two negative integer then the result is positive. Conversely, If that summed are two negative integers of the sum of three numbers round and the positive integer is less than the result the sum of two negative integers then the result is negative. "

After the explanation is submitted then the students no longer ask while the teacher said that if there are still less clear, please ask. Since no more learners are asking, then the teacher proceeds to the next step of dividing the learners into three groups.

Organize learners in groups and assign tasks to discuss. This activity is carried out after learners to review the material that has been presented by the teacher individually. In this step, learners are divided into three groups consisting of four members each of the three groups. The division of the group is based on differences in the level of critical thinking ability of learners and based on sex differences. At this stage learners are given problems through the help of math tree media to find alternative answers. The teacher explained the procedure. Learners are asked to discuss problem solving related to group assignments provided by the teacher. Tugsa's finished group was presented in writing and verbally in front of the other group's friends and given feedback if there was any work wrong. The activity is repeated until all three groups have finished presenting their group's work as in figure 4 bellow:



Figure 4. Work in group.

Doing a talking stick game. This step is done after the students do group work. While making a circle, learners from various groups were mingling and holding a rotating baton game. While singing one of the national mandatory songs, the learner enthusiastically follows the game. The rules in the rotating baton game are the learners who get the last stick when there is instruction from the teacher with the word "stop / stop" then the learners are obliged to answer questions from the teacher through the math tree media. Learners who have not been given a careful listening to the work of their friends and then provide input at the end of the alternative settlement answer his friend as in figure 5 below:

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Figure 5. Talking stick and students to answer question.

Rotating baton activity is repeated until all learners have the opportunity to solve the problems given by the teacher. Rotating baton activity aims to assess the critical thinking ability of learners about counting operations of summing in whole numbers. Some learners are still confused and have not understood the material properly so that teachers provide guidance as learners solve problems given by teachers in front of their friends.

Summing up the subject matter. Teachers and learners together conclude about the matter of counting operations of summing in whole numbers. Some learners start actively to conclude or express what they understand, some learners are also still guided by the teacher's help to conclude related sum arithmetic operation on integers, and there are 3 people who conclude the subject matter well and correctly, then the teacher adds the conclusion of learners. The conclusions are presented to the learner to provide a general overview of the counting sum arithmetical material on the integer that has been studied. After concluding activities, individual learners are given the final test of each meeting as in figure 6 bellow.



Figure 6. Summing up the subject matter.

Individual and closing evaluations. Evaluation activities carried out to measure the extent of the critical thinking skills of learners in following the learning process on the matter of counting operations summing in whole numbers. The test is administered after the lesson at each meeting is completed. Individual evaluation activities consist of three questions relating to the sum arithmetic operation of integers involving negative integers, sum arithmetic operations on integers by means of number lines and complementing leaves on mathematical tree media, as well as daily activities associated with counting operations summing in whole numbers. The end of this activity is to convey a moral message and close the lesson with prayer and closing as in figure 7 bellow:



Figure 7. Individual and closing evaluation.

Conclusion

A teacher who longs to provide the best learning experiences for students is confronted with the challenges in selecting strategies and models which are best suited for students. One of ways to overcome these challenges is that the teacher can plan a learning activity by mixing and the learning model with the media used. This may serve as an alternative to tackle the future challenges he faces in developing his professional competence, pedagogical competence, personal competence, and social skill in a balanced manner. The application of the Mathematical Tree Media assisted Talking Stick Learning Model to diverse learners comprises the following steps: 1) teacher prepares a stick; 2) teacher plans out the subject matter to be studied; 3) teacher allows students to review the subject matter in the textbook; 4) teacher asks students to discuss the group assignment. Those progressing faster can help others who make slow progress to solve the problems together; 5) students close the book and get the stick from the teacher; 6) singing, students holding a stick need to answer questions the teacher gives, and the process continues until all students have a chance to answer the teacher's question; 7) students and teacher conclude the subject matter; 8) teacher carries out individual written evaluation and closes the lesson. Based on the results the indicators of students' critical thinking including the interpretation of problems, analysis of facts, problem solution, evaluation, and conclusion, appear in the learning process. The results of this find suggested that to improve grade five students' critical thinking skills in Palembang, West Sulawesi Province Mathematical Tree media assisted Talking Stick model can be applied to achieve the desired learning objectives set in the current curriculum as well as in the future.

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