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Implementation of the NHT Type Cooperative Learning Model to Improve Mathematics Learning Outcomes

Jose Bonatua Hasibuan

Indonesian Education University

email: josehasibuan@upi.edu

Dinn Wahyudin

Indonesian Education University

email: dinn_wahyudin@upi.edu

Abstract

At the Integrated Agricultural Vocational High School in Riau Province, there are many problems faced by students in the process of learning mathematics, including the lack of motivation to learn, students are less active in learning activities, students have difficulty mastering the material, and students' basic mathematical abilities are low, so this will also affect student

learning outcomes. The results of the author's observations as a teacher in Class XII APHP 1 found that most students had difficulty solving math problems, so this had an effect on student learning outcomes that were not optimal. Researchers think that a learning model is needed that can activate students during teaching and learning activities. The learning model that is expected to encourage activeness, independence and responsibility in students is the NHT cooperative learning model. Through the application of the NHT type cooperative learning model, it is hoped that it can increase the learning activity of class XII APHP 1 students so that student learning outcomes will also increase.

Keywords: cooperative learning, Numbered Heads Together, learning outcomes.

Abstrak

Di SMK Pertanian Terpadu Provinsi Riau, banyak permasalahan yang dihadapi siswa dalam proses pembelajaran matematika, antara lain kurangnya motivasi belajar, siswa kurang aktif dalam kegiatan pembelajaran, siswa kesulitan menguasai materi, dan siswa Kemampuan dasar matematika rendah sehingga hal ini juga akan mempengaruhi hasil belajar siswa. Hasil observasi penulis selaku guru di Kelas XII APHP 1 menemukan bahwa sebagian besar siswa mengalami kesulitan dalam menyelesaikan soal matematika, sehingga hal ini berdampak pada hasil belajar siswa yang tidak maksimal. Peneliti berpendapat bahwa diperlukan suatu model pembelajaran yang dapat mengaktifkan siswa pada saat kegiatan belajar mengajar. Model pembelajaran yang diharapkan dapat mendorong keaktifan, kemandirian dan tanggung jawab pada siswa adalah model pembelajaran kooperatif NHT.

Melalui penerapan model pembelajaran kooperatif tipe NHT diharapkan dapat meningkatkan keaktifan belajar siswa kelas XII APHP 1 sehingga hasil belajar siswa juga meningkat.

Kata Kunci: pembelajaran kooperatif, Numbered Heads Together, hasil belajar.

A. Introduction

Mathematics is often referred to as *the* queen of science. Why is that? Because mathematics is a science that is obtained by thinking or reasoning. However, it turns out that many students at school view mathematics as the most challenging field of study, even though it is widely applied in everyday life. By learning mathematics, students learn to think logically when solving everyday problems. For this reason, mathematics needs to be taught at every level of education in schools.

At the Integrated Agricultural Vocational High School in Riau Province, there are many problems faced by students in the process of learning mathematics, including the lack of motivation to learn, students are less active in learning activities, students have difficulty mastering the material, and students' basic mathematical abilities are low, so this will also affect student learning outcomes. So far, the learning process carried out by mathematics teachers is teacher-oriented learning. Students are still not active in learning activities because the teacher gives many lectures about the material during learning. So, the activities carried out by students usually only involved listening and taking notes. Students rarely ask questions or express opinions. Discussions between groups are rarely carried out, so interaction and communication between students and other students or teachers have not been established during the learning process.

The teacher observations in Class XII APHP 1 showed that most students had difficulty solving math problems. Students are still embarrassed to ask the teacher if they have difficulty unde-

rstanding or solving the questions given. So that this also affects the learning outcomes of students who are not optimal.

Based on this problem, the researcher believes improving the learning process for class XII APHP 1 students at Integrated Agricultural Vocational School, Riau Province, is necessary. This is done so that students can actively participate during the learning process. Students exchange opinions about the material provided and can solve the problems by discussing in groups. Researchers think a learning model that can activate students during teaching and learning activities is needed. The learning model expected to encourage activeness, independence, and responsibility in students is the *NHT* cooperative learning model (Numbered Heads Together). Through the application of the *NHT*-type cooperative learning model, it is hoped that it can increase the learning activity of class XII APHP 1 students so that student learning outcomes will also increase.

To the description above, the researcher is interested in conducting Classroom Action Research titled "Efforts to Improve Student Learning Outcomes Through the Implementation of the *NHT* Type Cooperative Learning Model in Class XII APHP 1 SMKN Integrated Agriculture Riau Province". This research was conducted to find out whether cooperative learning of the *NHT* type could improve the learning outcomes of class XII APHP 1 students on the material of Enumeration Rules and Opportunities.

In the learning process, students are still shy about asking and expressing opinions, so the students' activeness is not visible. This is because learning mathematics in class XII APHP 1 at the Integrated Agricultural Vocational School of Riau Province is still teacher-centered. Interaction and communication between students and other students and the teacher were not established during the learning process because group discussions were rarely carried out. In the teaching and learning process, students should be active to make the learning process meaningful. Teachers should use a learning model that invites students to study in groups so that students will get used to actively asking

questions and giving opinions. One learning model that encourages students' activeness, independence, and responsibility is the NHT type of cooperative learning model.

Based on the background above, this research will only discuss the problem of efforts to improve student learning outcomes by applying the NHT cooperative learning model. In this study, indicators of increasing student learning outcomes were seen from the learning process as long as the action was given. Based on the description above, the formulation of the problem posed in this classroom action research is: How is the application of the NHT type cooperative learning model in improving student learning outcomes in class XII APHP 1 Integrated Agricultural Vocational School, Riau Province?

Correlation research conducted by Wasito (2019) with the title *The Relationship Between Motivation and Cooperative Learning on Learning Achievement at SD Muhammadiyah Sukonadi Yogyakarta* found no relationship between learning motivation and cooperative learning on student achievement. This research is a Classroom Action Research (PTK), carried out with the assistance of colleagues directly involved as observers in research activities. Classroom action research is action research conducted to improve the quality of learning practices in the classroom. Classroom action research focuses on the class or on the teaching and learning process that occurs in the class, not on class *input* (syllabus, materials, etc.) or output (learning outcomes). Classroom Action Research must be focused on or about things that happen in the classroom (Suhardjono, 2009, p. 58). In this research, the planned action is applying mathematics learning through the NHT-type cooperative learning model to improve students' mathematics learning outcomes in class XII APHP 1 SMK KN Integrated Agriculture Riau Province.

B. Definition of Learning and Learning Outcomes of Mathematics

According to Hintzman, learning is an act that occurs in

humans caused by experiences that can influence human behavior (Muhibbin Syah, 2005, p. 90). From this understanding, learning can be assumed as a new experience for students. Through learning activities in class, it is hoped that new experiences will occur for students that can influence behavior in everyday life.

According to Oemar Hamalik (2003: 50), there are elements related to the learning process, including 1) student motivation, 2) learning materials, 3) learning aids, 4) learning atmosphere, and 5) the condition of the subject being studied. These five elements are dynamic and often change, strengthen, or weaken, affecting students' learning process. The learning process is a change in behavior in certain situations, which is repeated based on one's circumstances.

According to the author, learning is a change caused by new experiences that affect students' behavior in certain repeated situations. Each learning act contains several elements that are dynamic in the sense that they can become stronger or weaker. This dynamism is influenced by conditions within the learner and those outside the learner, which also influence the learner's learning activities.

Learning outcomes are students' abilities after they receive their learning experience (Sudjana, 2010). Learning outcomes appear with changes in behavior that can be observed and measured in the form of changes in knowledge, attitudes, and skills (Hamalik, 2003).

Several factors influence student learning outcomes. These factors influence each other in the individual learning process, so it determines the quality of learning. According to Baharuddin and Wahyuni (2010), in general, the factors that influence learning outcomes are divided into two categories, namely:

1. Internal factors

Internal factors are factors related to the individual's physical condition. Internal factors include physiological and psychological factors.

- Physiological factors

Physiological factors are factors related to the individual's physical condition. This factor is divided into two types: (1) the state of physical tone (muscle tension) significantly influencing one's learning activities. Healthy and fit physical conditions will positively influence individual learning activities. (2) state of physical/physiological function.

- Psychological factors

Psychological factors are a person's psychological state that can affect the learning process. The main psychological factors affecting the learning process are students' intelligence, motivation, interests, attitudes, and talents.

2. External factors

External factors come from outside the individual and affect learning activities. These factors are divided into two kinds, namely, social environmental factors and non-social environmental factors.

- Social environment

The school's social environment, such as teachers, administrative staff, and classmates, can influence one's enthusiasm for learning. Furthermore, the social environment includes the social environment of the community, such as the environmental conditions in which students live, which also affect student learning. In addition, the social environment that significantly influences learning activities is the family environment. Harmonious relationships between family members, parents, children, brothers, or sisters will help students carry out suitable learning activities so that the results will also be good.

- Non-social environment

The non-social factors include the natural environment, instrumental factors, and subject matter factors. The natural environment greatly influences learning activities, such as fresh air conditions, not hot and not cold, and a calm atmosphere. In-

strumental factors are learning tools classified into two types: hardware, such as school buildings, learning tools, and so on, and software, such as school curricula, school regulations, guidebooks, etc.

Based on the understanding of learning outcomes in the opinion of the experts above, the learning outcomes of mathematics in this study are defined as the level of students' understanding of the subject matter of mathematics after participating in the learning process by applying the cooperative learning model of the NHT type to the subject matter of Enumeration Rules and The opportunity for an event is obtained through learning outcomes and is expressed by a score or number.

C. NHT Type Cooperative Learning

Cooperative learning uses a grouping system of four to six people with heterogeneous academic abilities, gender, and ethnicity (Wina Sanjaya, 2007, p. 240). Students can work in small groups to discuss and solve problems in the learning process. Group assignments can spur students to collaborate to integrate new and existing knowledge. Meanwhile, Kauchak and Eggen (1997) define cooperative learning as a teaching strategy to help students find their learning goals, personally and interpersonally arranged in a small group.

Cooperative learning is a model that prioritizes student cooperation to achieve learning goals. This is the opinion of Slavin (2009), who says that the cooperative method is a teaching and learning method that uses a communicative approach in small groups, which only consist of 4-5 people in each group, emphasizing collaborative, communicative elements. And strong cooperation. Meanwhile, according to the Ministry of National Education (2005:14), the cooperative learning model has the following characteristics:

- To complete the learning material, students study in groups cooperatively.
- Groups are formed from students with high, medium, and

low abilities.

- If students of several different races, ethnicities, cultures, and genders are in a class, efforts are made so that each group consists of different races, ethnicities, cultures, and types.
- Rewards are prioritized for group work rather than individuals.

To master the subject matter, each student is jointly responsible for discussing and exchanging opinions, knowledge, and experience. With the cooperative learning model, students are expected to develop all their potential optimally by actively thinking during the learning process.

According to the Ministry of National Education (2005: 15) managing learning using cooperative learning strategies, there are at least three objectives to be achieved, namely:

- Academic learning outcomes

Cooperative learning aims to improve student performance in academic assignments. Many experts argue that the cooperative model excels in helping students understand complex concepts.

- Recognition of diversity

The cooperative model aims to allow students to accept their friends with different backgrounds. These differences include ethnicity, religion, academic ability, and social level differences.

- Development of social skills

The cooperative model aims to develop students' skills such as sharing tasks, actively asking questions, respecting the opinions of others, wanting to explain ideas or opinions, and working in groups.

In cooperative learning, there are six learning steps (Ismail, 2003, p. 21), namely:

- Delivering goals and motivating students

The teacher conveys the lesson objectives to be achieved in the lesson and motivates students to learn

- Presenting information

The teacher presents information to students using demonstrations or reading material.

- Organizing students into study groups

The teacher explains how to form study groups and helps each group transition efficiently.

- Guiding group work and study

The teacher guides study groups when they do assignments

- Evaluation

The teacher evaluates the results of learning about the material that has been studied, or each group presents the results of their work

- Give awards

Teachers look for ways to reward individual or group learning efforts or results.

Suppose we pay attention to the steps of the cooperative learning model above. In that case, it appears that the democratic process and the active role of students in the classroom are more prevalent during their learning. The obstacle faced in implementing the cooperative learning model is that students who are good at feeling burdened by their less intelligent friends. These clever students feel they contribute more to group values. This can be overcome by informing the students of the assessment system before learning begins.

NHT-type cooperative learning is a type of cooperative learning that emphasizes a unique structure designed to influence student interaction patterns and has the aim of increasing academic mastery. This type was developed by Kagen by involving students in examining the material covered in a lesson and checking their understanding of the lesson's content.

Ibrahim put forward three goals to be achieved in cooperative learning with the NHT type, namely:

- Structural academic learning outcomes: Aims to improve student performance in academic tasks.

- Recognition of diversity: Aims for students to accept friends who have various backgrounds.
- Development of social skills: Aims to develop students' social skills.

The skills in question include sharing tasks, actively asking questions, respecting the opinions of others, wanting to explain ideas or opinions, working in groups, and so on. The application of NHT-type cooperative learning refers to the Kagen concept with three steps, namely:

- Group formation;
- Discussion of problems;
- Exchange answers between groups

These steps were then developed into six steps as follows:

Step 1. Preparation

The teacher prepares the lesson plan in this stage by making a Learning Implementation Plan (RPP) and Student Worksheets (LKPD) using the NHT-type cooperative learning model.

Step 2. Group formation

In forming groups adapted to the NHT-type cooperative learning model. The teacher divides the students into several groups consisting of 3-5 students. The teacher gives a number to each student in a different group and the group's name. Numbering is the main thing in NHT. At this stage, the teacher divides students into groups or teams of three to five people and gives students a number so that each student has a different number according to the number of students in the class. In Group. The groups formed are mixed regarding social background, race, ethnicity, gender, and learning abilities.

Step 3. Each group must have a textbook or manual

In forming groups, each group must have a package book or guidebook to make it easier for students to solve LKPD or problems given by the teacher.

Step 4. Discussion of the problem

In group work, the teacher distributes LKPD to each student as material to be studied. In group work, each student thinks together to describe and ensure that everyone knows the answers to the questions already in the worksheet or the questions the teacher has given. Questions can vary from specific to general.

Step 5. Calling the member's number or giving an answer

In this stage, the teacher calls a number, and students from each group with the same number raise their hands and prepare answers for the students in class.

Step 6. Give a conclusion

The teacher and students conclude the final answers to all questions about the material presented.

There are several benefits to the NHT type of cooperative learning model for students with low learning outcomes proposed by Lundgren, including:

- The sense of self-esteem becomes higher
- Improve attendance
- Acceptance of the individual becomes greater
- Less disruptive behavior
- Reduced personal conflict
- Deeper understanding
- Increase kindness, sensitivity and tolerance
- Higher learning outcomes

According to Hill (1993) and Tryana (2008), the NHT model has advantages, including being able to increase student achievement, deepen student understanding, delight students in learning, developing positive attitudes among students, developing student leadership attitudes, developing a sense of curiosity know students, increase students' self-confidence, develop a sense of belonging to each other, and develop skills for the future.

D. Implementation of NHT Type Cooperative Learning in Mathematics

The research carried out in this study was the application of the NHT-type cooperative learning model in mathematics learning for class XII TPHP of Integrated Agriculture State Vocational School. The learning process is carried out twice a week, namely Monday and Wednesday, each meeting consisting of 4 hours of lessons (4 x 45 minutes) and 4 hours of lessons (4 x 45 minutes). The implementation of the learning process in this study consisted of two cycles with a total of four meetings with four times the implementation of the action.

Learning activities in the first cycle of the first meeting will discuss the enumeration rules, which are guided by RPP-1 and are equipped with LKPD-1, and observation sheets will be used for observations. Lessons begin at 07.15 WIB. After the bell rings, the teacher enters the action class, asks the class leader to prepare the students, gives a signal to pray, and greets the teacher. Then, the teacher checked the presence of students and obtained information that all students were present. The teacher reminded me of the previous material about ordered pairs.

The teacher begins by asking students about examples of sets of ordered pairs. One student answered and answered correctly. Furthermore, the teacher motivates students by giving examples of problems that exist in everyday life. Some students submitted their opinions, but some did not pay attention to the teacher. Then, the teacher conveys the learning objectives as stated in RPP-1. The teacher conveys the scope of the material to be studied, namely the counting rules (addition rules and multiplication rules). Then, the teacher provides information about the learning activities that will be carried out, namely the NHT-type cooperative learning model.

The teacher informs that students will study in groups, and each student will receive LKPD-1, Question Sheet-1, and a number card. LKPD and Question Sheets are done together in groups that have been previously formed. The teacher asks

students to work on the LKPD first and reminds students not to work on the questions on the question sheet before being instructed by the teacher. Number cards will be used when calling for presentations. The teacher will call students randomly to work on the questions on the question sheet. Students who are called must be able to answer these questions because they become representatives of the group to explain the results of their group discussions. The teacher emphasizes to students that the results obtained are group results. The teacher hopes that students can work well together in their groups.

The teacher organizes students into study groups and immediately instructs them to occupy their respective groups. In the process of forming groups, the class situation was noisy; some students did not want to sit in a predetermined group, but after the teacher explained, he wanted to sit with his group. After all students occupy their groups, the teacher gives the groups names: algebra, numbers, calculus, geometry, trigonometry, and statistics. Then, the teacher distributed LKPD, question sheets, and number cards to each student in each group and distributed markers and cardboard to make reports. However, when students received the LKPD, there were many questions about filling it in, so the teacher explained how to fill it in in front of the class and informed them that it took 60 minutes to complete.

During group discussion activities, the teacher observes each group and guides groups with difficulty filling out the LKPD. In addition, there are still students who do not participate in discussions in their groups and work on their own LKPD, and the teacher instructs these students to participate in discussions with their groups. Some students only copy the work of their group mates. The teacher reprimands these students to join the discussion instead of copying their friend's LKPD.

The teacher reminds students that the remaining time to complete the LKPD is only 5 minutes, and they immediately complete the group report. After the LKPD work time ends. The teacher asks students to work on the practice question sheets

given before. Some students ask other groups. The teacher also admonishes them to work with their group. In the Geometry group, one of the members worked on the problem sheet alone and did not discuss it with the group. The teacher rebuked the students and reminded all the groups that what was presented resulted from group work. The teacher reminded me that the time to work on the question sheet would end.

The teacher asks students to stop working because the set time has ended. The teacher asks students to hold their respective numbers at the answering stage. The teacher draws one number, 4, and then all students holding the number 4 raise their hands. The teacher draws many groups, and the group drawn is the Numbers group, with the one holding number 4 to present question number 1. The teacher drew one more number, and the number drawn was number 3. The student holding number 3 raises their hand, and the teacher draws many groups. The draw is the Algebra group to present problem number 2.

When calling numbers, students are reluctant to come to the front of the class, and the teacher must repeatedly call so that students come forward and much time is used. Students present their answers by writing them on the blackboard and explaining them in front of the class. Advanced students only read the answers written on the blackboard. They find it difficult to explain. Then, other students were asked to respond, but no students responded. The teacher asked if there were answers that were different from those on the blackboard, and the students answered no. Then, the teacher asked whether the students understood, and the students answered. The teacher gave reinforcement through praise and applause to students who had advanced.

The teacher continued the activity, namely giving awards to the group. The form of appreciation given is in the form of verbal appreciation and applause. At this meeting, the teacher made his conclusions from today's lesson because time was running out. The teacher cannot carry out quizzes because the learning time has run out, so the teacher makes quiz questions as homework.

The teacher reminds students to learn about set operations, namely the intersection and combination of sets, and then the teacher closes the lesson by greeting them.

After learning ended, the teacher discussed the learning process with the observers at the first meeting. The discussion results found that the implementation of learning was not by the planning in the RPP; the time spent on forming groups, working on LKPD, and making reports was too long. During the presentation, students only read the answers and did not explain, and students who listened to the presentation were reluctant to respond. Students are unfamiliar with group learning and cannot work with their groups. The improvement suggested by the observers is that the teacher is expected to be able to discipline students regarding the use of time and guide students when presenting the results of discussions.

Learning activities at the second meeting of the second cycle will discuss permutations and combinations, which are guided by RPP-2 and equipped with LKPD-2, and observation sheets will be used for observations. Lessons begin at 07.15 WIB. The teacher enters the action class, instructs the head of the class to prepare students, gives a signal to pray, and greets the teacher. Then, the teacher checks the presence of students. All students are present.

The teacher reminded me again of the previous material related to today's subject matter, namely the enumeration, addition, and multiplication rules. The teacher displays several pictures through PowerPoint. Ask students to answer what is in the picture. Several students answered simultaneously, and the teacher appointed one of the students to answer, and the answer was correct.

Furthermore, the teacher motivates students by giving examples of daily problems related to permutations, namely the election of the chairman and deputy chairman and the selection of a team in a sports team. Then, the teacher conveys the learning objectives in lesson plan 2. The teacher conveys the scope of

material that will be studied today.

The teacher reminded me again that the implementation of learning activities was the same as the previous ones. Each student will receive an LKPD, question sheet, and number card. After working on the LKPD and question sheets, students will present them to the class. For the presentation of the question sheet, a certain number will be called so that each student can understand the problem-solving. Then, the teacher instructs students to occupy their respective groups immediately. In the process of forming groups, there are still students who joke with their friends. The teacher rebuked the students to join the group immediately.

All students have occupied their groups. The teacher reminds the name of each group. Then, the teacher distributed LKPD, question sheets, and number cards to each student in each group. The teacher instructs students to discuss completing the activities in LKPD-2 first. The question sheet is done after receiving instructions from the teacher.

During group discussions, the teacher observes each group and guides groups with difficulty filling out the LKPD. Some students still directly ask the teacher about things they do not understand without asking their group mates first. In addition, some students work alone regardless of their group mates. The teacher immediately admonished him to cooperate with his group to complete the LKPD.

The teacher asks students to stop working because the set time has ended. The teacher asks students to hold their respective numbers at the answering stage. The teacher draws one number, 4, and then all students holding the number 4 raise their hands. The teacher draws many groups, and the group drawn is the Numbers group, with the one holding number 4 to present question number 1. The teacher drew one more number, and the number drawn was number 3. The student holding number 3 raises their hand, and the teacher draws many groups. The draw is the algebra group presenting question number 2. The designated

student answers the question and explains the answer in front of the class. Then, other students were asked to provide feedback. No one gave a response. Students stated that their answers were the same as those written in front of the class. The teacher asked whether the students understood today's lesson. Students gave a positive response by answering already.

The teacher continues the activity, namely giving awards in the form of praise to groups that have appeared. Furthermore, the teacher guides us to make conclusions from today's learning. The teacher gives formative test questions to check students' understanding of the material for adding and subtracting opportunities. The teacher reminds students to study the material about the Multiplication of Opportunities for the next meeting. The teacher closed the lesson by greeting.

After the learning process, the teacher discusses it with the observer. From the results of the discussion, it was found that during the discussion, some students still did not participate in the discussion and only copied from their group mates. During the presentation, some students did not pay attention to their friends. The improvement suggested by the observers is for teachers to pay more attention to students when the group discussion process and in front of the class takes place and to motivate students to dare to represent their group.

The teacher held a daily test at the second meeting. This daily repetition was carried out for 90 minutes. After the test ended, all answer sheets were collected. The teacher thanks very much to all the students who have followed the learning process using a problem-based learning model. It turned out that students felt happy and excited to work on the questions given and felt responsible.

Before carrying out the test, the teacher instructs the head of the class to prepare the class, and then the teacher checks the students' attendance. The teacher asks students to save math textbooks and prepare stationery. Furthermore, the teacher asks students to condition the arrangement of tables and chairs like

during the exam. Then, the teacher distributes test sheets to each student. The teacher explains to students to write down complete answers in the way that has been discussed. The teacher goes around monitoring students and working on daily test questions. When the time is up, the teacher reminds the remaining time to work on the questions and reminds students to re-check the answers that have been done, and the teacher instructs students to collect the answer sheets that have been done.

The reflection process in cycle I can be seen from the observations about implementing teacher and student learning activities on the observation sheet. Students have difficulty working on LKPD because they are not used to filling out LKPD and are not used to group learning being carried out, so group discussions do not go well. The class atmosphere when discussing was not conducive because the students made much noise. Passive learners when allowed to ask questions. The learning process does not follow what is written in the lesson plan.

NHT learning model in more depth so students can understand NHT strategies, *work in groups well*, and use time effectively. Efficient, 2) The teacher must pay more attention to students by getting closer to each discussion group and giving directions, 3) The teacher provides additional motivation to stimulate students to be more courageous in expressing opinions so that students can understand learning material and work on test questions well formative.

Learning activities at the first meeting of the second cycle will discuss the sample space, the probability of an event guided by RPP-3 and equipped with LKPD-3, and observation sheets will be used for observations. The teacher enters the action class, instructs the head of the class to prepare students, gives a signal to pray, and greets the teacher. Then, the teacher checked the presence of students and obtained information that 1 student was absent due to illness.

The teacher reminded me again about the previous material: addition rules, subtraction rules, permutations, and combinatiu

ons. The teacher gives motivation to students by displaying dice images. The teacher conveys the scope of material to be learned about the sample space and the probability of an event.

The teacher informs the activities to be carried out. The teacher instructs students to occupy their respective groups immediately. Then, the teacher distributed each student's LKPD, question sheets, and numbered heads. The teacher instructs students to discuss completing the activities in LKPD-3 and informs them that the time allotted to work on LKPD is 60 minutes.

The teacher reminds students to work in their groups. The teacher observes each group and guides groups with difficulty filling out the LKPD. When working on LKPD, several students did not understand the steps contained in LKPD-3, which raised many questions for students. The teacher explains to students who ask by approaching students in their group and giving directions. After students understand, the teacher instructs students to immediately complete LKPD-3 by discussing it with their respective groups. After the time for working on the LKPD ends, the teacher instructs students to work on the Question Sheets. The teacher informed me that working on the question sheet was 15 minutes. The teacher asks each group to ensure all group members understand the group's answers. After the time is up, the teacher asks students to stop working. The teacher asks students to hold their respective numbers at the answering stage. The teacher draws one number, 4, and then all students holding the number 4 raise their hands. The teacher draws many groups, and the group drawn is the Numbers group, with the one holding number 4 to present question number 1. The teacher drew one more number, and the number drawn was number 3. The student holding number 3 raises their hand, and the teacher draws many groups. The draw is the Algebra group to present problem number 2.

Students present their answers by writing them on the blackboard and explaining them in front of the class. The teacher

allows other groups to respond; some students from other groups respond, and the teacher confirms the discussion results. The teacher reinforces the form of praise and applause to advanced students.

The teacher guides students to make conclusions from today's lesson and summarizes the conclusions submitted by students. Next, the teacher gives formative test questions. The teacher reminds students to study the material for the next meeting, namely the distribution of opportunities. The teacher closes the learning process by greeting.

After the learning process, the teacher discusses it with the observer. From the results of the discussion, it was found that some students were getting used to the NHT learning model, but students had difficulty understanding the contents of the worksheets. Students looked more active than in the previous meeting and started to be bravely expressing their opinions.

Learning activities at the second meeting of the second cycle will discuss the distribution of opportunities guided by RPP-3 and equipped with LKPD-3, and for observations, used observation sheets. The teacher enters the action class, instructs the head of the class to prepare students, gives a signal to pray, and greets the teacher. Then the teacher checked the presence of students and obtained information that 1 student was absent due to illness and 2 students were not present with a statement of permission.

The teacher reminded me again of the previous material, namely the sample space and the probability of an event. The teacher displayed several questions about Opportunity and asked students to answer them in front of the class. When working on the questions given, some students still answered incorrectly. The teacher asks other students to correct their friend's mistakes. Other students answer questions their friends ask, which are correct. The teacher conveys the scope of the material to be studied, namely the distribution of opportunities.

The teacher informs the activities to be carried out. The

teacher instructs students to occupy their respective groups immediately. Then, the teacher distributed each student's LKPD, question sheets, and numbered heads. The teacher instructs students to discuss completing the activities in LKPD-4 and informs them that the time allotted to work on LKPD is 60 minutes.

The teacher reminds students to work in their groups. The teacher observes each group and guides groups with difficulty filling out the LKPD. When working on LKPD, most students have started understanding the steps in LKPD-4. Most of the students seemed to have worked well in their groups.

After the time for working on the LKPD ends, the teacher instructs students to work on the Question Sheets. The teacher informed me that working on the question sheet was 20 minutes. The teacher asks each group to ensure all group members understand the group's answers. After the time is up, the teacher asks students to stop working. The teacher asks students to hold their respective numbers at the answering stage. The teacher draws one number, 4, and then all students holding the number 4 raise their hands. The teacher draws many groups, and the group drawn is the Numbers group, with the one holding number 4 to present question number 1. The teacher drew one more number, and the number drawn was number 3. The student holding number 3 raises their hand, and the teacher draws many groups. The draw is the Algebra group to present problem number 2.

Students present their answers by writing them on the blackboard and explaining them in front of the class. The teacher allows other groups to respond; some students from other groups respond, and the teacher confirms the discussion results. The teacher reinforces the form of praise and applause to advanced students.

The teacher guides students to make conclusions from today's lesson and summarizes the conclusions submitted by students. Next, the teacher gives formative test questions. The teacher reminds students to study the material for the next

meeting, namely the probability of multiple events. The teacher closes the learning process by greeting.

After the learning process, the teacher discusses it with the observer. From the results of the discussion, it was found that some students were getting used to the NHT learning model, although some students still had difficulty understanding the contents of the worksheets. Students looked more active than in the previous meeting and started to be bravely expressing their opinions.

The teacher held a second daily test at the second meeting. This daily repetition was carried out for 90 minutes. After the test ended, all answer sheets were collected. The teacher thanks very much to all the students who have followed the learning process using a problem-based learning model. It turned out that students felt happy and excited to work on the questions given and felt responsible.

Before carrying out the test, the teacher instructs the head of the class to prepare the class, and then the teacher checks the students' attendance. The teacher asks students to save math textbooks and prepare stationery. Furthermore, the teacher asks students to condition the arrangement of tables and chairs like during the exam. Then, the teacher distributes test sheets to each student. The teacher explains to students to write down complete answers in the way that has been discussed. The teacher goes around monitoring students and working on daily test questions. When the time is up, the teacher reminds the remaining time to work on the questions and reminds students to re-check the answers that have been done, and the teacher instructs students to collect the answer sheets that have been done.

The reflection process in cycle II can be seen from the observations about implementing teacher and student learning activities on the observation sheet. From the results of observations in this cycle, the learning process has been carried out according to the lesson plans. Students looked more active than in the previous meeting and started to be bravely expressing

their opinions.

Based on the summary of the observation sheet explanation above, students are confident presenting in front of the class. Orderliness in carrying out activities already looks promising. Students can discuss well in their groups. The habit of students asking questions with other groups when discussing is rarely done. The class atmosphere is also more conducive.

In the learning process of cycle II, the application of the NHT learning model in general has been going well. Group discussion activities ran smoothly, and almost every student participated in the discussion to complete the given LKPD. Students look more active in learning activities.

NHT cooperative learning model in learning mathematics. This is proven based on the data obtained by increasing the indicators used by the teacher.

Analysis of teacher and student activities during the teaching and learning process of mathematics through the application of NHT cooperative learning can be seen in the observation sheet of teacher and student activities so that facts are obtained about the suitability between teacher activities and student activities in the process learning with the activities required in the RPP.

Based on the reflection of the observation sheets in Cycle I and Cycle II, the teachers and students in Cycle I and Cycle II actively completed the activities the teacher gave. Students work together in their respective groups. In addition, students seem to have the courage to ask the teacher if there are difficulties. Students are confident in presenting in front of the class. Based on the description above, it can be seen that the activities of teachers and students in cooperative learning of the NHT type of each cycle have increased according to expectations.

The recapitulation of data analysis processing reports from observations of teacher activities and student activities during the learning process can be seen in Table 1 below.

Table 1 Processing of Data Analysis Results of Observation of Teacher Activities

No	Teacher Activities	Cycle I		Cycle II	
		I	II	III	IV
1	Prepare the condition of students	1	1	1	1
2	Check Attendance	1	1	1	1
3	Delivering learning objectives	1	1	1	1
4	Motivate students	1	1	1	1
5	Convey the benefits of learning materials	1	1	1	1
6	Associating current learning material with previous learning	1	1	1	1
7	The apperception provided includes things needed to build students' initial knowledge	1	1	1	1
8	Convey information on the scope of the material to be studied	1	1	1	1
9	Provides information about learning steps	1	1	1	1
10	Presents a problem	1	1	1	1
11	Provide opportunities for students to ask questions related to the problem	1	1	1	1
12	Ask students to sit in groups	1	1	1	1
13	Give LKPD to each student	1	1	1	1
14	Supervise students when they work on LKPD	1	1	1	1
15	Ask the group to make a report on the results of the discussion	0	0	1	1

16	Facilitating students in presenting the results of their discussion	1	1	1	1
17	Ask a group representative to present the results	1	1	1	1
18	Guiding students to make conclusions	1	1	1	1
19	Summarize the conclusions that have been submitted	1	1	1	1
20	Provide formative tests to students	1	1	1	1
Amount		19	19	20	20
Percentage %		95	95	100	100

Table 2 Processing of Data Analysis of Observation Results of Student Activities

No	Student Activities	Cycle I		Cycle II	
		I	II	III	IV
1	Answer the teacher's questions about students' prior knowledge	1	1	1	1
2	Ask the teacher about the information provided	1	1	1	1
3	Occupy the group that the teacher has determined	1	1	1	1
4	Actively involved in discussions on working on LKPD	1	1	1	1
5	Ask the teacher if the group is having difficulty	0	0	1	1
6	Make a report on the results of the discussion	1	1	1	1
7	Group representatives present the LKPD	1	1	1	1
8	Responding to the presentation of his group of friends who came to the front	1	1	1	1
9	Student representatives convey conclusions	1	1	1	1
10	Pay attention or record the conclusions of the material that has been studied	1	1	1	1
11	Students work on formative tests given by the teacher	1	1	1	1

Amount	10	10	11	11
Percentage %	91	91	100	100

Based on the students' learning scores, it can be seen that there are still students who have not reached the KKM in the first and second daily tests. The increase in student learning outcomes before and after the action can be seen in Table 3 below.

Table 3 Student Learning Outcomes

Learning outcomes	Base score	UH 1	UH 2
The number of students who achieve KKM	19	22	28
Percentage (%)	59,3	68.75	87.5

The learning completeness of students for each indicator is analyzed individually. Students are said to have achieved the KKM indicator if they score more than or equal to 75. The number of students who have achieved the KKM can be seen in Table 4 and Table 5 below.

Table 4 Student Completeness in Cycle I

No	Indicator	Number of students who achieve KKM	Percentage of students who achieve KKM (%)
1	Analyze the addition rule through contextual problems	27	84.3
2	Analyze the multiplication rule through contextual problems	28	87.5
3	Analyze permutations through contextual problems	20	62.5
4	Analyzing Combinations through Contextual Problems	28	87.5

Table 5 Learning Completeness of Students in Cycle II

No	Indicator	The remaining number reached KKM	Percentage of students who achieve KKM (%)
1	Determine the sample space of an experiment	32	100
2	Determine the probability of an event occurring in an experiment	28	87.5
3	Determine the complement probability of an event	20	62.5
4	Determine the probability of mutually exclusive events of an event	30	93.7
5	Determine the probability of independent events of an event	25	78.1
6	Determine the expected frequency of an event	27	84.3

E. Conclusion

Numbered Heads Together (NHT) cooperative model to improve students' mathematics learning outcomes in class XII A PHP 1 at the Integrated Agriculture State Vocational School, Riau Province, in the 2021/2022 academic year. The results obtained by the teacher can be concluded as follows:

- The NHT cooperative learning model can increase the active-ness of learning mathematics, namely by taking the following steps: 1) Students are divided into groups, and each student in the group is given a number; 2) The teacher gives assignments or questions and each group works on them, 3) The group discusses to find the answer that is considered the most correct and ensures that all group members know the answer, 4) The teacher calling one of the numbers, students with the number called present their answers to the results of their group discussions, 5) Other students are asked to respond, then the teacher appoints another number, 6) Makes

Learning Conclusions.

- There is an increase in the activeness of learning mathematics using the NHT cooperative model, which can be seen from the increase in the following indicators:
- Students pay attention to the teacher's explanation before the action, as many as 15 (48.39%) after the action, and as many as 25 (89.29%).
- Students respond to questions when the teacher gives questions before the action, as many as 8 students (25.81%) after the action, as many as 20 students (71.43%)
- Students ask friends when experiencing difficulties in the discussion session before the action, as many as 10 students (32.26%) after the action, and as many as 19 students (67.86%).
- Students answered friends' questions during the discussion session before the action. As many as 14 students (45.16%) after the action, and as many as 22 (78.57%).
- Students were able to explain the results of the discussion to others (presentations) before the action, as many as 8 students (25.81%), and after the action, as many as 18 students (64.29%).
- Students gave criticism and responses to the results of the discussion submitted by other groups before the action, as many as 5 students (16.13%), and after the action, as many as 16 students (57.14%).
- Students conveyed the conclusions of the material before the action as many as 6 students (19.35%), and after the action, as many as 15 students (53.57%).
- Students recorded the conclusions of the material summarized by the teacher before the action, as many as 15 students (48.39%), and after the action, as many as 24 students (85.71%).

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