IMPLEMENTATION OF GROUP INVESTIGATION LEARNING MODEL TO IMPROVE PROBLEM SOLVING ABILITY IN CLASS VIII SMP NEGERI 11 MEDAN

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ABSTRACT

The purpose of this study was to: 1) Repairing the learning process by using the group investigation learning model to improve the problem solving ability. 2) To know the big of the improvement of students' problem solving ability using Group Investigation learning model. 3) To know the process of students' answer in improving the problem solving ability. Type of this research is the Classroom Action Research (CAR). This research was conducted at SMP Negeri 11Medan academic year 2014/2015. The population of this research was all students at SMP Negeri 11 Medan in grade VIII-7. This study consisted of two cycles, the first cycle consists of two meetings and the second cycle consists of two meetings. The results of this study could be seen: (1) The process of implementation problem based learning was running well because the observation of implementation based teacher side is good category and student side is active category. (2) The improvement of problem solving ability of students by the implementation of group investigation learning model belongs to high category with the normalized gain value is 0.83 where the average of problem solving ability of students in cycle I is 48.16 and in cycle II the average is improved become 91.02. (3) The process of students' answer is improve from the cycle 1 to cycle II. There are 80% of students to meet the minimum completeness criteria after learning activities using group investigation learning model in small study groups.

Keywords: Problem Solving Ability, Group Investigation

ABSTRAK

Tujuan penelitian ini adalah: 1) Untuk memperbaiki proses pembelajaran dengan menggunaka model pembelajaran group investigasi untuk meningkatkan kemampuan pemecahan masalah. 2) Untuk mengetahui seberapa besar peningkatan kemampuan pemecahan masalah dengan menggunakan model pembelajaran group investigasi. 3) Untuk mengetahui proses jawaban siswa dalam peningkatan kemampuan pemecahan masalah. Tipe penelitian ini adalah penelitian Tindakan Kelas (PTK). Penelitian ini dilaksanakan di SMP Negeri 11 Medan tahun ajaran 2014/2015. Populasi dalam penelitian ini adalah semua siswa di SMP Negeri 11 Medan di kelas VIII-7. Penelitian ini dilakukan sebanyak dua siklus, siklus pertama terdiri dari dua pertemuan, dan siklus kedua dilakukan sebanyak dua pertemuan. Hasil penelitian ini dapat dilikat sebagai berikut: (1) proses penerapan model pembelajaran group investigasi berlangsung dengan baik karena observasi yang dilakukan dari sisi guru dikategorikan baik dan dari sisi siswa diaktegorikan aktif. (2) Peningkatan kemampuan pemecahan masalah siswa dengan menggunakan model pembelajaran group investigasi dikategorikan tinggi dengan normalisasi gain 0.83 dimana rata-rata kemampuan pemecahan masalah siswa pada siklus 1 48.16 dan siklus II 91.02. (3) Proses jawaban siswa meningkat dari siklus I ke siklus II. Ada lebih dari 80% siswa melewati nilai ketuntasan setelah menggunakan model pembelajaran group investigasi dalam kelompok kecil.

Keywords: Kemampuan Pemecahan Masalah, Grup Investigasi

INTRODUCTION

Mathematics is a study that be the basic of science and technology that is very important in every aspect of human life. Therefore, mathematics is very important to teach in every level of education such as SD, SMP, SMA and university. Beside of that mathematics is mother of all science, so mathematics is very important to teach. Cokrof (in Abdurrahman in Nasution, 2014:1) said that:

Matematika perlu di ajarkan kepada siswa karena (1) selalu digunakan dalam segi kehidupan; (2) semua bidang studi memerlukan keterampilan matematika yang sesuai; (3) merupakan sarana komunikasi yang kuat, singkat dan jelas; (4) dapat digunakan untuk menyajikan informasi dalam berbagai cara; (5) meningkatkan kemampuan berpikir logis, ketelitian, dan kesadaran keuangan; dan (6) memberikan kepuasan terhadap usaha memcahkan masalah yang menantang.

Beside that statement above, Cornelius (in Abdurrahman in Nasution, 2014:1) also said that:

Lima alasan perlunya belajar matematika karena matematika merupakan (1) sarana berpikir yang jelas dan logis; (2) sarana untuk memcahkan masalah kehidupan sehari-hari; (3) sarana mengenal pola-pola hubungan dan generalisasi pengalaman; (4) sarana untuk mengembangkan kreativitas; dan (5) sarana untuk meningkatkan kesadaran terhadap perkembangan budaya.

Because mathematics is very important to learn, so mathematics is considered as the main lesson in education, so time lesson for mathematics is much than the other lesson. Even though mathematics lesson is very important to teach in school but many students have many problems in study mathematics in school. This problem is because of student assumed that mathematics is a lesson that very difficult to be studied and mathematics is not interested to be studied.

The importance of mathematical problem solving also be said by Barca (in Sumarno in Wahyuni, 2013: 4) are: (1) problem solving ability is the main purpose in study mathematics; (2) problem solving consist of method, procedure, and strategy was a main process in curriculum of mathematics; and (3) problem solving is a basic ability in study mathematics.

There some factors that caused the students have assume that mathematics is difficult and not interested to be studied, one of the problem is students have less problem solving ability in mathematics. There some competences that hoped be able to reach by students in study mathematics in every level of education such as SD, SMP until SMA. Depdiknas (in Wahyuni, 2013: 3), he said that the competence that be hoped can be reached by students are:

1. Showed the understanding mathematical concept that be studied, explained the relation between concept widely, accurately, efficiency, and right in problem solving.
2. Have the ability to communicate the idea using symbols, tables, graphs or diagrams in explaining the problem.
3. Using reasoning in pattern, characteristics or do manipulate mathematics in make generalization, arranging the fact or explaining idea and mathematics statement.
4. Showing the strategy ability in making (formulating) the model of mathematics in problem solving.
5. Having the respect in used mathematics in daily life.

Based on the competences that be hoped by Depdiknas, problem solving ability must be have by students in study mathematics in school. Because of problem solving ability was very important to have by students. The importance of mathematical problem solving also be said by Barca (in Sumarno in Wahyuni, 2013: 4) are: (1) problem solving ability is the main

purpose in study mathematics; (2) problem solving consist of method, procedure, and strategy was a main process in curriculum of mathematics; and (3) problem solving is a basic ability in study mathematics.

Based on initial observation that be done by the observer that have the purpose to know the mathematical problem solving of students in class IX-9 by giving four question of four problems about cubes and beams. In observation, students do the exercise by individually to know their ability to solve the problems. The observation shows that the mathematical problem solving of the students still low.
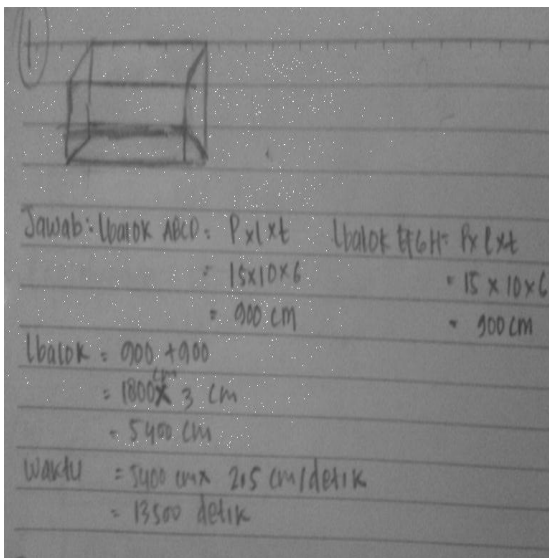
Figure 1 Sample of Student's Sheet Answer Number 1

Based on picture 1.1, we can know that the students can't understand what the asked in that question. Student doesn't make the known and the asked from the problem above.

In the next question, student also has the mistake in doing the problem solving process to answer the question.
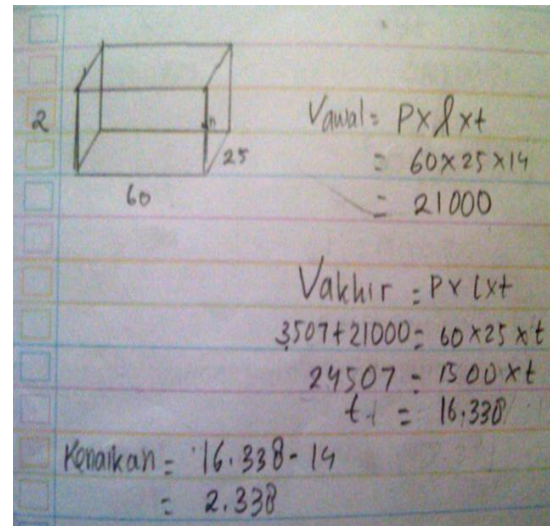
Figure 2 Sample of Student's Sheet Answer Number 2

Based on picture 1.2, the students still can't understand what was asked in the problem above. The student still doesn't make the known and the asked in the process of problem solving.

In the third question, student also makes the mistake in process of problem solving in that question.
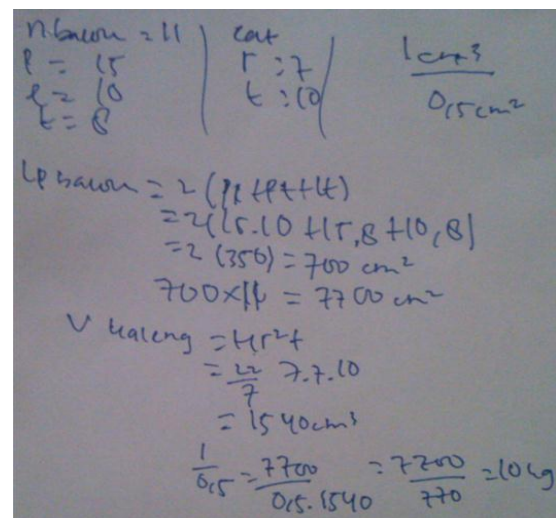
Figure 3 Sample of Student's Sheet Answer Number 3

Based on pictured 1.3, the student still can't understand what that asked in the problem above, the student still not make the known and the asked from the problem above.

In the fourth question in observation, the students still have many mistakes in process of problem solving to answer the question.

Figure 4 Sample of Student's Sheet Answer Number 4

Based on picture 1.4, the students still not understand what is asked in the problem above. The student still doesn't make the known and asked from the problem above.

The student almost be understand the problem from the question above and the way to get the solution from the question above although they don't use the right of mathematics model to solve the problem. However, the student can't be interpreted correctly to get the answer correctly because they don't know the position of P, so they don't use the Pythagorean theorem to find the distance of lizard and mosquito. So in the last problem, the student can't know to find the correct comparison to solve the problem above because they don't understand the problem or they don't have many time to answering the problem above.

Based on the explanation above, that problem showed that the problem solving ability have some indicators, they are: (1) understanding the problem with written the known and the asked in that problem, (2) finding the plan by written the formula that used to solve the problem, (3)

solving the problem based on the formula that has been planned, (4) correcting back the result that get from that solution. Based on that analyzed about the average of problem solving ability students' are still low. No one of the student get score 80 in the test, but some student that get score of 60-75 is 6 students from 42 students, and they almost completed in process of problem solving, and the approximation of 6 students are 14.29% because 85.71% from the students uncompleted in answering the problem

Based on the result of observation and interview that be done by researcher to the one of the mathematics teacher in SMP Negeri 11 Medan, she is Mrs. Adelina Hartati S.Pd, known that the student still have many difficult in solving the problem in mathematical problem. That is caused of the student still have difficulties to understand the problem that was be asked in the problem especially to know what they asked and they known in that problem, so the students still were very difficult to solve the problem.

The students' difficulty which was found is in the problem of understanding, drawing diagrams, reading the charts correctly, conceptual formal mathematical understanding, and mathematical problem solving. The appropriate problem representation is the basic way in order to understand the problem itself and make a plan to solve it. (Surya, et al, 2013).

Based on the facts above, so one of the method that can be used to solve that problem is cooperative learning method type Group Investigation (GI). Group investigation is a cooperative learning method in which students from groups based on their interest in a particular topic for in-depth study and investigation (Ellis and Stuen 1998:84).

Group Investigation is learning model group by make the planning, finding and solving the problem in discussing group so they get the purpose of learning that had formulated (Yumisnaini, 2012:3). Beside of that Trianto (in Yumisnaini, 2012:4) also give the opinion about group

investigation, group investigation is the method of learning that involved the student from the planning, finding the topic or ways to learn in investigation. This learning model uses the student to have the good ability in communication or in group process skills.

In implementing the Group Investigation learning model, the teacher divided the students be some groups that consists 5-6 students that heterogeneous in every group. The implementation of group investigation learning model, have four steps, they are: (1) identifying commonly the topics and organizing the student in group; (2) planning the learning tasks; (3) doing investigation; (4) preparing the last report; (5) presenting the last report; (6) evaluation (Rusman, 2010: 221-222).

Based on the opinion above, Group Investigation learning model is one of the learning models that suitable to improve problem solving ability of students in learning process. It is because of in learning process that used group investigation learning model, have some steps of learning that suitable to improve the problem solving ability in class, they are: (1) dividing the students into a small group that consists ± 5 students; (2) giving the open question that analytically; (3) inviting every students to participate in answering the question by group alternately clockwise in time that agreed (Rusman, 2010:223).

Based on the explanation above, the researcher has the focus in group investigation learning model to improve the problem solving ability. So, this research have the title is: "Implementation of Group Investigation Learning Model to Improve Problem Solving Ability in Class VIII in SMP Negeri 11 Medan Academic Year 2014/2015".

The objective of this research is repairing the learning process by using the group investigation learning model to improve the problem solving ability in topic cubes and beams in SMP Negeri 11 Medan Academic Year 2014/2015, knowing the big of the improvement of students' problem solving ability using Group Investigation learning model on the matter cubes and beams in SMP Negeri 11 Medan in Academic Year 2014/2015, knowing the process of students' answer in improving the problem solving ability in topic cubes and beams in SMP Negeri 11 Medan Academic Year 2014/2015.

RESEARCH METHOD

This study was a classroom action research (PTK) to analyse the Implementation of Group Investigation Learning Model to Improve Problem Solving.
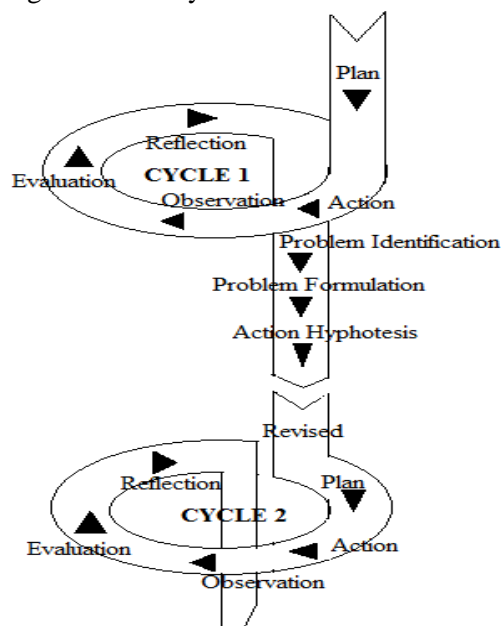Design of the study was as follow:

Figure 5 step of Car

The population of this research was all students at SMP Negeri 11Medan in academic year 2014/2015. The sample of this study was 46 students in VIII-7.

Procedure for the application of action research on this subject consists of five steps: (1) planning, (2) acting, (3) observing, (4) reflecting (5) Evaluating. Giving a plan of learning tools and test takes a lot of time, when the schedule it should be implemented based on the school schedule it, researchers are planning some learning tools and tests for two cycles.

RESULT AND DISCUSSION

From the mathematical problem solving ability tests of cycle I and cycle II, it was obtained that students' mathematical problem solving ability is improving. It can be seen from:

Based on tests in cycle I and cycle II, we obtained the increasing average value of each indicator. It can be seen from the following chart of each indicator:

Table 1 The Increasing Mathematical Problem Solving Ability of Each Indicator

Indicator	Cycle I	Cycle II
I	68.88	97.96
II	53.74	98.64
III	49.32	91.50
IV	17.39	72.45
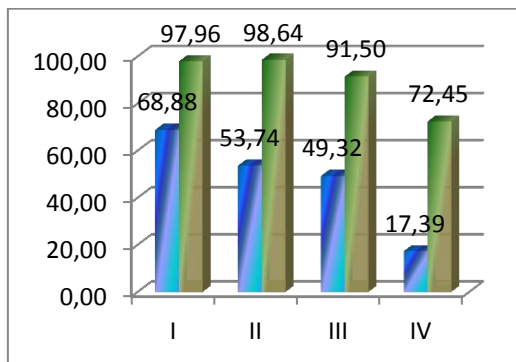
Figure 6 The Improvement of Mathematical Problem solving Ability from Cycle 1 to Cycle 2 of Each Indicator

Note:
I   : Understanding the Problem.
II   : Planning for Problem Solving.
III   : Implementing Problem Solving.
IV   : Checking the Results.

From the above chart, it shows that the improvement of mathematical problem solving ability in each indicator. First, the indicator of understanding the problem in first cycle has the average score 68.88 and for the second cycle has 97.96. Second, the indicator of planning the problem solving in first cycle has the average score 53.74 and for the second cycle has 98.64. Third, the indicator of implementing problem Solving in first cycle has average score 49.32 and for the second cycle has 91.50 The last indicator, checking the result in first cycle has the average score 17.39 and for the second cycle has 72.45.

Based on the increasing of mathematical problem solving ability results, where the average results of the tests in cycle I is 48.16 and the average results of the tests in cycle II is 91.02. The improving the mathematical problem solving was in the category is high with score 0.83. The complete result can be seen from the following table:

Table 2 The Improvement Average Score of Mathematical Problem Solving Ability

Average Score of Cycle I	Average Score of Cycle II	Gain Score
48.16	91.02	0.83

1. The Increasing of Students Who Has Completed Mathematical Problem Solving Ability

Based on cycle I and cycle II, the increasing of students who has completed mathematical problem solving ability can be seen in the following table:

Table 3 The Improvement of Students Who Has Completed Mathematical Problem Solving Ability

	Students Who Has Completed Tests	Percentage
Cycle I	6	11.24%
Cycle II	44	89.8%

From the table above, we obtained that in cycle I the total of completed student is 6 students (11.24%) and increased to be 44 students (89.8%) in cycle II. Then the increasing of students who completed the mathematical problem solving ability is 78.56%.
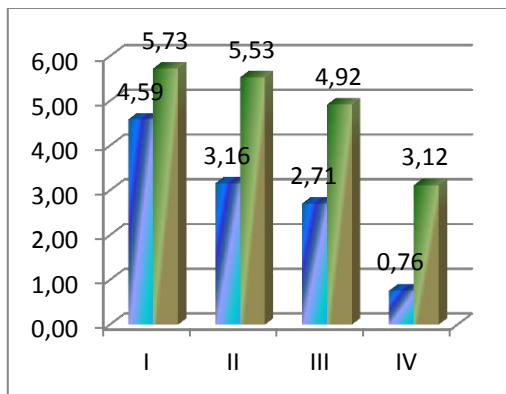
From the Process of Students' Answer in cycle I and cycle II, it was obtained that Process of Students' Answer is improving. It can be seen from:

1. The Increasing of Process of Students' Answer of Each Indicator

Based on tests in cycle I and cycle II, we obtained the increasing average value of each indicator. It can be seen from the following chart of each indicator:

Table 8 The Increasing Process of Students' Answer of Each Indicator

Indicator	Cycle I	Cycle II
I	4.59	5.73
II	3.16	5.53
III	2.71	4.92
IV	0.76	3.12

Figure 7 The Improvement of Process of Students' Answer from Cycle 1 to Cycle 2 of Each Indicator

Note:
I   : Understanding the Problem.
II   : Planning for Problem Solving.
III   : Implementing Problem Solving.
IV   : Checking the Results.

From the above chart, it shows that the improvement of Process of Students'

Answer in each indicator. First, the indicator of understanding the problem in first cycle has the average score 4.59 and for the second cycle has 5.73. Second, the indicator of planning the problem solving in first cycle has the average score 3.16 and for the second cycle has 5.53. Third, the indicator of implementing problem Solving in first cycle has average score 2.71 and for the second cycle has 4.92. The last indicator, checking the result in first cycle has the average score 0.76 and for the second cycle has 3.12.

Based on the increasing of Process of Students' Answer results, where the average results of the tests in cycle I is 1.40 and the average results of the tests in cycle II is 2.41. The improving of the process students' answer in problem solving ability was in category medium. The complete result can be seen from the following table:

Table 9 The Improvement Average Score of Process of Students' Answer

Average Score of Cycle I	Average Score of Cycle II	Gain Score
1.40	2.41	0.63

2. The Increasing of Students Who Has Completed Process of Students' Answer

Based on cycle I and cycle II, the increasing of students who has completed Process of Students' Answer can be seen in the following table:

Table 10 The Improvement of Students Who Has Completed Process of Students' Answer

|	Students Who Has Completed Tests	Percentage
Cycle I	20	41%
Cycle II	45	92%

From the table above, we obtained that in cycle I the total of completed student is 30 students (41%) and increased to be 45

students (92%) in cycle II. Then the increasing of students who completed the mathematical problem solving ability is 51%.

Teacher activities that include delivering learning objectives to be implemented and perform motivation by explaining the relationship with the previous material and arouse students' prior knowledge, then the teacher presents a problem to broaden the students to understand the material, ask the students to understand the SAS and group work according SAS. Teachers guided students into study in small groups. Then the teacher gave evaluation and reward. Weaknesses that occur in the cycle I is not repeated in cycle 2. I obtained that the average assessment of observing the teacher activity in cycle I is 3.91 is in good category while in cycle II is 4.36 is in good category too. Furthermore the results can be seen in the following table:

Table 11 The Observation Results of Teacher Activity

| Cycle	Percentage	Total score
Cycle 1	86%	43
Cycle 2	96%	48
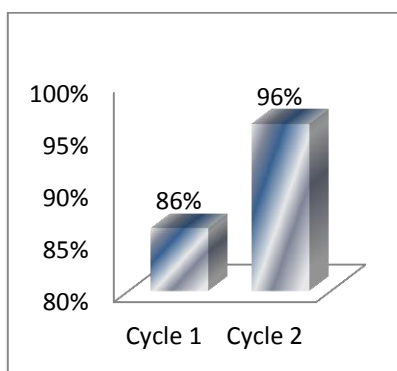
Figure 8 The Improvement of The Teacher's Observation Result from Cycle I until Cycle II

It obtained the result of observation of student activities in cycle I is passive category while in cycle II is active category. Furthermore the results can be seen in the following table:

Table 12 The Observation Results of Student Activities

Cycle	Percentage	Average
Cycle 1	32.65%	7.94
Cycle 2	81.63%	10.33
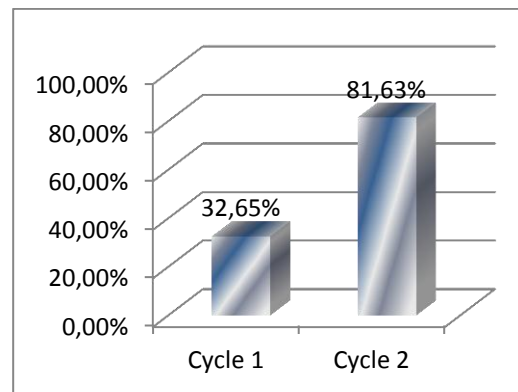
Figure 9 The Comparison of The Average Students' Activities in Cycle I and II

Based on the test results of students' mathematical problem solving skills first cycle and the second cycle is known that the average test score increased from 48.16 becomes 91.02. Classical learning completeness is from 12.24% to 89.80%. Increasing students' mathematical problem solving ability in this study occurred in the wake of the ability of teachers in implementing the learning by using group investigation learning model and the use of student activity sheet (SAS) that are contextual.

These results are supported by Purba (2012) that concluded that: Cooperative learning model can improve the group investigating mathematical creativity junior high school students on the subject of cubes and beam in class VIII SMP Negeri 16 Medan. It also can be seen from the research conducted by Ginting (2012), conclude that: there is increasing in mathematical problem solving ability of students to use learning model group investigation on the subject of similarity and congruence in class IX SMP Negeri 1 Kotarih Academic Year 2011/2012.

These result also supported by learning theory of constructivism, in this theory, emphasizes that in the learning activities of teachers act as facilitators and resource persons, while the student-centered learning activities. This is in accordance with the implementation of cooperative learning model group Investigation. Knowledge is built by the students themselves actively through the process of individual and social interaction processes. In this theory, knowledge can't be transferred meaning of teachers to students, student is most responsible for the way and their learning outcomes.

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Another theory that supports is Vygotsky's theory, Vigotsky is one of the leaders of constructivism. The most important of Vygotsky's theory is the importance of the interaction between the internal and external aspects learning with an emphasis on social learning environment. Another important idea of Vygotsky's theory is the scaffolding. So that group investigation learning model can improve problem solving ability.

CONCLUSION AND SUGGESTION

1. Conclusion

Based on the results and the discussion obtained some conclusions which are the answers to the questions posed in the formulation of the problem, these conclusions are:

1. Based on learning process which are implemented in this research and observation result, mathematics learning process by using group investigation learning model done well.
2. The improvement of problem solving ability of students by the implementation of group investigation learning model belongs to high category with the normalized gain value is 0.83.
3. The process of students' answer is improve from the cycle 1 to cycle II.

2. Suggestion

Based on these results, the authors propose some suggestions for learning mathematics that promote problem-solving abilities, especially in secondary schools, namely:

1. Learning mathematics with GI models can be used as an alternative learning effective in improving students' mathematical problem solving ability, the process of students' answer and activities.
2. GI models also can stimulate students in learning activities. Therefore this kind of learning is recommended to be developed further on mathematical topics and different levels of education
3. For the next researcher, expected to use the research result as comparison matter and to implement GI models in the other topic and make textbooks as attractive as possible and SAS have a relationship with textbooks so students will be actively reading textbooks.

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