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The Application of the Number Head Together (NHT) Type Cooperative Learning Model in Science Learning

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ABSTRACT

The application of learning models plays a very important role. This research aims to analyze the effectiveness of the NHT model in learning science and technology in grade 5 at a Madrasah Ibtidaiyah (an elementary religious-based school). The method used is a qualitative-descriptive study with a case study approach. The results show that the application of the NHT model is able to increase active participation and student learning outcomes. If the methods used in education are not appropriate, then achieving educational goals will be difficult to realize. The type of research used is qualitative. The qualitative research approach is concerned with human behavior and roles in research proposals. As a result, it is hoped that it will be easier for researchers to develop approaches and change their research targets so that they can be applied in the field. Physical fitness because it will influence learning outcomes and individual social adjustment. Students must also be seen as mentally prepared, referring to intelligence, high memory, fulfilled needs, desire or motivation to learn, ability to concentrate and pay attention, then readiness of learning materials as learning materials, exercise books, supported by various reading sources. This book provides information and helps students answer questions related to the teacher's lessons.

Keywords
Cooperative Learning
Elementary Education
Madrasah Ibtidaiyah
Number Head Together
Religious-based School
Science Learning

Introduction

To advance the progress of a nation, education plays a very crucial role in forming superior individuals. Achieving this requires intensive and sustained effort. Teachers, as the front guard in the educational process, hold a big responsibility to produce graduates who have superior competencies. So, it is important for teachers to have the ability to optimize the learning process in school. Learning that is well-designed, systematic, and oriented towards achieving student goals will make it easier for students to master the material [1].

Learning is not easy because teachers do not just transfer knowledge and let students absorb it. The learning process also involves various activities and actions needed to improve student understanding and learning outcomes [2]. The teacher's main task is to arouse enthusiasm for learning in students and motivate them so that they can receive the lesson material well and achieve the learning goals that have been set. To ensure students can participate actively in the learning process and achieve optimal results, the learning model applied must be adapted to the characteristics of the material to be taught [3].

NHT learning model is one of the learning models that can be applied, which is in accordance with the learning material that will be taught at Science Learning (*Ilmu Pengatahuan Alam dan Sosial* or IPAS). The application of learning models plays a very important role. If the methods used in education are not appropriate, then achieving educational goals will be difficult to realize. This method functions as a personal approach between teachers and students to create student interest and interest in the material being taught.

The use of appropriate methods in the learning system is a crucial factor for the success of the teaching and learning process; without appropriate methods, the implementation of learning will not be effective. Methods are the basis for successful learning as well as the basis for achieving the expected educational goals. No matter how good a strategy is implemented, if the method chosen is not appropriate, the results obtained will be less than optimal. On the contrary, using the correct methods will have a positive impact on the quality of education. To overcome learning problems like this, learning development must be carried out through discussion and collaboration with colleagues. Currently, innovation and creativity are needed in developing learning that can involve the active participation of students in all learning activities [4].

Learning and motivation influence each other. Students who study actively are influenced by the motivation that exists within them. Motivation is a change in energy within the student's personality, which is enhanced through the emergence of affective and emotional reactions to achieve goals. This energy change can take the form of real activity, such as physical activity. Students do activities because they want to achieve their goals. If it is

connected to the learning process, the teacher's role will become clearer, namely, related to increasing learning motivation. Motivation is the force that drives someone to do something. Motivation can be defined as the driving force within the subject. Teachers must encourage students to learn [5].

A learning model is a pattern used as a guide in planning learning in the classroom, including in preparing the curriculum, compiling material, determining learning objectives, determining learning steps, managing the classroom, and managing the learning environment. In order to avoid misunderstandings about the definition of NHT, it is necessary to explain that NHT is a variation of learning in group discussions that can influence student interaction patterns. The NHT learning model is a variation of discussion in groups, with the characteristic that the teacher appoints one student in each group to represent the group [6].

Various perspectives developing in natural and social sciences are adapted to IPAS subjects. In IPAS, research on society can only be carried out in a limited environment, namely, the state environment or the school environment. In this way, students who study science can appreciate current natural and social events by studying past events. Overall, IPAS is a field of science that investigates human living creatures and their world in the universe, as well as the fact that humans are social creatures who always live together. Life has many aspects, not only human life. Aspects such as social relations, economics, psychology, culture, and history are among them. Teaching and learning activities in education, which especially take place in schools, involve active interaction between students and teachers. In the science and science learning process, teachers act as facilitators. The teacher provides information or lectures to students. Teachers must also focus on learning objectives to develop higher levels of thinking and critical thinking skills [7].

Teachers are not only the center of learning activities, but it is also important for students to participate actively and use learning resources. Teachers must be more creative in organizing learning activities so that students are actively involved. This means they must be able to use various learning models and approaches, and use various appropriate learning resources [8].

Science should be a subject that is fun and popular with students. However, for most students, Science is a subject that is considered the most difficult, most boring, and often also the most frightening. This condition results in science subjects being disliked, ignored, and even avoided. Various efforts have been made to improve the quality of education, considering the importance of education in improving the quality of human resources. It is hoped that various efforts to improve the quality of education will lead to increased student learning outcomes, especially in science and technology subjects [9].

Based on the results of observations made when teachers provide learning materials, it is found that teachers more often use questions found in books and student worksheets because teachers feel that the questions contained in books and students are in accordance with the material, teachers do not provide learning motivation to students because students in class learning are only listeners which results in students quickly feeling bored in participating in learning, in the learning process it is still teacher centered because teachers still find it difficult to get students to play an active role in the learning process, in learning it is still dominated by the lecture method because teachers feel they are not truly teaching if they don't explain. In short, students' skills in describing answers are low, which leads to an inability to complete essay questions [10].

This has an impact on the low IPAS score. The results of these observations are supported by the results of interviews conducted with the grade 5 science and science teacher. Muhammadiyah Romang Lompoa, West Bajeng District, Gowa Regency. Based on the interviews conducted, information was obtained that students were still very weak when working on science questions in the form of descriptions because the knowledge they possessed was still rote, students were unable to systematically explain their answers even though they got the correct final results, teachers gave more types of closed questions because teachers still found it difficult to make open questions and the average science scores of grade 5 Madrasar Ibtidaiyah Muhammadiyah (an elementary religious-based school) students at Gowa Regency is still low.

Through this learning model, students can express their thoughts, exchange opinions, and work together if there are friends in their group who are experiencing difficulties. This can improve student learning outcomes in reviewing and mastering science and science subject matter, so that later they will achieve good learning outcomes with good student science learning achievement. Looking at students' mastery of science and science subject matter, in this research the learning model chosen is the NHT model because in this model students occupy a very dominant position in the learning process and collaboration occurs in groups with the main characteristic being numbering so that all students try to understand each material taught and are responsible for their respective member numbers. NHT can help students understand and master science learning concepts, improve collaboration skills between students, and improve critical thinking skills. Collaborative involvement of students in groups to achieve this common goal allows NHT to improve results [11].

This study investigates the effectiveness of the model in improving science and technology learning outcomes for grade 5 students in a Madrasah Ibtidaiyah. The research examines how NHT supports engagement, collaboration, conceptual understanding, and achievement in a religious-based primary school learning environment.

Literature Review

A. Definition of Numbered Head Together

The generic definition of a learning example is a method or systematic presentation technique used by the teacher to organize the experience of the learning process to achieve objectives based on learning [12]. A learning model is a plan or pattern that functions as a guide in implementing learning in class and in tutorial sessions [13].

The learning process that students experience is more meaningful and gives a strong impression, so that the subject matter taught will be easier to remember and understand, and the learning process can proceed well. The learning model itself has a broader meaning than strategies, methods, or just learning procedures. Currently, various kinds of learning models have been developed, from simple ones to very complex and complicated models, because they require a lot of tools to implement, using tools that make it easier for students to learn. So, the existence of a learning model functions to help students obtain information, ideas, skills, values, ways of thinking, and understanding that they express.

An effective teaching process is needed to produce effective learning. Among the conditions needed to create effective teaching are students who learn actively. One learning model that provides opportunities for students' active processes, constructing or constructing their own knowledge, utilizing various learning resources, and giving students opportunities to work together is cooperative learning [14].

This learning model is known as a learning approach. This learning approach uses plans and flow to organize classroom learning. A good and appropriate learning model is applied to teach specific study materials, topics, or subtopics using minimal time and resources while ensuring students achieve the best possible outcomes.

The numbered heads together type of cooperative model is a learning model that prioritizes student activities in searching, processing, and reporting information from various sources, which are ultimately presented in front of the class [15]. Cooperative learning is known as the numbered heads together type, which is basically a variant of group discussion with its distinctive characteristics, namely, the teacher appoints one student who can represent the group without first telling who will represent the group.

The NHT model is a learning model that begins with numbering, where the teacher divides students into groups and assigns each person a number. Then, the teacher poses several questions, and each group brainstorms and discusses the answers. Next, the teacher calls on students with the same number from each group and discusses the most appropriate answer [16]. NHT cooperative learning is a type of learning that emphasizes a specific structure designed to influence student interaction patterns and aims to improve academic mastery.

This type is developed by involving students in reviewing the material covered in a lesson and checking their understanding of the content.

B. Learning Syntax

Another learning model, NHT, also has basic references and phases that must be passed in implementing the learning model. Agus Suprijono [17] divides the syntax of the NHT learning model as follows:

Table 1. The Syntax of Numbered Head Together

No.	Fase	Teacher Behavior
1.	Establishing clear communication objectives and preparing students.	Explaining learning objectives, background information on the lesson, and preparing students to learn.
2.	Demonstrating Demonstrating knowledge or skills	Demonstrate correct skills, present information step by step
3.	Guided Practice Guiding training	Planning and providing initial training.
4.	Feedback Checking understanding and providing feedback	Check whether students have successfully completed the task, and provide feedback
5.	Extended practice Provide opportunities for advanced training and application	Prepare for opportunities to undertake advanced training, with specific training on application to more complex situations in everyday life..

C. Learning Motivation

The implementation of the NHT learning model consists of several systematic steps aimed at improving student participation and learning outcomes. The first step begins with the teacher delivering learning materials in accordance with the basic competencies to be achieved. Next, the teacher administers individual quizzes to measure students' initial scores or initial level of understanding. Afterward, the teacher divides students into small groups of 4 to 5 students, with each group member assigned a number or name as identification. The teacher then poses a problem to be discussed and solved together in groups. To check student understanding, the teacher randomly calls out a number or the name of one group member to represent the group in answering questions. In the next stage, the teacher facilitates students in compiling summaries, providing directions, and emphasizing key points of the learning. Next, students are given individual quizzes to measure their understanding. As a form of appreciation, the teacher awards groups based on the increase in individual scores from the initial score to the next quiz score. This strategy not only encourages active student involvement but also strengthens individual and collaborative responsibility in the learning process [18].

Motive is derived from the word motivation, which means the effort that drives students to do something [19]. Learning motivation is all efforts within oneself that give rise to learning activities, ensure the continuity of learning activities, and provide direction to learning

activities so that the desired goals are achieved. Learning motivation is a non-intellectual psychological factor and plays a role in fostering the enthusiasm for learning for individuals [20].

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Teachers seem to force students to accept the material they present. This situation is detrimental because students cannot learn optimally, which, of course, also results in suboptimal learning outcomes. The learning process places motivation as a crucial aspect in fostering student learning motivation.

Motivation is a condition that activates and directs a person's behavior to achieve a specific goal, while learning is seen as a process of behavioral change that occurs through practice or experience. In the context of education, motivation plays a crucial role as the primary driver of student learning activities. Sardiman classifies human motivation into three main categories. First, biological motivation, which is the basic motivation that arises from basic needs such as hunger, thirst, fatigue, lack of air, or pain. These conditions can drive students to behave to meet these needs. Second, emotional motivation, which stems from feelings such as fear, anger, joy, love, and hate. These emotions influence students in making decisions and behaving in certain ways during the learning process. Third, value and interest motivation, which is the drive that arises from the values believed in and the personal interests held by students in a particular field. In this case, students tend to exhibit learning behaviors that align with their value systems and personal interests. For students with a religious background, their learning behavior is also strongly influenced by their religious values. Thus, motivation is not only physical or emotional, but also closely related to aspects of students' values, interests, and spirituality as part of their personality structure and physiology [22].

Material and Methods

The type of research used is qualitative. A qualitative research approach relates to human behavior and roles in the proposed research. As a result, researchers are expected to more easily develop approaches and modify their research objectives for application in the field. This research is a case study, not a population study. This is because qualitative research begins with a single case in a specific social situation, and the results are transferred to other social situations comparable to the case being studied. In qualitative research, the sample is referred to as a source, informant, friend, or instructor. This research was conducted using an

approach known as a case study. A case study is a type of qualitative research that focuses on a specific topic and defines it as a case that requires thorough investigation to discover the reasons behind the phenomenon. Essentially, what is seen is merely a representation of what is inside, not reality [23]. Qualitative research is social science research that collects and analyzes data in the form of words (spoken or written) and human actions, and researchers do not attempt to calculate or quantify the qualitative data that has been obtained, and thus do not analyze numbers.

Results and Discussion

Learning is a relatively permanent change in behavior resulting from past experiences or from purposeful or planned learning [22]. Learning outcomes are abilities acquired after following a series of learning processes, and changes that students have as a result of learning experiences [23]. According to Kompri, learning is a component of educational science that is concerned with the objectives and reference materials for interactions, both explicit and implicit (hidden) [24]. To capture the content and messages of learning, in learning, individuals use abilities in the cognitive domain, namely abilities related to knowledge, reasoning, or thinking, consisting of the categories of knowledge, understanding, application, analysis, synthesis, and evaluation [25]. Affective, namely abilities that prioritize feelings, emotions, and reactions that are different from reasoning, consisting of categories of acceptance, participation, attitude assessment, organization, and formation of lifestyle patterns, psychomotor, namely abilities that prioritize physical skills, consisting of perception, readiness, guided movements, complex movements, adjustment of movement patterns, and creativity [26].

Motivation is a student's desire to do something as desired to achieve a goal [27]. Good motivation will lead to good results, just as in learning. High motivation is expected to lead to good learning success [28]. After all, students do this with the motivation to try to solve the problems they face and achieve the desired learning goals. The implementation of the NHT Cooperative Learning model is expected to increase student motivation to learn [29].

Teachers can further develop their ability to apply learning through varied learning methods, which is one way to overcome student boredom in learning [30]. This can be supported by the use of a high-quality learning environment, teachers can present materials with the help of various creative and innovative learning methods, students do not get bored with the material and continue to develop, with good technical skills supporting the student learning process, can change the atmosphere of boredom by learning to be happier, more enthusiastic and more motivated, thus, students in learning have the potential to improve [31].

The NHT learning model is a collaborative learning model that provides opportunities for students to share ideas and consider the most appropriate answers, which strengthens the

spirit of student cooperation [32]. This learning model offers every student the opportunity to participate in learning [33]. Counted together means heads, and numbering means thinking together, so the heads together learning model is thinking together with numbers. Learning with the NHT model is a variation of cooperative learning or group discussion [34].

The technical stage of learning is when the teacher first asks students to form groups [35]. Each member gets a number. After finishing, the teacher calls the number to present the results of the discussion. The teacher does not say what number the next performance will be, and so on, until all numbers are called. This random invitation ensures that all students are truly involved in the conversation, the NHT type of cooperative learning model has learning stages, namely, students are divided into several groups, each student in the group is given a number, the teacher gives an assignment or question and each group works on it, the group will discuss to find the correct answer and ensure everyone in the group knows the answer [36], the teacher calls the number then the students who are called present the results of their group discussion.

Before implementing the learning process, an important step for teachers is to prepare students to fully participate actively in the learning process [37]. To motivate students in learning, explain the learning objectives to be achieved. These objectives can be expressed verbally or in writing. Explain the material to be studied, the learning steps that will be taken, and how the assessment results will be shared with students so that students know where their abilities lie [38].

Before the learning process, the teacher checks the students' readiness to learn [39]. The teacher also motivates the students by conducting apperception and creating a pleasant learning atmosphere, so that students are encouraged to be active in the learning process activities. NHT model learning is an active learning that uses effective methods or ways by involving all students in the learning process, asking questions, paying attention, answering questions, doing teacher assignments, and expressing opinions in discussions [40]. A wise teacher can set rules in groups that require all members to participate in discussions, no one holds control and no one just listens passively, appoints a group leader who knows how to stimulate discussions and guide its members so that discussions become positive, discussions have many benefits for learning, in addition to being an opportunity to improve student performance, discussions train students in critical thinking and also build self-confidence [41]. Teachers must deliver subjects as interestingly as possible, so that children's interest in the subject grows, interest increases motivation, to spread into curiosity, this curiosity can lead students to learn independently, collaborate with various learning resources, and present what they have learned.

The first thing that a teacher needs to master in implementing the NHT cooperative learning model, namely preparing students to fully play an active role in the learning process, providing instructions for the steps of NHT model learning, preparing a classroom that shows the boundaries of the learning environment, and classroom management is the process of selecting the activities of the teacher who leads the learning and most importantly is the selection of the use of learning tools that are appropriate to the characteristics of the class. Before opening the learning, the teacher must see the readiness of students who will participate in learning activities, whether students have the desire to learn, have sufficient physical, mental and energy abilities and good health, while mental readiness includes sufficient interest and physical, mental and motivation to participate in learning activities. Opening the learning must see the readiness of students to learn in terms of physical health. Physical fitness is closely related to health, which affects learning outcomes and individual social adjustment, students must also be seen to be mentally ready referring to intelligence, high memory, fulfilled needs, desire or motivation to learn, the ability to concentrate and pay attention, then the readiness of learning materials as learning materials, exercise books, supported by various reading sources, this book provides information and helps students answer questions related to the teacher's lesson.

Second, the teacher's efforts to motivate in using the NHT cooperative model by designing learning according to the material to be presented, then the teacher introduces the learning model used in the learning process, explains the stages carried out, and the steps that must be carried out by students, after that forming students into several groups aims to work together in doing assignments, discussions not only facilitate students' understanding of the subject, but also encourage closeness between teachers and students. Learning is an activity planned by teachers where students are involved in learning activities to achieve the expected goals or competencies. In planning this learning, teachers must understand the characteristics of students, the learning objectives achieved or competencies that must be mastered by students, the teaching materials to be presented, and the methods of presenting the material. Measuring or knowing student activities during learning from teachers can recognize student actions during the learning process in the classroom by using instruments based on measurements that are indicators of student learning activities from time to time, monitoring learning in the classroom, measuring student skills and abilities, and teachers can directly observe and see which students do the best work. This NHT model is a model that prioritizes student achievement in learning. Students interact with other students and also with the teacher. Its characteristic is that the teacher appoints students according to the number stated by the teacher. Students will represent their group in such a way that they have to work together.

Fig. 1. Classroom Situation during NHT Implementation

Fig. 1 illustrates the initial classroom arrangement at the beginning of the NHT learning implementation. Students are divided into small collaborative groups to support discussion, sharing ideas, and problem-solving during science and technology learning activities. This arrangement is designed to optimize interaction and engagement throughout the NHT instructional process. Grouping students to work together in the learning process, providing opportunities for students to develop their respective talents, helping students think theoretically and practically in various subjects and school activities, helping students learn to assess their abilities and roles in learning The role of teachers in forming study groups helps students understand and formulate various problems that they, with learning discussion activities, students are allowed to discuss a problem or topic so that each student expresses his opinion, exchanges ideas until reaching a common conclusion from the discussion held. Reinforcement is a positive response from a teacher to students in the learning process, aims to provide information or feedback, reinforcement and reinforcement of several good things such as encouragement or correction so that students can maintain or improve good behavior, reinforcement can create a comfortable learning atmosphere that teachers provide to students to increase positive student behavior, while feedback is how teachers give students confidence either through praise or responses. The purpose of learning reinforcement is to increase students' motivation and attention in learning and develop students' ways of thinking in a better direction, reinforcement is carried out by teachers by giving awards according to the principles of behavioral change, because through teacher reinforcement, students are enriched with various positive behaviors that cumulatively and synergistically support student performance and the achievement of educational goals.

Third, Student learning outcomes in NHT can shape students in the learning process, instill a sense of togetherness with friends in their class, encourage students to work together during the learning process, aim to encourage students to be more active in learning, enable students to help each other understand the material and learning tasks they face, in addition

students are also allowed to represent each group to show their work in front of other group friends and this is a source of pride for students who can appear in public.

Fig. 2. Observation of Student Activities

Fig. 2 illustrates the researcher directly observing student engagement, communication patterns, and collaborative interactions during the implementation of the NHT case study. The observation process focuses on how students actively participate, share ideas, respond to prompts, and contribute to group decision-making throughout the learning activities conducted in the classroom environment. Student evaluation results show the learning outcomes themselves, high student learning motivation is reflected in good exam results, on the contrary if the results are not good, then students are not motivated to learn and teachers must help students to be more motivated to learn, a teacher must guide and motivate students to continue learning, make students enthusiastic about learning, teachers must always remember that each student has different talents, personalities, skills and potential, when teachers give assignments they should understand the condition of students. This can be supported by the use of a high-quality learning environment, teachers can present materials with the help of various creative and innovative learning methods, students do not get bored with the material and continue to develop, with good technical skills supporting the student learning process, can change the atmosphere of boredom by learning to be happier, more enthusiastic and more motivated, thus, students in learning have the potential to improve.

Fig. 3 presents an example of student work and the assessment results collected after the NHT model was applied in science and technology learning. This sample highlights students' level of understanding, accuracy of responses, and the extent to which collaborative learning supported improved performance, conceptual mastery, and problem-solving outcomes.

Fig. 3. Student Learning Outcomes

Teachers must pay attention when giving assignments to students, whether students understand the purpose of the assignment, ensure students can understand that the assignment will arouse students' interest in learning, if a student has a problem, the teacher must care and motivate students to study harder, the teacher can also give assignments by allowing students to work together with discussion methods in groups, so that students feel enthusiastic and motivated to complete the assignment. Because the development of affective domain assessments has a very positive influence on students, especially in learning. The role of teachers in motivating students in the affective domain also determines learning attitudes that can influence student learning activities. Positive learning attitudes are closely related to interest and motivation; therefore, all things being equal, students with positive learning attitudes learn more actively and thus achieve better results than students who have negative attitudes towards learning.

Teachers appreciate learning in the classroom by taking preparatory steps, namely students are mentally and physically ready to participate in learning, encourage students to learn, ask about subjects and prior knowledge, explain learning objectives, provide explanations about learning, objectives, scope of material and descriptions of activities by preparing students mentally and physically to learn, so that the delivery of material delivered by the teacher is not hampered by problems, for that, teachers must be able to expand their roles and expertise in various issues and teaching techniques that teachers can develop to achieve their goals actively, innovatively and creatively.

In implementing the NHT learning model, teachers must direct students who have been formed into groups to be responsible for their groups, so that there is no difference between one student and another in delivering the material, teachers use groups of numbers that correspond to their respective sequences, as a forum for conveying students' perceptions and thoughts, then connecting the questions asked or asked to improve social relations between students, to get answers from the results of students' ideas.

Knowledge is the ability of students to know something that has been learned without expecting to be able to use it [42], understanding is the ability of students to understand something after something is known and remembered [43], while application is the ability of students to apply or use ideas in new and concrete situations [44], while analysis is a person's ability to detail or describe a substance or situation into smaller parts and to understand the relationship between parts or factors with other factors, synthesis is the ability to think, which is the opposite of the analytical process of thinking, or the process of combining parts or elements logically so that they become a pattern in the form of a new structure or formula [45], and evaluation is the ability of students to make judgments about situations, values, or ideas, which can improve student learning achievement [46].

Conclusion

Implementation of the NHT model in Science Learning, teachers can use it by introducing it to students from the beginning of the lesson and must see students' readiness to learn in terms of physical health, physical fitness because it will affect learning outcomes and individual social adjustment, students must also be seen to be mentally prepared referring to intelligence, high memory, fulfilled needs, desire or motivation to learn, ability to concentrate and pay attention, then the readiness of learning materials as learning materials, exercise books, supported by various reading sources, this book provides information and helps students answer questions related to the teacher's lesson.

The results of student evaluations fulfill three domains, namely affective, cognitive, psychomotor, these three indicate learning outcomes that cannot be separated, high student learning motivation is reflected in good assessment results, on the other hand, if the results are not good, then students are not motivated to learn and teachers must help students to be more motivated to learn, a teacher must guide and motivate students to continue learning, make students enthusiastic about learning, teachers must always remember that each student has different talents, personalities, skills and potential, when teachers give assignments they should understand the condition of the students.

Limitations and Suggestions

The application of the NHT model is used as motivation for student achievement in the learning process, so that student learning outcomes can improve. All school members support the implementation of the NHT model. This is being implemented continuously so that it can be applied not only to science subjects in grade 5 but also to other subjects.

Conflict of Interest

The authors declare no conflict of interest.

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