ISSN No:-2456-2165

Development of Science Learning Materials With Cooperative Learning of Group Investigation Model To Improve High Order Thinking Skill of Junior High School Students

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Abstract:- The purposes of this research to produce learning materials by using Cooperative Learning Model Group Investigation Type that valid, effective, and practical to improve high order thinking skills of junior high school students. The study was conducted in two phases, the development stage of learning materials adapted to the 4-D model and the classroom implementation stage with 38 students by using the one-group pretest-posttest design. Data analysis result are: (1) Validity of learning materials based on: (a) Validation of the materials have very good category, (b) Readability of handout and worksheet are easy for students to understand; (2) Efectiveness of learning materials based on: (a) The response of students are very strong, (b) High order thinking skills of students improvment with high category of N-Gain; (3) The practical of learning materials based on: (a) Feasibility of instructions have very good category, (b) Students activities have active category, (c) Constraint of learning can be overcome. The conclusion of this research that development of learning materials by using Cooperative Learning Model Group Investigation Type are eligible to improve high order thinking skills of junior high school students.

Keywords:- *Learning Materials, Group Investigation, High Order Thinking Skills.*

I. INTRODUCTION

High order thinking skills are needed when a person faces a complex and confusing situation, so that it requires rearrangement of new facts and the facts have been stored in your memory, then connected and expanded to find answers (Tran Vui, 2001). This high order thinking ability is needed to deal with problems in the complex and overlappingof 21st century.

The Developments in the 21st century are largely determined by knowledge and service, in contrast, the 20th century, the further knowledge develops with industry and technology. You can say that the development was caused by the development of computer and technology. By the development of computer technology, the development of science and technology later became a period of science that became a feature of the 21st century knowledge. Science and technology are interrelated to develop the education climate and communication awareness of the world community, so that the education is challenged to be able to create an educational order that can creat high order thinking students and also trained resources to use the power of their arguments rather than conventional physical strength. Education is expected to be able to creat high quality of human who are creative, independent and critical, in line with the goals of national education, that is to creat potential students whho are able to develop into good human who believe and fear the Almighty of God, and they are noble, healthy, knowledgeable, capable, creative, independent, and become a democratic and responsible (Permendikbud No. 54 of 2013).

According to Bloom's taxonomy in the cognitive side is divided into three parts, including the low order thinking or lower-order thinking skills, that is remembering, understanding, and applying. And the other three parts are included in the intellectual division of higher-order thinking or higher-order thingking skills, that is analyzing, evaluating and creating (Anderson & Krathwohl, 2001). Thomas and Thorne (2005) state that students' thinking abilities can be stimulated by creating a conducive learning atmosphere so that according to him the ability or skill is a process that can be trained.

The development stage of junior high school students who are between the ages of 12-15 years is at the stage of the Formal Operational development. This is in accordance with the theory of cognitive development proposed by Piaget (in Suparno, 2001) that the stage of formal operational cognitive development begins in the teens. Development at this stage has the main characteristic which children have been able to think abstractly and logically. At these ages, intellectual thinking of students who are developing that is the ability to think by using symbols and begin to be able to understand something meaningfully even without the use of actual objects or images (Slavin, 2006).

High order thinking skills really need to be improve to prepare the students for the 21st century. According to Kang, Kim, Kim & You (2012) the ability / proficiency framework of the 21st century is in the scope of cognitive, affective, and social culture. The cognitive scope is divided

into sub-scopes: the ability in managing data / information which is the ability to use tools, resources and the ability of inquiry through the discovery process; the ability in designing knowledge by processing data obtained, expressing arguments, and thinking critically; the ability of using data / information through an analytical process, evaluating, and solving some problems; and the ability in solving problems by using metacognitive abilities and creative thinking.

Some facts that happen stated that Indonesian students still have high level of thinking ability which is relatively in low level. The ability of memorizing which is the lowest cognitive level, in learning science and mathematics still dominates in student achievement. The Trends test results of the International Mathematics and Science Study (TIMSS), which contained contextual questions and needed mathematical reasoning, in 2011 showed that in the field of science, Indonesia was ranked in 40th with a score of 406 from 42 countries whose 8th grade students take this test (Martin, 2013). This Indonesian science test score dropped 21 points and compared to 2007 TIMSS. These results indicated that Indonesian students are less able to solve problem which require reasoning abilities.

TIMMS 2011 Science results also shows that Indonesian students are very good at memorizing information. At this lowest level of cognitive level, for example, when there are questions about the chemical formula of water, Indonesian students can answer easily and even defeat students from several developed countries. But when there are questions about how to know whether a substance is metal or not, Indonesian students are less able to answer correctly. In answering questions that require reasoning and information processing and disclosure of arguments, Indonesian students tend to fail. This failure indicates that the learning process focuses more on the ability to have a low level of learning, and tends to ignore the ability to think high.

The previous studies conducted by some researchers at 27 state junior high schoo Surabaya, high order thinking skills of students have not shown satisfactory in the results. Some questions with indicators of high-order thinking ability have been given, the highest score achieved by students is not more than 60, this shows that many students have not been able to solve the problem that require high order thinking skills.

Based on the results of the Science teacher group discussion (MGMP) observations in the school, it was revealed that the most students find that it is difficult to be invited to think with a high order thinking ability, when applied learning models which demand to these abilities independently, they often do not work well. Referring to these conditions, the teacher prioritizes the provision of science subject by memorizing rather than developing students to think in higher order thinking.

The learning process can facilitate the development of high order thinking skills and cannot be done by using a teacher-centered learning process, because the role of students will be limited, and the students' high order thinking skills can not improve their thinking towards teaching materials. Some learning models have the potential to empower highorder thinking skills are authentic instruction, inquiry-based learning, problem-based learning, learning which encourages students to monitor and directly do their own learning (self regulated learning), and cooperative learning (Corebima, 2010).

According to Aunurrahman (2009), the cooperative learning model of group investigation is often used with several conditions, including if the teacher intends to develop research skills, and if the teacher wants to improve students' thinking skills. According to Zingaro (2008) the use of group investigation learning models on students can actually improve students' ability to answer high order questions that require the ability to solve a problem.

Critical thinking and creative thinking are included in the indicators of high order thinking and several studies have been carried out to develop a learning process that trains of two thinking skills. One of the things that Barbara Limbach did is that there are five steps to creating a learning environment where students has a role as an active student who can enhance students' high order thinking skills. These steps are 1. Determineg Learning Objectives, 2. Teaching through asking, 3. Practice before conducting an assessment, 4. Review, Refine, and Improve, 5. Holding Feedback and Assessment in Learning (Limbach & Waugh, 2006). Some steps in Barbara Limbach's research, that is teaching through asking and holding feedback and assessment in learning, are also applied at the investigation and evaluation stages in the cooperative learning model of group investigation.

Ramirez and Ganaden in their research revealed that creative activities during the learning process can improve students' high-order thinking skills. The learning strategy uses creative activities and carried out by Ramirez and Ganaden in his research, among others, many questions in the form of who, what, where, when, how, what if, and why (Ramirez & Ganaden, 2008). This question- strategy was also developed in the group-investigation of cooperative learning model when students carry out the investigation phase for their chosen topic.

According to Zohar and Dori (2003) who conducted four studies with several different learning strategies found that students, both those with high order thinking abilities and low order thinking students, could be accustomed to using high-level thinking skills during the learning process. One of the strategies used by Zohar and Dori is the TSC method (Teaching in Science Classrooms) which consists of learning activities through experiments / experiments, invitations to Invitition to Inqury, and critical thinking assessments of snippets of newspaper news (Zohar & Dori, 2003). Invitational learning activities through investigations in the Zohar and Dori studies were also

conducted in the cooperative learning model of the group investigation at the investigation stage.

Some of research that has been done above all states that high order thinking skills can be trained during the learning process so that it can improve students' high order thinking skills. Some of the steps in the learning process in these studies are also found in the cooperative model of group investigation. Then a device development is needed by using cooperative learning models of group investigations that can improve students' high order thinking skills. According to Sumarmi (2012) the cooperative learning model of group investigation is cooperative learning which consists of several small groups, students use group investigations (planning and group discussion) then present their findings in class. The ability of students who are good at communication skills and group process skills is needed for learning models like this (Nurhadi, et al., 2004).

Students are guided to be able to define problems, explore various problems, collect relevant data, develop and test hypotheses during the learning process using cooperative models of group investigation. This learning model familiarizes students to build the ability to think independently and critically and provide opportunities for students to develop abilities in groups to solve a problem. According to Slavin (2010) the steps in applying the group investigation learning model are as follows: 1) the topic grouping and selection stage, 2) the planning stage, 3) the investigation phase, 4) the organizing stage, 5) the presentation stage, and 6) evaluation. Students' critical thinking skills take precedence in each step of the learning model.

Cooperative learning type group investigation models have several advantages compared to other cooperative learning models, the benefits according to Sharan (in Sumarmi, 2012), those are: 1) students who participate in cooperative learning models group investigation are more often involved in discussion and contribute in certain ideas, 2) students of speaking skills and collaboration can be observed, 3) students can learn how to work together more effectively, so that they can improve their social interactions, 4) encourage students to hanve an active role, so that the knowledge can be transferred to the outside classroom, 5) freeing the teacher to be more informal, 6) it can improve students' abilities and learning outcomes.

According to Sumarmi (2012) the disadvantages of cooperative learning models of group investigations are: 1) not supported by the results of studies specifically discussing this group investigation, 2) group assignments often involving capable students, 3) sometimes requiring situation settings and different conditions, different types of material, and different teaching styles, 4) class conditions do not always provide a good physical environment for the group, and 5) the success of the cooperative learning model of group investigation depends on the ability of students to lead groups or work independently.

Some learning devices that have been developed to discuss many ways to train critical thinking skills of the students, and there are still not many development tools which discuss in three levels of high order thinking skills, such as the leaning device developed by Irfa Rochimah Alfi using 5E learning cycle learning with PBMP strategy (Thinking Empowerment Through Questions) (Alfi, 2012). Rahymawati also developed learning tools that train students' critical thinking skills using guided discovery learning methods (Rahymawati, 2012). The teacher book published by the Ministry of Education and Culture provided several alternative learning models for science that can be used by teachers in the classroom, that is Inquiry Based Learning models, Problem Based Learning learning, Project Based Learning and Learning Cycles. In this study the learning devices developed were oriented towards the high order thinking abilities of students, so the reseach question of this research is "How is the feasibility of learning devices developed to improve the high order thinking skills of junior high students by using cooperative learning models of group investigations?"

II. METHOD

The subjects of the study were 8th grade students of 27 state junior high school students in academic year 2016/2017 who participated in science learning with Newton Law material for 3 meetings and on the next day as the pretest-posttest, and it were held in October 2016.

The procedure of this study was divided into two stage; the first stage of development of learning devices and the second stage is the stage of application of classroom learning devices. The implementation phase in the class used the One Group Pretest-Posttest, which is described as follows:

O1 X O2

Information:

O1: Preliminary test to determine students' prior knowledge before treatment.

X : teaching learning process used development leaning devices.

O2: Final test to find out student learning outcomes, cognitive, affective and psychomotor after giving treatment

A. The research instrument used consists of:

1. Validation Sheet used to assess the feasibility of productive Chemistry learning devices that have been developed. This validation sheet is given to expert lecturers in their fields. This validation sheet is in the form of lesson plan validation sheets, student's worksheet and handouts.
2. Students worsheet Level Test Sheet and Handout, given to students who are asked to complete certain words that omitted to evaluate the readability of the device by students in reading and understanding the content / material in handouts and worksheets.
3. The Observation Sheet for the Implementation of the Teaching and Learning Process is used to collect data

about the implementation of the stages of learning through the direct learning model as stated in the lesson plan. Filling out the observation sheet is done by giving a check mark (√) in the column that corresponds to the stages of learning carried out by the teacher, and giving the score and range of 1-4.

4. Student Activity Observation Sheet, used to observe student activities while applying chemical learning productive using developed learning tools.
5. The Higher Order Thinking Ability Test Sheet made in multiple choice forms accompanied by reasons for answer choices. This test was developed by researchers with reference to Bloom's revised taxonomy of high-level thinking ability indicators.
6. Observation Sheet Obstacles in teaching and learning process, in the form of obstacles found during teaching learning process and alternative solutions used to overcome these obstacles. This instrument is filled by observers
7. Student Questionnaire Response used to find out the opinions of students on learning devices used in learning activities.

B. Data Analysis Technique

This technique describes the activities of teachers and students during the learning process takes place based on the cooperative learning model of group investigation in this study as follows:

1. Validation of chemistry learning productive tools oriented to science are carried out by reviewers to get input, improve the device, and produce learning devices that are worth testing.
2. Observation is used for two things, (1) obtaining and measuring data about activities and a set of students' knowledge and skills for the entire activities to be measured in the research, (2) observing the implementation of learning in accordance with the stages designed by the teacher in the implementation of lesson plan, (3) obtaining information about obstacles during teaching and learning.
3. Giving test is created in essay form or description. This test was developed by researchers with reference to cognitive, psychomotor and affective indicators. The initial test (pretest) is given before learning begins, while the final test (posttest) is given after the learning is carried out.
4. The questionnaire is used to obtain data on the level of readability of student responses. Questionnaire readability is given before handouts are applied in teaching learning process, while student response questionnaires are given after the learning process finish.

C. Analyzing of data

This technique describes the activities of teachers and students during the learning process takes place based on the cooperative learning model of group investigation in this study as follows:

1. Validity of lesson plan devices

The data analysis of the learning device was carried out in a quantitative descriptive, by averaging the scores of each component given by the validator. The results of the average score can be described as follows:

Interval average score	category	information
1,0 < score ≤ 1,75	Invalid	Cannot be used and still need consultation
1,75 < skor ≤ 2,50	Less Valid	Can be used with many revisions.
2,50 < skor ≤ 3,25	Valid	Can be used with a slight revision
3,25 < skor ≤ 4,00	very Valid	Can be used without revision

Table 1:- Description of validation score (Ratumanan dan Laurens, 2011)

The instrument's reliability is determined by the assessment of two validators with a real-time level and calculated by using the Percentage of *Agreement formula*:

$$R = \left(1 - \frac{A-B}{A+B}\right) \quad \text{..... (1)}$$

Information:
R = Reliability Level
A = the high score from validator
B = the low score from validator

2. The Readability Analysis of Handouts and students' worksheet level

The Readability Analysis of Handouts and students' worksheet level was analyzed qualitatively. The percentage of the readability of handouts and students' worksheet is calculated using the following formula.

$$P = \frac{jumlah\,jawaban\,benar}{jumlah\,seluruh\,jawaban} \times 100\% \quad \text{.....(2)}$$

The percentage of readability level is converted according to the criteria in table 2 below.

Procentage	criteria
P < 40%	Difficult to be understood
40% ≤ P < 60%	Instructional
P ≥ 60%	Independent

Table 2:- The criteria of readability level of handout and students' worksheet (Earl F Rankin dan Joseph W Culhane dalam Ahmad dan Yeti, 1996)

3. Analysis of lesson plan implementation

Observation of the implementation lesson plan implementation was carried out by two observers by giving a check mark (√) on the observation sheet for lesson plans, with provisions (1: bad, 2: good enough, 3: good, and 4: very good). The observer's assessment results are used to determine the accuracy of learning with the following formula

$$P = \frac{\Sigma A}{\Sigma N}\ x\ 100\% \text{.....} (3)$$

Information:
P = lesson plan implementation prcentages
ΣA = the number of implemented aspect
ΣN = the number of observed aspect

The quality of the implementation of learning is determined by calculating the average rating of observers with the criteria in table 3.

Interval of average score	Information
1,0 < skor ≤ 1,75	bad
1,75 < skor ≤ 2,50	Good enough
2,50 < skor ≤ 3,25	good
3,25 < skor ≤ 4,00	Very good

Table 3:- The criteria of implemented lesson plan
(adapted from Ratumanan dan Laurens, 2011)

The reliability of the instrument is determined by the assessment of two observers with a reliability calculated by using the Percentage of Agreement formula:

$$R = \left(1 - \frac{\text{A}-\text{B}}{\text{A}+\text{B}}\right) \text{.....} (4)$$

Information:
R = Reliability Level
A = the high score from validator
B = the low score from validator

4. Analysis of Student Observation Activities in the Class

The results of observations on student activities were analyzed qualitatively. Student activity is observed by two observers every 5 minutes during learning by giving a sign according to the activity category. The formula used to calculate the percentage of student activities is as follows:

$$\text{P} = \frac{\Sigma R}{\Sigma N} \text{ x } 100\% \text{ .....} (5)$$

P = lesson plan implementation prcentages
ΣA = the number of implemented aspect
ΣN = the number of observed aspect

The criteria for determining the percentage of student activity are in table 4.

Interval Score	information
P ≤ 20%	Very bad
20 % < P ≤ 40 %	bad
40 % < P ≤ 60 %	enough
60 % < P ≤ 80 %	good
P > 80 %	Very good

Table 4:- Student activity criteria
(adapted from dari Ratumanan dan Laurens, 2011)

The instrument's reliability is determined by the assessment of two observers with a real-time level calculated using the Percentage of Agreement formula:

$$R = \left(1 - \frac{\text{A}-\text{B}}{\text{A}+\text{B}}\right) \text{.....} (6)$$

Information:
R = Reliability Level
A = the high score from validator
B = the low score from validator

5. Analysis of Students' High order Thinking Tests

Assessment of students' high-level thinking skills was obtained from tests of high-level thinking skills of students. Each test item is assessed by a scoring method based on a predetermined indicator. Students are said to have high-level thinking skills if the results of the test scores are high-level thinking skills ≥ minimum completeness criteria (KKM) that have been determined for each indicator. Overall, the total of each indicator, the KKM value on the subject of Newton's Law is 75, so the predicate of its ability is described in Table 5.

Interval score	Predicate	Description
100 – 91	A	Very good
90 – 83	B	good
82 – 75	C	enough
< 75	D	bad

Table 5:- Range of KBTT Test score

Testing the effectiveness of learning with a cooperative model of type of group investigation in improving high-level thinking skills is used a normalized gain formula (Wiyanto, 2008) as follows:

$$N - Gain = \frac{\langle S_{post}\rangle - \langle S_{pre}\rangle}{100 - \langle S_{pre}\rangle} \text{.....} (7)$$

$\langle S_{post}\rangle$and $\langle S_{pre}\rangle$ symbol stated the average score of *pre-test* dan *post–test* every individual. The big factor of *N-Gain* categorized in the table 6.

Interval Score	category
> 0,70	high
0,30 - 0,70	medium
0,30	low

Table 6:- criteria of students' *N-Gain*

To find out the differences in high-level thinking skills of students before and after learning cooperative model learning group investigations using the t-test, using the formula:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sum b^2}{N(N-1)}}} \text{.....} (8)$$

Information:
t = index of difference standard mean pretest and posttest score

$\bar{X}_1$ = mean skor *pre-test*
$\bar{X}_2$ = mean skor *post-test*
□b² = the number of deviation from the mean difference
N = the number of subject (Hadi, 2000)

There are significant differences (tcount> t table) where the post-test results are higher than the value of the pre-test results, the cooperative learning model of group investigation has proven effective to improve students' high-level thinking skills.

6. Analysis of Obstacle teaching learning process

The problems were analyzed by descriptive narrative, that is the observer and the researcher provided notes about the obstacles that occurred throughout the teaching and learning activities.

III. RESULT AN DISCUSSION

A. Validity of Lesson Plan

The results of the evaluation of the RPP learning device arranged have very good categories so that it can be used without revision with scores obtained for each section between 3.56 - 3.88 with a reliability of 97.4%, then the RPP learning device can be applied in the learning process.

B. Validity of student handouts

The results of the validity assessment The student handouts have categories both in one aspect and are very good in several aspects, and can be used without revisions with the scores obtained between 3.53 - 3.88 with 99.2% reliability, so that the Handout can be used in learning process.

C. Students worksheet Validity

The results of the validity assessment of Student Activity Sheets in general have compiled a very good category so that it can be used without revision, the score obtained between 3.67 - 3.88 each aspect, with reliability of 99.2%. The aspects assessed from the LKS include LKS format, content and language feasibility. Suggestions from the validator are to be equipped with the purpose of the experiment and to add to the indicators that are in the lesson plan, namely formulating conclusions. LKS has been improved according to the validator's suggestion (table 4.6), so that the LKS learning device can be used in the learning process.

D. The high order thinking validation test

The conclusion of the validation test for high-level thinking skills is valid category without revision, can be understood and can be used (feasible). Some questions developed can be used after a small revision in the writing answer. Two questions are suggested by the validator to be revised by changing the description of the answer choices with pictures / graphs to better test students' high-level thinking skills.

The type of questions developed are 30 multiple choice questions that have been selected with difficulty level categories 0.3 - 0.7. High-level thinking ability tests are used to measure students' high-level thinking skills. This test is given twice, before and after learning.

E. Students response

Student responses showed that 38 students during the cooperative learning model of the group investigation type in general stated that they were pleased with the components of the learning device which were 85.71% and those who expressed dislike is 14.29%. The results of students' responses stating the new thing about cooperative learning model group investigation type was 83.83% and the one that stated was not new was 14.29%. Handouts and LKS in this study were considered attractive by 86.32% of students and did not appeal to 11.68% of students. In terms of teacher explanations and guidance on cooperative learning learning this type of group investigation 90.70% of students consider it easy and only 9.21% consider it difficult. So that 86.84% of students expressed interest in participating in the cooperative model learning group type investigation for subsequent topics and only 15.79% of students were not interested in following this type of learning.

F. The implementation of lesson plan

The average value of RPP implementation in this study was conducted by two observers indicating that in general the implementation of lesson plans had a very good category with an average of 3.86 (Ratumanan & Laurens, 2006). The average reliability of RPP class VIII-B implementation is 97.84%, meaning that the implementation of RPP in learning is categorized as good because the reliability value is ≥ 75% (Borich, 1994) so that it can be used in the learning process. The implementation of science learning using learning tools cooperative model group investigation type can be categorized very well.

G. The obstacle of teaching learning process

Observations made during the learning process by two observers provide several obstacles that occur and then find alternative solutions as shown in table 4.18 page 96, including: 1) limited time in implementing CBC more due to the beginning of the teacher meeting a little difficulty in arranging students to follow the cooperative learning model of the type of group investigation that has just been applied in the classroom, so that the alternative solution is to pay more attention to the time allocation for each activity; 2) students are free to choose one of the two topics provided to make the number of students choose one topic and the other become less balanced, alternative solutions so that students do not choose more on one topic then the teacher should direct students in selecting topics so they can be balanced with availability investigative tools and materials; 3) students have difficulty in arranging lab tools and materials written on the worksheet, so the solution is the teacher provides guidance and explanation in understanding the instructions written on the worksheet; 4) Students have difficulty in answering analysis questions on students worksheet because students are not accustomed to

facing questions that require high-level thinking skills so the solution needed is the teacher to provide guidance to students to better understand the questions on the students worksheet and direct students to use handouts as a reference; 5) Many students who are not confident when asked by the teacher to deliver their work in front of the class so that the solution is to motivate students to be brave to appear in front without worrying wrong with their opinions.

These five constraints that are considered by observers are rather disturbing but do not have too much impact on the smooth learning process. It's just that in the first meeting the learning time becomes less in accordance with the planned time allocation.

Learning with this model requires active students to investigate the topic using the equipment provided so that the class looks rather crowded and a little chaotic, especially when students are asked to group according to the topic chosen, but overall these obstacles can be overcome and do not make the learning process.

H. Students activity

Student activities during the learning process are observed by two observers who are in the class. Student activities observed at each meeting include listening / paying attention to the teacher's explanation; submit, answer, and respond to questions from the teacher; cooperate in practical stages; discuss between students / teachers; understand and resolve questions in the students' worksheet; writing relevant to teaching learning process; involve yourself in groups to practice high-level thinking skills (analyzing, evaluating, creating).

Based on observations of student activities in the learning process from meetings 1 to 3, in the activity of listening to the teacher's explanation, collaborating in practical stages, discussing between students /teachers, understanding and solving questions in the students worsheet, involving themselves in groups to practice level thinking skills high (analyzing, evaluating, creating) tends to increase. While the activities of submitting, answering, and responding to questions from teachers and writing activities relevant to teaching learning process tended to decrease because at meetings 2 and 3 students had begun to adjust to the cooperative learning model type of group investigation so that their activities shifted to other activities. This is consistent with the research conducted by Rikcy Almeda (2017), that the stages in the cooperative learning model of the type of group investigation starting from the beginning to the end stimulate students' curiosity from the selection of topics to investigation of the chosen topic, so that at the second and third meetings of student activities involve themselves more in groups.

In line with the results of the study of Siti Zubaidah (2017) that the cooperative learning model of this type of group investigation places more emphasis on student participation especially when determining topics, investigating problems, analyzing data, and presenting the results of discussions.

IV. CONCLUSION

Based on the findings and discussion it can be concluded that the development of cooperative learning model tools in group investigation type fulfills the elements of validity, effectiveness, and practicality to improve the high-level thinking skills of junior high school students.

V. SUGGESTIONS

1. Learning devices of the creative model in group investigation can improve the high-level thinking skills of junior high school students so that they need to be applied in schools.
2. Preparation and management time need to be considered, because in using the cooperative learning model the type of group investigation to improve higher-order thinking need time in the selection and division of topics so that it is balanced to adjust to the available equipment.
3. Students are accustomed and motivated to be more confident and brave when presenting the results of the discussion in front of their classmates.

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