Original Research Article

DEVELOPMENT OF COOPERATIVE LEARNING MODEL TO IMPROVE MATHEMATIC GENERALIZATION ABILITY OFJUNIOR HIGH SCHOOL STUDENTS

ABSTRACT

This study aims to: 1) describe the needs of junior high school teachers and students in learning mathematics; 2) obtain comprehensive information in designing cooperative learning models that can improve junior high school students' mathematical generalization abilities; 3) produce cooperative learning models in improving the mathematical generalization abilities of junior high school students that are valid, practical, and effective. This research is research and development by adopting the Plomp model design which consists of five phases, namely initial investigation, design, realization/construction phase, test phase, evaluation, and revision and implementation phase. Data collection was carried out using several instruments in the form of needs analysis questionnaires, validation questionnaires, observation sheets, teacher response questionnaires, and tests of mathematical generalization ability. The data collected was then analyzed using qualitative and quantitative methods. The results of the study indicate that it is necessary to develop a cooperative learning model to improve junior high school students' mathematical generalization abilities. The results of the validation test showed that the model book and learning tools were declared valid based on the expert's assessment. Furthermore, the results of the practicality test also state that the model is practical based on the results of observations of the implementation of learning, learning management, and teacher response questionnaires. While the results of the effectiveness test through the n-gain test from the pretest and posttest data showed that this learning model was declared effective for increasing the mathematical generalization abilities of junior high school students.

Key Words: *Mathematics, cooperative learning model, mathematical generalization ability*

INTRODUCTION

Mathematics is an important science to study because mathematics is a science that has the characteristics of being a science that has abstract objects, is patterned on axiomatic deductive thinking, and is also based on truth. With these characteristics, mathematics is useful in developing abilities and forming the personality of students. Mathematics as a basic science is also needed to achieve high quality success. Therefore, mathematics is taught at all levels of school, from elementary to tertiary level.

Reasoning is the ability to think logically and systematically. Reasoning is one of the skills that plays an important role in learning mathematics so it needs to be mastered. The importance of reasoning for school students has been written in the Regulation of the Minister of National Education number 22 of 2006 concerning Content Standards which is the goal of mathematics subjects, namely that students are able to use reasoning on patterns and characteristics, perform mathematical manipulations in making generalizations, compiling evidence, or explaining ideas. and mathematical statements (Depdiknas, 2006: 346). Ministry of National Education (2002: 6) states that "Mathematical material and mathematical reasoning are two things that cannot be separated, namely mathematical material is understood through reasoning and reasoning is understood and trained through learning mathematical material". Based on the objectives of learning mathematics, one of the important reasoning mastered by students is generalization. Generalization is drawing conclusions from specific evidence to general conclusions.

To carry out this generalization process, students are free to look for which path to take to find conclusions drawn based on the understanding of the concepts they already have. The process of finding these conclusions is not easy, because even though students are free to choose a path to find conclusions, students also have to work hard to think and be creative according to students' ideas and data previously provided by the teacher. According to Anggoro (2016) concluded (generalization) is a very important stage, because through this stage students will be able to take the essence of the learning process that they have done, and can see the extent to which students understand the material presented. The teacher also plays an important role, namely that he must always supervise students in the generalization process so that misconceptions do not occur which will later affect students' understanding of the material they have understood.

Based on the results of the pretest during the initial observation at SMP Negeri 32 Makassar to 67 students, there were still many students who were unable to conclude after identifying the patterns found, including when solving problems. Figure 1 shows a pattern-related math problem:

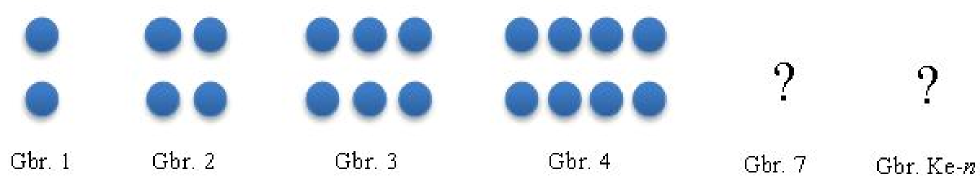

Figure 1. A series of balls arranged according to a certain pattern

Given a row of patterned balls as shown in Figure 1, ask for the number of balls in the 7th and nth pictures. To answer the number of balls in the 7th picture all students can answer correctly, although in different ways. Most students (85%) answered by sorting the balls into pictures 5, 6, 7, thus finding the number of balls in the 7th picture, namely 14 balls. There are some students (15%) who have thought more creatively by making Table 1 as follows:

Table 1. The relationship between the number of balls and the nth image

The picture	1	2	3	4	7
Lots of Balls	2	4	6	8	14

When asked 7 students why they made tables, all three said that if they were made in the form of a table, the calculations could be seen. 1×2, 2×2, 3×2, 4×2, 5×2, 6×2, and 7×2, so the 7th image has 14 balls. However, to answer the nth ball, all students were confused about the answer. Supposedly when they have found a pattern from the 1st to the 7th picture, students can already determine the conclusion or generalization for the nth ball image. In fact, from the results of interviews with mathematics teachers, students have studied number pattern material, but students forget the concepts that have been taught by their teachers. The results of this pretest indicate that the generalization ability of SMP Negeri 32 Makassar students is still low. This is also supported by the results of the Indonesian Student Competency Assessment (AKSI) survey in 2017 which showed that general level difficulty in mathematics at the junior high school level still resulted in 49.52 knowing questions, 52.59 applying questions, and 51.52 reasoning questions. Therefore, students' reasoning is 51.52, so students' mathematical reasoning is still very lacking. This problem illustrates that students' mathematical generalization abilities in learning mathematics are still low so that the impact on learning outcomes is also low.

Various attempts have been made by the government to improve generalization capabilities in Indonesia, but have not been satisfactory. One of the causes of low achievement in learning mathematics in Indonesia is due to the inaccuracy in the use of teaching methods in learning. Based on the results of interviews with the Mathematics teacher at one of the Public Middle Schools in Makassar, information was also obtained that, in the learning process, most students still experience difficulties in making conjectures, manipulating mathematics, giving reasons for the correctness of solutions, and difficulties in drawing conclusions from the material taught. they have obtained. This is because the learning process that is carried out is only conveying formulas and does not relate the material to experience or everyday life.

The method used still makes students bored, so students often daydream and fall asleep while participating in learning in class. Students still have difficulty receiving the material presented optimally. This is because students are less focused in following the lesson so that students become less active and learning outcomes are still unsatisfactory. When the material is delivered, students are still used to just listening and receiving information without trying to find the information themselves. Students are also still less active in asking questions or expressing opinions in class. When the teacher provides feedback or learning stimulus, students are less active in responding. And when the learning process ends students still find it difficult to draw a conclusion from the material that has been studied. As said by Anggoro (2016) that the low ability of students' mathematical generalizations is also due to the fact that in their learning the teacher still uses conventional learning and the class still focuses on the teacher as the only source of learning.

To overcome the low generalization ability of students in learning, it is necessary to make a change in the use of learning methods in schools that can encourage students' interest in learning. Especially at the elementary and junior high school levels, mathematics should be taught with learning that is related to the real world, so that the learning that occurs can make it easier for students to enjoy mathematics. Moreover, in accordance with the current curriculum that the competencies that must be mastered by students are demonstrating the skills of reasoning, processing and presenting creatively, productively, critically, independently, collaboratively and communicatively in concrete and abstract realms in accordance with what is learned at school and other sources available. the same from a theoretical point of view. One way to improve the learning process is to apply a cooperative learning model.

According to Rusman (2012: 202), "Cooperative learning is a form of learning by means of students learning and working in small groups collaboratively whose members consist of four to six people with heterogeneous group structures". In a cooperative learning system, students learn to work together with heterogeneous group members so as to train students to have a high social spirit. Students who are smart and able to master the material faster must be willing to share knowledge with other friends who don't understand. And for students whose level of understanding is slower will be motivated to understand the material faster. With a cooperative system will make students have a high social sense and reduce their individualistic nature. Nur (2011) argues that all cooperative learning models apply team rewards, individual responsibility, and the same opportunity to succeed, only the way of implementation is different.

Through cooperative learning, the learning process will be livelier and the learning atmosphere will be more enjoyable because students will work together to achieve common goals. As stated by Ulhusna et al (2020) that collaboration skills are very important in class activities because they can increase students' knowledge in achieving learning goals. Groups of students working collaboratively will produce more knowledge. Research shows that collaboration has a powerful effect on student learning and knowledge retention. The advantages of learning with the ultimate goal of collaboration are: practicing effective division of labor; improve the character of student responsibility, combining information from various sources of knowledge, perspectives, experiences; and increased creativity and quality of solutions stimulated by the ideas of members in each group (Child, 2016; Dooley & Sexton-Finck, 2017).

Collaborative learning can ultimately improve students' way of thinking in understanding learning material or taking the essence of the material. To conclude or make generalizations, it is necessary to pay attention to students' inductive thinking processes. This inductive way of thinking was pioneered by Hilda Taba (Joyce, Weil and Colhoun, 2011). Taba developed this inductive learning model based on the concept of students' mental processes by paying attention to students' thought processes to handle information and solve it. This learning model is designed based on constructivism theory, because the design of the learning syntax is dominated by student activities in constructing knowledge based on students' own experiences. Learning begins by giving examples or special cases towards concepts or generalizations. Students make a number of observations which then build on a concept or generalization. Students do not have to have primary knowledge in the form of abstractions, but arrive at these abstractions after observing and analyzing what is observed. In this inductive activity under the guidance and direction of the teacher, students actively learn mathematics individually. Even so, students are given the opportunity to interact with their friends, for example exchanging opinions with their peers or with friends nearby.

By thinking inductively students will practice learning the material with their own active thinking. Only after that did they deepen the material by paying attention to the teacher's presentation bringing material that they had learned before and most importantly learning must foster an atmosphere that makes students want to actively progress in explaining the results of their work, and be active in asking questions that are not clear. In this lesson, students do not daydream or fall asleep in class. All participate and think in the learning process, so that each group member will share the information they get during discussions and conclusions. As stated by Suryani (2009) that through collaborative learning makes it easier for students to learn and work together, contribute ideas to each other and be responsible for the achievement of learning outcomes both in groups and individually.

This description empowers researchers to develop a learning model that is fun and facilitates students to be active in learning, where this learning model emphasizes thinking processes to the fullest for all students' abilities to investigate and solve problems systematically, critically, logically, and analytically, based on data, symptoms, facts, and student experiences. The real conditions at SMP Negeri 32 Makassar which underlie the importance of developing cooperative learning models that are linked to the implementation of the learning process in class, include: (1) the learning tools used by teachers are oriented towards student center learning but are not implemented in real classes, (2) the teacher gives group assignments but does not activate students' mathematical generalization thinking skills so that students are less trained to develop their reasoning power in solving problems and applying the concepts they have learned in real life, (3) the teacher's lack of motivation in developing learning models adapted to the mindset children, (4) the availability of supporting facilities and infrastructure that is inadequate in the learning process, so that it can affect the development of learning models that are not varied and innovative, and (5) there are still many students who are less responsive and passive in group discussion activities.

Based on the background of the problems above, researchers conducted research to develop cooperative learning models in improving the mathematical generalization abilities of class VIII students of SMPN 32 Makassar.

METHOD

The type of research that researchers use is development research. In this study, research and development (R&D) methods are used. In this case the research and development that will be carried out is to produce a product in the form of a cooperative learning model type AKI (Active, Collaborative, and Inductive). To be able to produce certain products, research that is in the nature of needs analysis is used and to find out if these products can function in the wider community, research is needed to test the validity, effectiveness and practicality of these products.

This research was conducted at SMP Negeri 32 Makassar in the even semester of the 2022 academic year starting in January 2022 until March 2022.The subjects of this study were even semester VIII grade students at SMP Negeri 32 Makassar.

This research and development design uses the Plomp development model which consists of 5 stages, namely (1) the initial assessment stage, (2) the planning stage, (3) the realization/construction stage, (4) the test, evaluation, and revision stages, and (5) implementation stage.

Data collection techniques in this development research are as follows. (1) Interview; (2) Validation Sheet; (3) Observation; (4) Questionnaire; and (5) Test. The data obtained in this study were analyzed and then used to revise the developed instruments in order to produce appropriate instruments according to the specified criteria. Analysis of each data as follows:

Preliminary Study Data Analysis

In the preliminary study, the data obtained were analyzed using a qualitative descriptive approach in the form of narrative. The data comes from the results of interviews with mathematics teachers at the research location. The results of the interviews were analyzed in order to obtain a description of the conditions of the learning model used by the mathematics teacher at SMP Negeri 32 Makassar.

Validity Data Analysis

Data from the validation results of experts using the Active, Collaborative, Inductive (AKI) cooperative learning model validation sheet developed were analyzed taking into account the assessment, input, comments, and suggestions from the information validator obtained through the validation sheet. The things that were validated were: (1) Model books, (2) Teaching Materials (Modules), (3) Learning Implementation Plans (RPP), (4) Student worksheets (LKPD), (5) questionnaires about the practicality of learning models cooperative.

Activities carried out in the process of analyzing data validity of learning devices developing cooperative learning models are analysis of the results of content validity testing by experts using the Gregory formula in Ruslan (2009: 19), namely in the form of content validation coefficients. The formula used is:

validation coefficients= $\frac{D}{A+B+C+D}$

To determine whether the learning device instrument has an adequate degree of validity, the agreement model is used with the criteria for the assessment results of the two validators having at least "strong relevance". If the results of the content validity coefficient are high ($V > 75\%$), it can be stated that the measurement results are valid. However, if this is not the case, it is necessary to revise it based on the suggestions given by the validator team or by looking back at the aspects that have less value. Furthermore, a re-validation process was carried out on the revised instrument. And so on, so that the results of learning tools for developing a valid cooperative learning model are obtained.

Practicality Data Analysis

The practicality of learning tools for developing cooperative learning models can be seen from the implementation of the model, the teacher's ability to manage learning and the teacher's response to the use of AKI (Active, Collaborative, Inductive)cooperative learning models in the learning process.

The cooperative learning model is said to be practical if the teacher's ability level in implementing the learning model is at least mostly implemented and managing learning at least high and the teacher's response to the use of cooperative learning models in the learning process is positive.

Effectiveness Data Analysis

Analysis of the effectiveness of cooperative learning models is measured from student learning outcomes tests, in this case tests of students' mathematical generalization abilities. The AKI type cooperative learning model developed is said to be effective if students' mathematical generalization abilities are in the classically complete category.

Furthermore, to find out the description of the increase in students' mathematical generalization abilities, it will be reviewed based on the calculation of the normalized gain value. The normalized gain value in this study was obtained by dividing the gain score (the difference between the posttest and pretest) by the difference between the maximum score and the pretest score. The n–Gain formula according to Hake (Nasir, 2016) is as follows.

$$n\text{–}Gain = \frac{posttest\ score - pretest\ score}{maximum\ score - pretest\ score}$$

RESULTS AND DISCUSSION

Description of the Needs of the AKI Cooperative Learning Model in Improving Students' Mathematical Generalization Ability in Junior High Schools

The initial stage in research and development is the phase of needs analysis (need analysis) or commonly known as need assessment. This phase aims to obtain initial information and data about the needs of learning mathematics in junior high schools.Activities in the needs analysis stage begin with curriculum analysis, material analysis, analysis of student characteristics, and assessment analysis.

The results of a preliminary study conducted at UPT SPF SMP Negeri 32 Makassar show that the models and learning tools owned by mathematics teachers have not been fully developed independently. Mathematics books for teachers and students used in the learning process come from the Ministry of Education and Culture. Teachers and students only have these learning resources and also rarely use learning media to help students master or understand the concepts of mathematical material. Even though technological developments in the world of education are increasing rapidly, teachers must also be better prepared in implementing innovative learning media, so that material can be conveyed to students properly. The creative ability of teachers in the world of education is an important requirement, including junior high school mathematics teachers. Therefore, every teacher must be able to carry out a learning innovation. Teachers have a very strategic role in the learning process (Nasrulloh& Ismail, 2018; Sulistiyo, 2020).

The teacher has prepared and has learning tools, but the devices they have have not been updated or are still using examples of devices from the last 5 years. his school. As a result, the learning model applied in class is less varied. The teacher has implemented group or cooperative learning in class, but it is not optimal. This is because students are immediately asked to search, discuss, and present the results of their discussions in class. As a result, students who have high mathematical abilities will tend to solve them quickly and students with low abilities only need to receive discussion reports, so that active group collaboration does not occur. In addition, from the results of interviews with students they stated that they did not understand the concepts they had discussed because at the beginning of the lesson the teacher did not provide guidance on the material. Students are only assigned to search and discuss in their respective homes, so the teacher does not know which students are active in group work. As stated by (Alviyah et al., 2022) in his research that in reality most teachers are focused on the learning process, teachers are only fixated on what is conveyed and very rarely involve students in thinking, reasoning and the process of discovering the concept itself. From the results of this analysis, this indicates that the development of learning models by teachers has not been done much. Therefore, researchers develop a cooperative learning model that can activate students in collaborating, thinking/reasoning, concluding a concept and communicating ideas/opinions between students and students and students and teachers. One of the cooperative learning models developed is the Active, Collaborative, and Inductive cooperative learning model. As the results of research conducted by (Tharayil et al., 2018; Nicol, Owens, Le Coze, MacIntyre, & Eastwood, 2018; Kawuri, Ishafit, &Fayanto, 2019) that active discussion activities in this class are certainly very good for students in learning.

Description of Valid and Practical Cooperative Learning Models

In line with the opinion of Arends (Joyce et al, 2011) states that there are four concepts that describe the implementation of the model, namely: (1) syntax, is a learning sequence which is usually called a phase, (2) social system, namely a system that describes student roles and relationships and the teacher and the necessary norms, (3) the principle of reaction which gives the teacher an idea of how to perceive and respond to what students do; and (4) support systems, namely conditions or requirements for the implementation of a model, such as class settings, instructional systems, learning tools, learning facilities, and learning media. The learning model refers to the approach to be used, including learning objectives, stages in learning activities, learning environment, and classroom management (Wijaya &Arismunandar, 2018). In implementing a learning model, the learning environment created will have both direct (instructional effects) and indirect (nurturant effects) impacts (Joyce et al, 2011). Instructional impacts are learning outcomes that are achieved directly by directing students to the expected goals. Accompaniment effects are other learning outcomes produced by a learning process as a result of creating a learning atmosphere that is experienced directly by students without being directed directly by the teacher.

According to Nieveen (1999) a material is said to be of high quality, if it fulfills the quality aspects including: (1) validity, (2) practicality, (3) effectiveness. Nieveen further states that the validity aspect is associated with two things, namely: (1) whether the developed model is based on strong theoretical rationale, (2) whether there is internal consistency among the model components. The practicality aspect is related to two things, namely: (1) whether the experts and practitioners state that the developed model can be applied, and (2) actually in the field, the developed model can be applied. Meanwhile, the measure states that the model developed is effective associated with two things, namely: (1) experts and practitioners based on their experience state that the model is effective, (2) operationally in the field the model gives results as expected. Therefore, the developed model which contains model components, model books, learning tools and research instruments meets the criteria of validity, practicality, and effectiveness.

The average result of the validity value of the AKI type cooperative learning model and learning tools is 1.00, which means that the AKI type cooperative learning model and its devices meet the requirements as a valid learning model on the grounds that all its constituent components were declared "valid" by the validator team. high validity category. The two validators also stated that the learning tools developed could be used with minor revisions. As stated by Ramadhan et al. (2019) and Kholis et al. (2020) that a product can be proven valid if experts believe that the development product can measure the skills specified in the domain being measured.

The results of this study are also in accordance with the statement that the "valid" category can be given if the product developed is in accordance with the demands of the applicable curriculum, is presented systematically, contains subject matter with clear and directed learning objectives, can support smooth learning and there is a stimulus that can increase user response (Banjaraniet al.: 2020).

Description of the Implementation/Effectiveness of the AKI Type Cooperative Learning Model

The research began with giving pretest questions about mathematical generalization abilities to class VIII UPT SPF SMP Negeri 32 Makassar at the first meeting. After testing descriptive statistics, it can be seen that the average ability of students' mathematical generalizations in the pretest is 59.84.

Once it is known that the class has the initial ability to generalize mathematics then learning continues at the next meeting. Learning in class VIII is adjusted to the RPP (Learning Implementation Plan) that has been prepared previously using the active, collaborative, and inductive (AKI)type of cooperative learning model. During the learning activities, students are exposed to examples or make observations of pictures/objects related to mathematical generalization abilities and students are also required to be active in collaborating with group members in order to achieve common goals. As the results of research conducted by (Tharayil et al., 2018; Nicol, Owens, Le Coze, MacIntyre, & Eastwood, 2018; Kawuri, Ishafit, &Fayanto, 2019) that active discussion activities in this class are certainly very good for students in learning.

The success of mathematical generalization abilities is based on the indicators used. Each phase applied in the model also reflects indicators of students' mathematical generalization abilities. The following are the steps for implementing the active, collaborative, and inductive (AKI)cooperative learning model:

Phase 1. Active

In the active phase, students observe the pictures in accordance with the sub-subject matter/material and identify and mention data one by one from the pictures. In this case, the materials provided are flat side shapes (cubes, blocks, prisms, and pyramids). In accordance with the needs analysis that has been carried out, there have been changes to the concept before and after. So, in carrying out this research, the researcher conveyed the learning objectives of the material at meeting 1, namely students could define their own concepts of flat side shapes (cubes, blocks, prisms, and pyramids), previously students were directly asked to find the surface area and volume of the shape. flat side chamber. Thus, prior to the implementation of this AKI type model, students only received information from one source, namely from a book issued by kemdikbud.

When observing the pictures contained in the LKPD that has been given, each group is asked to actively seek information from any source, either from the prepared learning modules or from the internet. The search for information needed at that time was to identify the characteristics contained in the image by mentioning the characteristics one by one starting from the base, the peak point (if any), and the shape of the sides or other things found by students. Here, the teacher acts as a motivator so that students are actively involved in these learning activities. As with Bruner's theory, a good way of learning is discovery learning, namely learning by means of enactive, iconic, and symbolic presentations. Enactive presentation is through teacher action, an iconic way through a set of images that represent a concept and a symbolic way of using words or language (Hutabarat, 2014).

Phase 2. Collaboration

At the collaboration fhase, students group data into similar categories and label the names of these groupings. In this grouping, students associate previous knowledge with what they have now. Students already know the properties of flat shapes in advance so they can classify flat side shapes into similar categories. This is also in accordance with Ausubel's theory (Dahar, 2011: 94) that the way students relate the material given to existing cognitive structures, namely in the form of facts, concepts, and generalizations that have been learned and remembered by students. Here, the teacher explores the level of understanding of students regarding the observations made and knows the difficulties encountered when looking for information about the characteristics of the image. Also at this stage, students are asked to continue to have discussions with their group mates, and if necessary share the roles and tasks of each group member so that the discussion continues and is in accordance with common goals.

Phase 3. Inductive

The last phase is the inductive phase, students identify patterns that are formed and find general patterns to make generalizations. Students make general conclusions from the observations made in phase 1 and 2. The teacher acts as a facilitator to provide instructions in making generalizations through questions. At this phase, students also conclude the results of their discussions and present them through the visiting-work learning model. After the presentation, students use the results of their generalizations to solve the given mathematical problems.

Then a posttest was held at the last meeting which aimed to find out the achievement of the mathematical generalization abilities of class VIII students of UPT SPF SMP Negeri 32 Makassar after being given treatment using the AKI cooperative learning model. Based on the research results it is known that the average score of students' mathematical generalization ability in the posttest is 79.44. Based on the description of students' mathematical generalization abilities on the posttest results, they have achieved KKM (Minimum Completeness Criteria), namely 70 because students have been able to achieve indicators of these mathematical generalization abilities. Judging from the n-gain test of 0.51 which is in the medium category which indicates that there has been an increase in the mathematical generalization abilities of class VIII UPT SPF SMP Negeri 32 Makassar students.

One of the factors that causes students' mathematical generalization abilities to increase is the application of Active, Collaborative and Inductive (AKI) cooperative learning models. Because the principles contained in the AKI type find their own concepts through an inductive thinking process from a number of observations made collaboratively on flat sided geometric material so that students can understand the material. Learning with the AKI cooperative learning model can train students to be active in learning activities, actively ask questions, express opinions and knowledge they have learned in modules and LKPD. This result is in line with the opinion (Yuni&Fisa, 2020) that whatever the students' opinion when generalizing, this is appreciated by the teacher and perfected with teacher guidance, not blamed but corrected. The importance of generalization ability is that it can help students know how far they understand the material, improve good communication, expand insights so that students are able to make decisions or conclusions quickly and accurately (Rizkiyah&Rahaju, 2018). The results of this study are also supported by the research of Dani et al (2017) which revealed that through the Realistic Mathematics Education approach it has a positive influence in improving students' mathematical generalization abilities because through this model it is customary to give students various kinds of questions related to everyday life and involve students to active in learning with the aim of maintaining student confidence during the learning process.

Based on the results of tests of mathematical generalization abilities both pretest and posttest which show that there is an increase in mathematical generalization abilities so it can be concluded that the application of the AKI type cooperative learning model in learning can improve students' mathematical generalization abilities and meet the criteria for effectiveness. The effectiveness of the AKI type cooperative learning model developed indicates that the goal of developing the model to improve mathematical generalization abilities has been achieved. This is supported by the statement that product development can be said to be effective if the product has produced results that are in accordance with the objectives for which the product is developed (Salam, et. al., 2020). With effectiveness, it can achieve predetermined learning goals (Suniasih, 2019).

The advantage of this type of AKI cooperative learning model is that students have an active opportunity to find concepts inductively so that students are involved in thinking and understanding concepts together (groups). When compared with other cooperative learning models, this type is more specific towards a generalization. At the beginning of learning, the teacher does not explain or explain this subject, instead it is the students who have to learn independently and construct their knowledge of the material. This learning model emphasizes collaborative so that each member of the group must participate in carrying out their duties and responsibilities. Each phase in this model also has more active students both in thinking, collaborating, presenting their thoughts (presentations), and making general conclusions.

CONCLUSIONS

Based on the results of the analysis and discussion of the research that has been put forward, it can be concluded that several main points related to the development of Active, Collaborative, and Inductive cooperative learning models in improving the mathematical generalization abilities of junior high school students are as follows:

1. The needs of junior high school teachers and students whose information through interviews and document analysis found that both teachers and students really need the development of learning models that can improve students' mathematical generalization abilities.
2. The initial design of the cooperative learning model to improve the mathematical generalization ability of junior high school students consists of: (a) an introduction that contains the rationale of the model and supporting theories of the model, (b) a model component that includes syntax, social systems, reaction principles, support systems, and instructional impacts and accompanying impacts, and (c) instructions for using the model.

3. Active, Collaborative, and Inductive cooperative learning models in improving the mathematical generalization abilities of junior high school students are supported by learning tools and are declared valid, practical, and effective.

SUGGESTIONS

Based on the research conclusions, the researcher has several suggestions that can be implemented, including:

1. The Active, Collaborative and Inductive cooperative learning models developed in this study are applied to mathematics subjects. However, future researchers can apply this learning model to other subjects.
2. The Active, Collaborative and Inductive cooperative learning models developed in their implementation are able to improve students' mathematical generalization abilities, therefore it is expected that teachers can apply them to a wider range of material.

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