The Efforts to Improve Mathematical Communication and Self Regulated Learning of Students By Using the Guided Discovery Method in Class X. IS3 SMAN 2 Sungai Limau

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Abstract. Communication skills self-regulated learning mathematics are needed. Mathematical communication is a higher-order thinking skill about math ideas, either oral or written. Meanwhile, self-regulated learning is one's ability to manage oneself in learning, can measure the level of achievement, and determine follow-up if it increases failure. In fact, communication skills and self-regulated learning mathematics of the students are still low. One effort to improve the students' communication skills and self-regulated learning is by using the guided discovery method in the mathematics learning process. The purpose of this study is to describe the improvement of communication and self-regulated learning of students' mathematics learning by using the guided discovery method in learning mathematics. This research is a kind of classroom action research. The subjects of the study were students of class X.IS3 of SMA Negeri 2 Sungai Limau, Sungai Limau District. The technique of collecting data through observation, tests, field notes, and documentation. Data analysis techniques include data reduction, data presentation and conclusions. The results showed an increase in communication skills seen from: the average communication skills of participants reached 60, in the first cycle increased up to 65.30, and in the second cycle also increased up to 70.50. While the increase in mathematics self-regulated learning of the participants can be seen from: the average level of mathematics self-regulated learning of students in class X. IS.3, which early only 65.9% in the sufficient category, in the first cycle it rise up to 69.8% still in the sufficient category, and in the second cycle rise up to 74.35% with a good category. Based on the description above, concluded that the application of guided discovery methods improves the students' communication skills and self-regulated learning in mathematics.

1. Introduction
The purpose of mathematics learning process is to improve students' mathematical abilities which consist of the ability to understand concepts, reasoning abilities, communication skills, and problem-solving abilities [1]. One important problem in learning mathematics today is the importance of improving students' mathematical communication skills [2]. Mathematical communication is defined as a student's ability to convey something he knows through dialogue or mutual relations that occur in the classroom environment, where message transfer occurs. Mathematical communication skills of students can develop mathematical understanding when using the correct mathematical language to write about mathematics, clarifying ideas, and learning to make arguments and representing mathematical ideas orally, pictures, and symbols [3]. All behavior can be said as communication if it involves two or more people.
In learning mathematics, students' learning independence is also needed. Learning independence is needed if students want to succeed in learning and achieving the desired goals. Students who have to learn independence if they already have to learn initiatives, can diagnose learning needs, set learning targets, can choose learning strategies, evaluate learning processes and outcomes, monitor, manage and control learning, view difficulties as challenges and utilize relevant resources, have self-efficacy/self-concept/self-ability [4].

Effectivity and creativity ways are needed to convey mathematical concepts and to achieve the goals of mathematics learning. That is, learning mathematics should be contextual. Between mathematical concepts and the daily life should be connect, because it can help students to understand mathematics that is abstract and can construct students' knowledge [5]. The application of appropriate methods and approaches in the learning process can improve communication skills and independence of students' mathematics learning [6]. The cause of the lack of communication and learning independence of the most dominant students is the variation in the strategies used by educators in learning. The learning method developed by mathematics educators is to use conventional methods or lecture methods [7]. One of them is the guided discovery method.

The guided discovery method is a two-way method to involves students in answering educator questions [8]. Guided discovery method with probing technique is a way of delivering mathematical topics with a series of questions that are demanding and explore students' ideas so that the teaching and learning process allows students to discover their own mathematical patterns or structures through a series of past experiences under the guidance of educators [9]. The guided discovery method of the discovery process is carried out by students based on educator instructions. The instructions given by educators can be in the form of guiding questions. Because with the guiding questions will help students in solving mathematical problems. Through questioning skills, effective and enjoyable learning will be created, because almost every stage of learning, educators must provide questions, and also the quality of questions raised by educators must be taken into account because it will determine the quality of answers given by students [10].

Learning is done by the transfer of knowledge or delivery of knowledge from educators to students. Class X.IS3 student activities at SMAN 2 Sungai Limau are still not maximal, and mathematical communication skills and students' learning independence are still low. Mathematical communication and learning independence of students have not yet reached a minimum level of mastery learning, in choosing the right learning method, researchers need to pay attention to the conditions/conditions and characteristics of students and also the suitability of the method with the subject matter. Learning in the classroom using the guided discovery method is intended so that students are active and able to communicate mathematical communication and learning independence of students in learning. Guided discovery is expected so that students can answer the questions given so that before learning in class, students are expected to have read the material to be learned. During learning takes place, researchers can observe the learning activities of students with the help of observers (observers). Guided discovery learning methods can encourage students to think for themselves, analyze themselves, so they can find a concept based on the data provided.

Based on the observations, it was found that some students assess mathematics as full of counts and poor communication, full of formulas, and students have not been able to use mathematics in everyday life. Students are less motivated to learn mathematics because they do not understand mathematical concepts. Students tend to see and imitate the work of their friends if given training and are not confident in the work they made themselves. When given questions about mathematical communication skills, a few students can answer these questions correctly.

Many students still assume that mathematics is difficult. They do not enjoy in learning math, and they feel so bored in that process. The nature of mathematics is difficult for students because mathematics itself is a science that requires ability and reasoning in learning it. Students have difficulty in working on math problems given by educators, so students only copy from friends who are considered able or waiting for answers from educators, this will not happen if learning utilizes the existing environment [11].
The results of tests of mathematical communication skills of students in class X.IS.3 SMAN 2 Sungai Limau as many as 2 (two) questions. From the answers for number 1 as many as 32 students, only 5 students have understood the problem well, the students' answers are correct in communicating mathematical problems and the answers are in accordance with what is expected. A total of 27 students have not been able to complete the answers and these students do not know how to end the completion. Based on the results of the students' answers to question number 2 as many as 32 students only 6 students were seen that the ability of students to solve communication problems is still low. Out of 32 students, only two students scored 93, out of a maximum score of 100. There are five students who are able to understand the problem, four students are able to understand the problem of mathematical communication and formulate a plan of the resolution, two students are able to at the stage of understanding the problem of mathematical communication, formulate a plan of the resolution, and implement a plan of the resolution, and only one person students who are able to complete the stages of solving mathematical communication problems to retest the steps that have been made, the rest just copy the work of a friend.

Learning independence is a learning activity that is driven by self-will, self-choice, and own responsibility without the help of others and can take responsibility for its actions. Students are said to have been able to learn independently if he has been able to do the task of learning without dependence on others [12]. Where the factors that influence learning, independence include knowledge (knowledge), motivation (motivation), and personal discipline (self-discipline). Motivation is an important factor in learning independence. Students with high learning motivation will be interested in doing a variety of tasks given because they like and have the motivation to complete them. They know the reason they are learning, so when they choose and do something, it is an encouragement from within themselves and not because they are influenced and controlled by others [13]. The indicators of learning independence are as follows: 1) learning initiative, 2). diagnose learning needs, 3) set learning targets and objectives, 4) monitor, manage and control learning progress, 5) view difficulties as challenges, 6) utilize and find relevant resources, 7) choose and implement learning strategies, 8) evaluate the process and learning outcomes and 9) have self-concept (self-concept) [14]. it is an encouragement from within themselves and not because they are influenced and controlled by others [13].

Independence of students in learning as a process of design and careful monitoring of cognitive and affective processes in completing an academic task. With the existence of good learning independence from students, then in solving a mathematical problem, students will not depend on educators or others. He can choose a strategy and carry out its design in solving problems and can evaluate its work [15].

One alternative that can be done in improving students 'mathematical communication skills and students' learning independence is to use the guided discovery method in the learning process. The learning can provide optimal results and can further empower students and put more emphasis on the involvement of students in full to be able to find the material being learned and can relate it to real life thus encouraging students to be able to apply it in their lives. Based on the above problems, the guided discovery method is applied in the learning process to improve communication skills and learning independence of class X students. IS3 SMAN 2 Sungai Limau. Teaching materials are arranged and designed specifically where learning materials are sourced from several literatures that are relevant to the basic competencies and subject matter taught with reference to learning by the guided discovery method.

The formulation of the problem in this study is "What is the process of improving mathematical communication and student learning independence with the guided discovery method of class X students. IS3 SMAN 2 Sungai Limau?". The purpose of this study is to improve communication skills and learning independence of students with the guided discovery method of class X. IS3 students at SMAN 2 Sungai Limau.
2. Research Methods
This research is a Classroom Action Research (CAR). This CAR is based on the results of initial observations that have been formulated as problems. In the planning stage, researchers involved mathematics subject educators by combining the results of observations used as preliminary data and then proceed with the implementation of learning actions by applying the guided discovery method in learning activities. The validity or validity of research data is examined through triangulation, which is a data validity checking technique that utilizes something else outside the data as a comparison. In this research, the triangulation used is the triangulation of the investigator, that is by utilizing researchers or other observers for the sake of checking the degree of trust in the data again. The data analysis technique used in this study is qualitative based on the results of each action, both written and oral. The components analyzed in the data analysis are data reduction, data presentation, and data verification or drawing conclusions [16].

3. Results and Discussion
In this study the learning method used is the guided discovery method. The guided discovery method has advantages that are 1) can help students to develop, increase readiness, and mastery of skills in the cognitive process of students; 2) students gain in-depth knowledge and can arouse students' enthusiasm for learning; 3) able to provide opportunities for students to develop and progress according to their respective abilities; 4) help students to strengthen and increase confidence in themselves with their own discovery process; 5) this method is student-centred not the educator, where the educator is only a study partner, helping when needed [17].

3.1. Class discussion centred on students
At the beginning of the learning class discussion was carried out. Students are given information and motivation on the material to be discussed. Then given the prerequisite material to support the material. Students are encouraged to find and express their interests. The purpose of this discussion is to increase the involvement of students in learning later and can stimulate their curiosity. This discussion should lead to topics that will be studied later. Learning that is centered on students towards the process of learning mathematics is expected to develop an understanding of mathematical material to make learning more effective. The goal is that learning can synergize students with their real experiences and make students more active.

3.2. Formation of groups and assignment of material topics
At this stage, a group formation is carried out. The number of students in each group consists of four to six people. Educators provide direction and encouragement to all students, according to the probing technique for wanting to work together in groups. Then educators share the topic of the material with each group. Each group gets the same material topic. Each material topic consists of four to six small topics that contain a summary of the material and practice questions.

3.3. Small topic selection in groups
In this step each group shares small topics with each group member. Each group member gets one small topic. Each group member will have to master the small topics they learn.

3.4. Preparation of small topics
After the students get small topics, they will work individually. The way students master these small topics can be by utilizing a variety of sources. This activity was carried out in a stronger interest because the students know they would share their work with their teammates and their work would contribute to the team's presentation. Usually this is the longest stage.

3.5. Small group presentations
After the students’ complete individual work, they present their small topics to their teammates. Small presentations and discussions in the team are carried out in a way that can make all teammates get all the knowledge and experience done by each team member. The goal is that there are team members who take notes, criticize, support, and check important points on the material.

3.6. Prepare for group presentations
Students are encouraged to bring together all the small topics in the group as material for group presentations.

3.7. Group Presentation
During the presentation, the class is the group that controls the class. After the presentation, the educator uses the probing technique to direct the feedback session or the team interview is a very useful action, so that other groups can learn something from what has developed in the presentation.

During learning interaction and discussion occurs in groups involving students actively, and accustom students to communicate with themselves, friends, and educators. Students discuss together with friends in groups and collect as much relevant information as possible and determine alternative solutions to prove correct. Based on the results of observations, in the implementation of the first learning, it appears that initially the students are busy and noisy, so learning begins with the division of groups. But this did not last long, and students began to adjust. During the teacher's explanation in broad outline the students seemed enthusiastic to pay attention but there were still many who were passive and reluctant to ask questions. However, the discussion in each group went smoothly. The passivity of students begins to change when asked to present, students look enthusiastic and enthusiastic. Likewise, in the second learning implementation, when there will be group discussions and presentations the students look enthusiastic and enthusiastic. In addition, at the second meeting the students seemed more prepared to take part in the learning activities and many were willing to ask questions about the material that was not yet understood. The class action that has been done for two cycles changes for the better. at the second meeting the students seemed more prepared to take part in the learning activities and many were willing to ask questions about the material that had not been understood. The class action that has been done for two cycles changes for the better. at the second meeting the students seemed more prepared to take part in the learning activities and many were willing to ask questions about the material that had not been understood. The class action that has been done for two cycles changes for the better.

Through the learning steps above, obtained an increase in understanding of the concept of mathematics shows that guided learning can improve the mathematical communication skills of students in class X.IS.3SMAN 2 Sungai Limau. The average ability to understand the concept of students can be seen in Table 1 below:

| Enhancement                | Average (before the action) | Average (after the action) |
|----------------------------|-----------------------------|----------------------------|
| Mathematical Communication Skill | 60.00                      | 65.30                      | 70.50                      |

Based on the data in Table 1, the results of the analysis of the second cycle test show the classical completeness level reaches 60%. This shows an indicator of the success of research to improve the ability to understand mathematical concepts of class X.IS.3 SMAN 2 Sungai Limau has been reached.

While the results of the mathematics independence questionnaire learners also showed a significant increase (see Table 2).
Table 2. Improving Student Learning Independence

| Enhancement        | Variable          | Cycle I    | Cycle II   |
|--------------------|-------------------|------------|------------|
| Independence Learning | Motivation        | 66.7%      | 72.5%      |
|                    | Students have the desire to do activities |           |            |
|                    | Learners have hopes and ideals            | 70.5%      | 80.4%      |
| Initiative         | Students are open in new experiences      | 65.1%      | 71.3%      |
|                    | Students are not easily discouraged and keep trying to think | 60.9% | 72% |
|                    | Students like hard and difficult tasks    | 60.1%      | 70.1%      |
|                    | Learners try to find answers that are broad and satisfying | 59.7% | 69.7% |
| Responsible        | Students have a high commitment to the task or work | 69.1% | 70.9% |
|                    | Students have the ability to lead          | 65.1%      | 69.5%      |

Based on the data in Table 1.1 obtained learning with guided discovery can improve mathematics learning independence of students in class X.IS.3, SMAN 2 Sungai Limau. The average level of independence learning mathematics students in class X.IS.3 which initially only 65.9% in the category enough. In the first cycle it rose to 69.8% even though it was still in the sufficient category. And in the second cycle rose to 74.35% in the good category. This shows the independence of learning mathematics students in the first cycle rose from the initial conditions before the study and in the second cycle rose again compared to the first cycle. It shows that the indicators of research success to increase mathematics independence of students in class X.IS.3SMAN 2 Sungai Limau also has been reached.

Students' responses to improving communication and learning independence were very good. Learners feel happy with the guided discovery method that makes it easy for them to communicate mathematical concepts and improve how they learn independently. They find it helpful to practice independence in learning, this way not only in mathematics, but also affects for other subjects.

So, it is generally obtained that by applying the guided discovery method in the learning process can improve communication skills and learning independence of students in class X.IS.3 SMAN 2 Sungai Limau. This is supported by the results of previous studies, namely, groups of students who have high communication skills provide high learning outcomes as well. On the other hand, groups of students who have low communication skills provide low learning outcomes. This proves that learning achievement depends on the level of students 'mathematical communication skills, meaning that large or small levels of students' communication skills, significantly improve students 'learning achievement, or in other words students' learning achievement is high [18]. Communication skills, mathematical problem solving and mathematical disposition of students who get guided discovery learning are better than students who get expository learning. There is a correlation between communication skills, mathematical problem solving and mathematical disposition in guided discovery learning [19]. Improved mathematical communication skills of students who learn through guided learning are better than students who learn through conventional learning [20]. Improving mathematical communication skills and independence of students who take part in learning using the guided discovery method are better than students whose learning uses a scientific approach [21]. There is a correlation between communication skills, mathematical problem solving and mathematical disposition in guided discovery learning [19]. Improved mathematical communication skills of students who learn through guided learning are better than students who learn through conventional learning [20]. Improving mathematical communication skills and independence of students who take part in learning using the guided discovery method are better than students whose learning uses a scientific approach [21]. There is a correlation between communication skills, mathematical problem solving and mathematical disposition in guided discovery learning [19]. Improved mathematical communication skills of students who learn through guided learning are better than students who learn through conventional learning [20]. Improving mathematical communication skills and independence of students who take part in learning using the guided discovery method are better than students whose learning uses a scientific approach [21]. There is a correlation between communication skills, mathematical problem solving and mathematical disposition in guided discovery learning [19]. Improved mathematical communication skills of students who learn through guided learning are better than students who learn through conventional learning [20]. Improving mathematical communication skills and independence of students who take part in learning using the guided discovery method are better than students whose learning uses a scientific approach [21]. There is a correlation between communication skills, mathematical problem solving and mathematical disposition in guided discovery learning [19]. Improved mathematical communication skills of students who learn through guided learning are better than students who learn through conventional learning [20]. Improving mathematical communication skills and independence of students who take part in learning using the guided discovery method are better than students whose learning uses a scientific approach [21]. There is a correlation between communication skills, mathematical problem solving and mathematical disposition in guided discovery learning [19]. Improved mathematical communication skills of students who learn through guided learning are better than students who learn through conventional learning [20]. Improving mathematical communication skills and independence of students who take part in learning using the guided discovery method are better than students whose learning uses a scientific approach [21]. There is a correlation between communication skills, mathematical problem solving and mathematical disposition in guided discovery learning [19]. Improved mathematical communication skills of students who learn through guided learning are better than students who learn through conventional learning [20].
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4. Conclusion
This research is a classroom action research applying the guided discovery method that can improve mathematical communication skills and students' learning independence in mathematics. Based on this conclusion the researcher recommends that educators be able to apply other innovative learning methods to improve mathematical abilities and learner learning independence in carrying out learning.

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