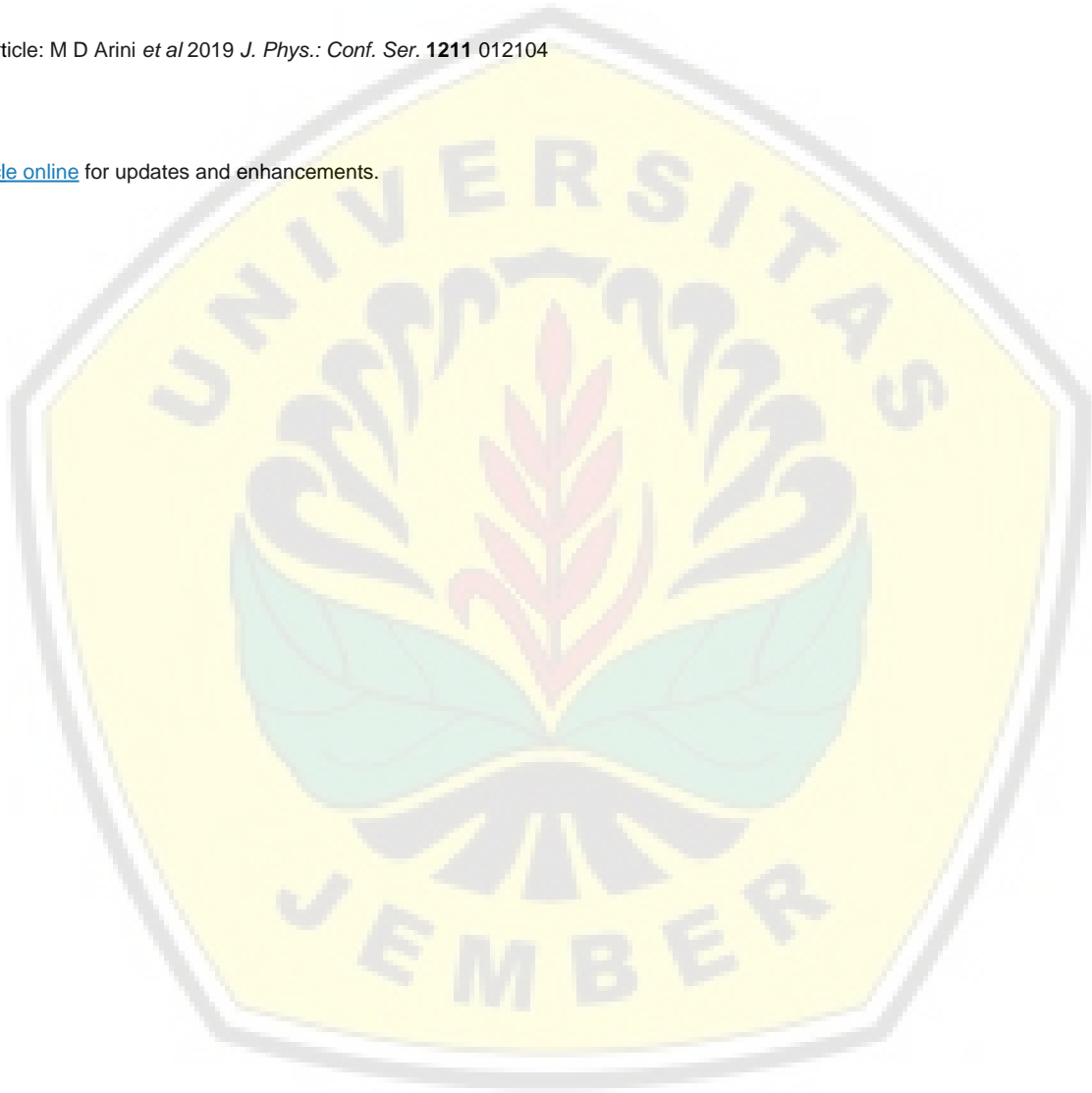


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## Analysis pattern of student communication skills in science process in inquiry learning: study of case study learning in regional schools Jember coffee plantation

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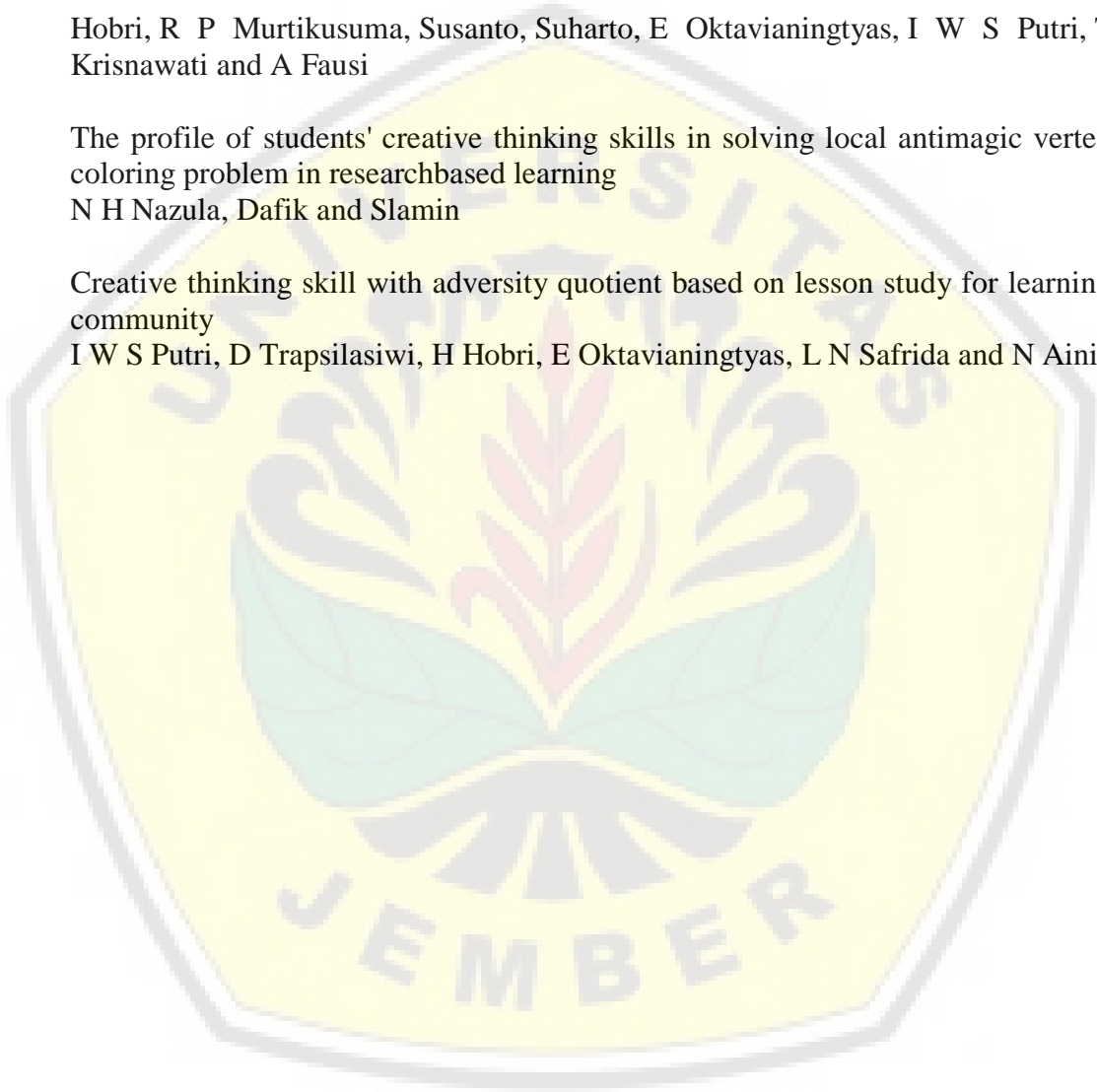
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## Analysis pattern of student communication skills in science process in inquiry learning: study of case study learning in regional schools Jember coffee plantation

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**Abstract.** Based on several other studies no researcher has used a combination of learning models regarding students' communication skills in inquiry learning especially in science learning that is applied to schools in coffee plantation areas. In inquiry learning methods, students are required to think critically and analytically to find and solve the answers to a problem, but in reality now students still cannot think critically about a question that is especially in material relating to their living environment. The purpose of this study was to analyze the implementation of students' communication skills in the science process in inquiry learning at Jember coffee plantation area school. The method used in this study is a mixed method, which combines the initial data collection methods and qualitative descriptive methods. This study uses 25 schools around the Jember coffee plantation area. The findings of this study that the implementation of students communication skills in inquiry learning especially science learning is very rarely applied, even no one has applied the combination of models especially in schools located in coffee plantation areas. This study aims on the basis that educators, especially science teachers in coffee plantation areas can be more creative and innovative in developing classroom learning plans. Based on the results of the study, that this learning model can improve student communication outcomes and student learning outcomes so that learning objectives can be obtained. The conclusion is that there is no implementation of communication skills that involve students with the environment around coffee plantations.

### 1. Introduction

Learning is a process of interaction between educators, students, and learning resources in a learning environment. Learning is used as a means of gaining knowledge, mastery of proficiency, and the formation of attitudes of students. In other words, learning is a process to help students to learn well and effectively. Recent studies show that qualified teachers produce quality students and, ultimately, quality citizens. Good and effective learning is comprehensive in its implementation and includes three competencies which include cognitive competence (thinking), affective (attitude), and psychomotor (acting). If all three competencies are met, there will be complete competency in students in accordance with the nature of science learning. Science learning has a fundamental function in generating and developing critical, creative and innovative thinking skills. In order for these goals to be achieved, the science needs to be taught in the right way and can actively involve students through scientific processes and attitudes [1].

The problem related to the real context of science learning is the matter of the interaction of living things with their environment. The study focused on SMP / MTs schools located in the Jember coffee plantation area in Garahan District, Jember Regency. In addition to coffee plants, there are also types of plants that can be found in the coffee plantation environment, including shade plants such as sengan, and coconut trees. This coffee plantation area in Jember Garahan has good environmental conditions so there are various types of plants that grow. Availability of various types of plants in the Coffee Plantation this



Jember garage can be used by teachers to develop learning models that connect learning material with the surrounding environment. Indonesia is the largest coffee producing country with the third in the world after Brazil and Vietnam. Based on data from the Indonesian Central Bureau of Statistics, Jember is the second largest coffee producer in East Java, Indonesia. The amount of coffee production in Jember district is 3,105 tons in 2013 with an increase in production of 18% every year. Based on this data, it is necessary to study the involvement of school-age children in helping their success in producing coffee. The involvement of school-age children includes skills and knowledge of their specific skills and knowledge in solving problems found when they are in the environment around their school. Based on the results of preliminary observations showing that 50% of students never associate learning material with the surrounding environment. In this material students are directed to find and explore the concept of their own knowledge through real problems so that the concepts obtained by students will not be easily forgotten [2].

One learning method that can be used to overcome these problems is by applying inquiry learning models that are combined with students' communication skills. Inquiry learning is the behavior involved in human efforts to explain rationally the phenomena that provoke curiosity. In other words, inquiry is related to active activities and skills that focus on finding knowledge or understanding to satisfy curiosity. Question-based learning fosters the development of independent learners, encourages students to take responsibility for their own learning based on the principles of the scientific method, in inquiry-based learning students observe a phenomenon, synthesize research questions, and finally analyze and communicate their findings [3].

Several quantitative studies support the effectiveness of inquiry-based learning as an instructional approach. Inquiry learning method as a general process carried out by humans to find or understand information so that the direct process experienced by students with teacher guidance during science learning can be an interesting and meaningful learning. In addition, the reason for choosing inquiry learning method is to solve problems that have an impact on improving communication skills and student learning outcomes because it trains students to find out for themselves all information to find a concept based on their experience and can train students to think higher [4].

The model of inquiry learning questions follows four cycles, namely triggering events, characterized by a sense of confusion, followed by collaborative exploration and information exchange in different media, after which students are involved in integration, where they connect and defend these ideas. When the completion phase is reached, where the initial problem is resolved, the solution is practiced and new ideas can be applied in practice to other problems or outside their learning environment. Students will be able to gain knowledge and understanding of the natural world based on inquiry, apply skills and processes of inquiry and develop attitudes and values that are important for science practice [5].

Inquiry-based learning can be characterized by the level of responsibility student play in responding to questions, designing investigations, evaluating and communicating their learning. The students are trained to learn on their own and do not depend on the knowledge given from the teacher. They are encouraged to develop and develop knowledge in them selves by seeking as much knowledge as possible. Cognitive as the most important domain of students is guided to always be accustomed to thinking critically and independently in solving a problem. So that when they are involved in the community they are able to implement their knowledge and can provide the best solutions to problems [6].

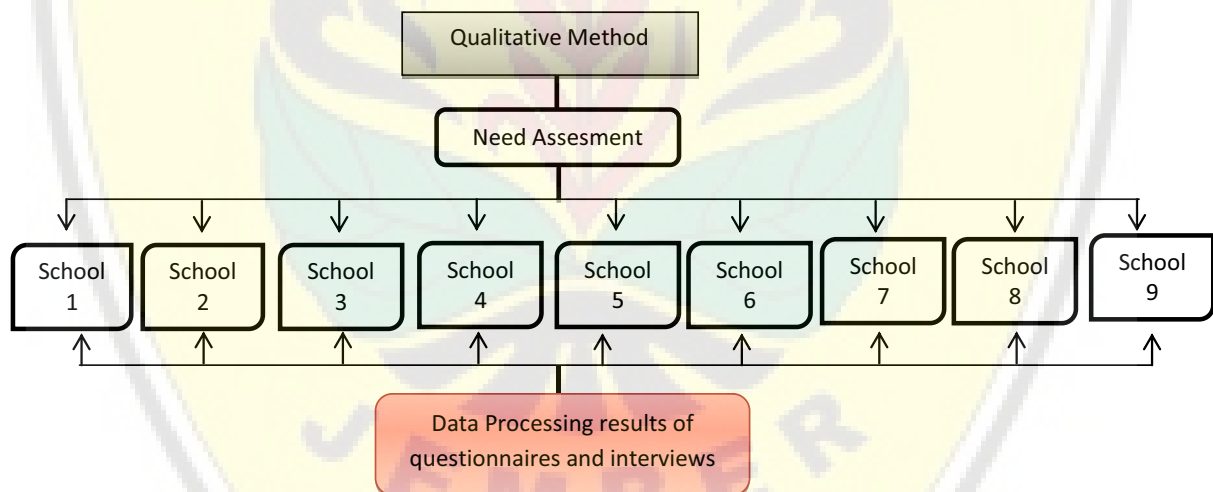
Communication is an aspect that plays an important role in science learning. Communication is one of the basic process skills that every student should have. These basic skills can be grown, trained, and even developed through learning activities in schools. Class communication includes face-to-face interaction and communication needed between participants involved in the class to ensure that learning takes place well. Students in motor movement must have awareness and coordination, so that skills will be realized. Student skills are needed to support the goals of learning itself. Students will take new actions in a conscious state. Such actions will benefit themselves and others, as students convey positive information to other friends [7].

Communication skills are also an important component in soft skills, namely intrapersonal abilities that complement academic skills that will determine the success of one's life. Students' communication skills in scientific activities are often not trained in learning. So, it is a challenge for a teacher to implement an appropriate learning strategy to develop students' communication skills in science learning. A good learning process is proven to improve communication skills so it can be concluded that the understanding of students' communication skills is the participation of students to express their thoughts,

ideas, knowledge, or new information in the form of verbal and nonverbal in the learning process. All of that will make it easier for other students to understand the subject matter and increase knowledge for students who convey ideas. The role of the teacher is also important in providing clear instructions on the course of the process of implementing student skills so that the learning process will run well and in accordance with the learning objectives [8].

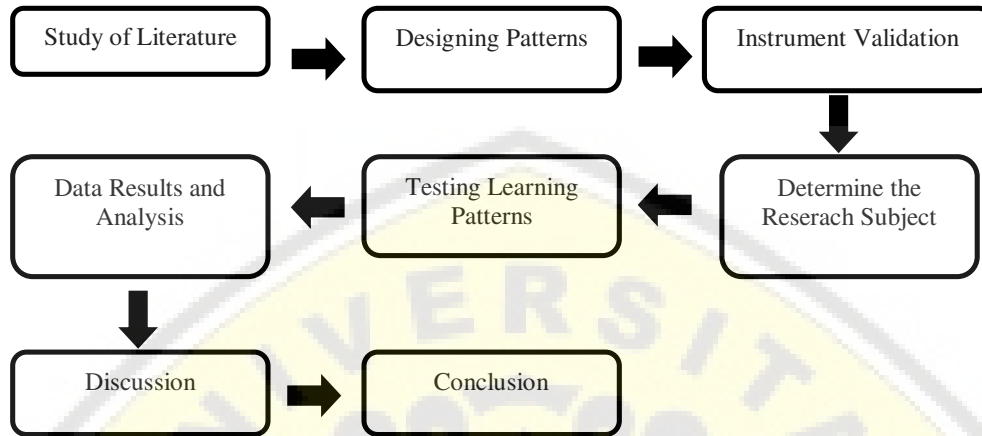
## 2. Method of Research

The research design of students' communication skills in the science process in inquiry learning was carried out at the University of Jember while the application sites were in coffee plantations Junior High School/ MTs in Jember Regency. The implementation time is conducted in semester 2 of the 2018/2019 academic year. The research subjects for the development of the learning model were grade VIII students in junior high school / MTs coffee plantations in Jember Regency. This type of research uses a triangulation method that combines qualitative and quantitative methods. Qualitative methods aim to obtain data through observation, interviews and questionnaires on the needs of selected teachers and students, while the quantitative method aims to obtain data obtained from the pretest, posttest and rubric tests of communication skills after applying patterns of communication skills in inquiry learning. The independent variable of this study is the pattern of communication skills in inquiry learning, while the dependent variable is science process skills. The following are qualitative and quantitative methods carried out in this study can be seen in Figure 1 and Figure 2.



**Figure 1.** Qualitative method.

Based on Figure 1, the step of the qualitative method consists of the distribution of needs questionnaires and interviews conducted on 9 junior high schools and MTs in the area around coffee plantations. Distribution of questionnaires is given to designated teachers and students. The distribution of questionnaires and interviews aims to determine the problems faced by teachers and students. Then data processing was carried out on the results of the questionnaire and interview.



**Figure 2.** Quantitative method

Based on Figure 2, the quantitative method is carried out at several stages, namely the literatur study phase which is adjusted to the results of questionnaires, then designs the appropriate learning patterns. Then make an instrument in the form of a learning device (Design of Learning Devices, Syllabus and Student Worksheets) which are then validated by experts / experts. Next, determine the subject of the study and test the pattern of communication skills in inquiry learning. Then do data analysis, discussion and conclusions. This study uses the 4D model proposed by Thiagarajan (1974 which consists of four stages, namely the definition phase, design stage, development stage and disseminate stage. However, in this study only at the development stage (develop) Limited analysis of student responses serves to find out the opinions of students after applying communication skills to inquiry learning. The student response data is obtained by giving questionnaires to students, after which it is calculated using a formula.

**Table 1.** Criteria for percentage of students' communication skills

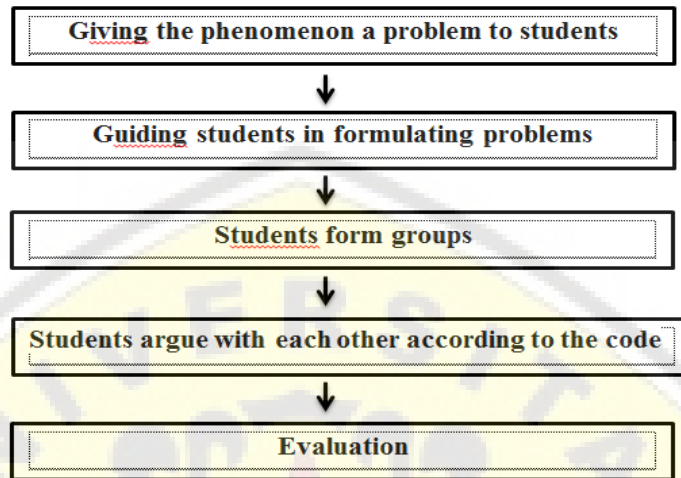
$$\text{Percentage (100\%)} = \frac{\text{The number that answer yesto all options}}{\text{Students Total}} \times 100\%$$

Percentage obtained	Category
80% < x	Very good
60% < x ≤ 80%	Good
40% < x ≤ 60%	Is being
20% < x ≤ 40%	Less
x ≤ 20%	Very less

The values obtained from the observations are presented in the form of percentages according to the formula above which the value can be stretched according to Table 1 to find out the categories of students' communication skills.

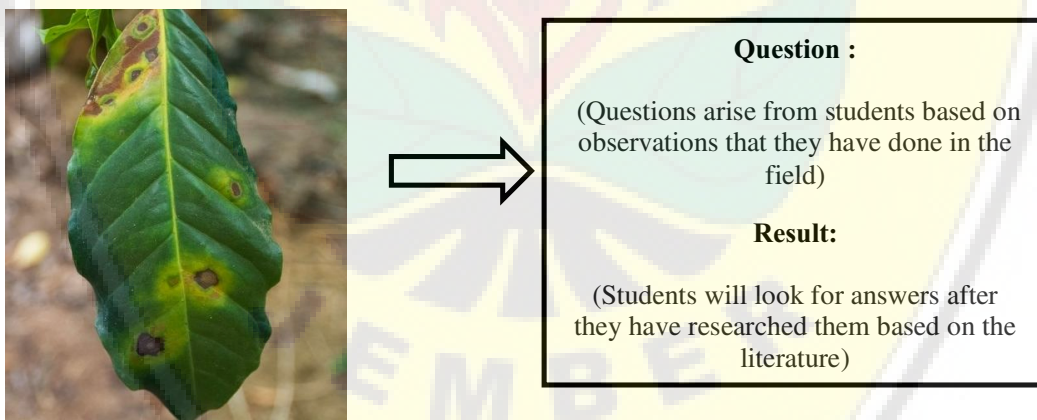
### 3. Results and Discussion

The following is a syntagmatic science communication skill combined with inquiry learning.



**Figure 3.** Syntagmatic science communication skill Combined with inquiry learning

Based on Figure 3, it can be seen that the steps in the inquiry learning process are added to the process of students giving each other opinions or questions so that indirect communication skills can run because each student must give an opinion or refutation.

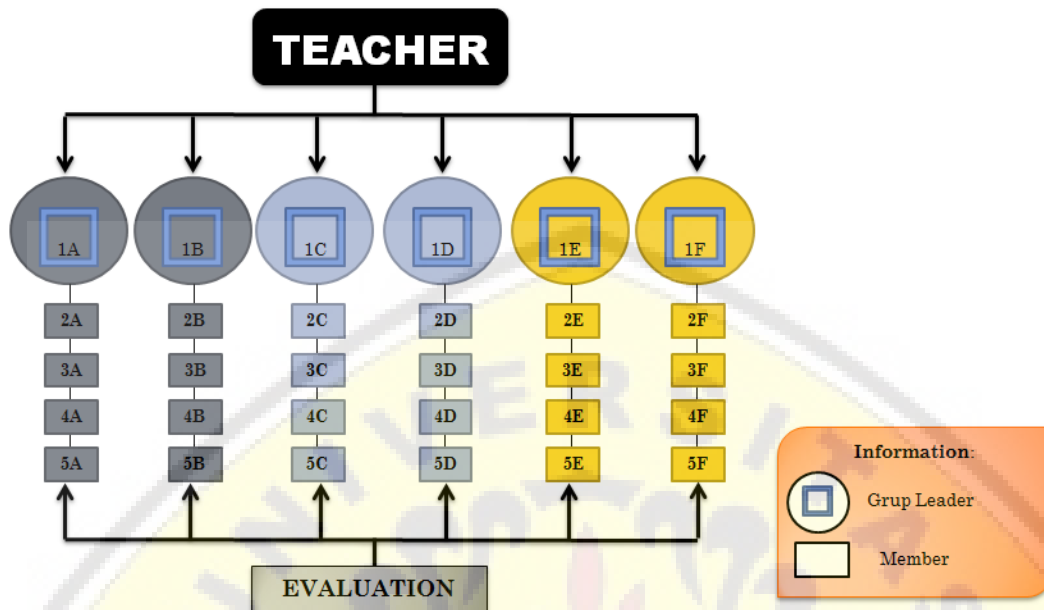


**Figure 4.** Sample problem description sheet

Based on Figure 4. description sheet of a problem raised by the teacher to students, where students will raise questions then they discuss each other, analyze answers and later will present the results of the discussion.

The following is an implementation of the application of patterns of science communication skills carried out by researchers in the classroom during the learning process.





**Figure 5.** Implementation of patterns of communication skills on inquiry learning

Based on Figure 5.in one class it will be divided into several groups, each of which consists of 5-6 students with 1 person as group leader. Then each member of group 1A and group 1B will argue with each other from giving questions and answers to the first meeting, then groups 1C and 1D argue with each other from giving questions and answers to the second meeting, then groups 1E and 1F collide with arguments from giving questions and answers at the last meeting. This interaction pattern requires that each student give an opinion or rebuttal in accordance with the code of each group so that indirectly all students are trained and must be able to argue about the material that has been discussed so that the pattern can indirectly train students to be active argue and think critically over all his arguments.

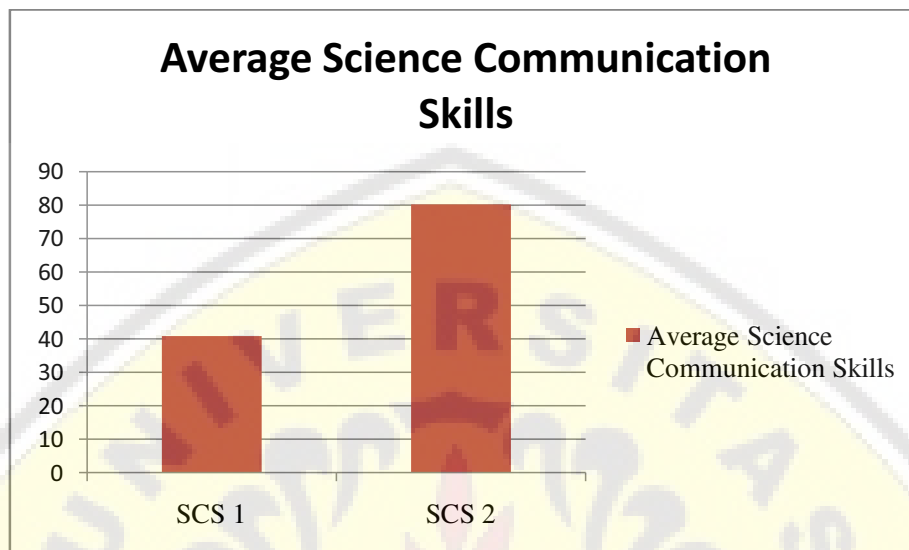
Tests of student science communication skills were carried out 2 times before the treatment (pretest) and after being given treatment (posttest). Test results and mean on science communication skills can be seen in Table 2 and Figure 5.

**Table 2.** Science communication skills test results in class VII.

No	Aspect that is considered	Pretest value	Posttest value
1	Discussion	52%	80%
2	Convey opinions	37%	75%
3	Answering questions	35%	78%
4	Writing down the discussion results	40%	83%
5	Good grammar	38%	80%
6	Short and clear talks	39%	81%
7	Sounds clearly heard	45%	85%

Based on Table 2.each student assessed his level of skill based on the communication skills assessment rubric. The interaction pattern that is applied is measured based on 7 indicators of assessment, among others, discussion, delivery of opinions, answers to questions, results of discussion, grammar, concise conversation, and clear voice. Based on Table 2, it can be seen that the percentage level of students' skills after the treatment that science communication skills of class VII increased from the pretest to the posttest. Starting from the discussion stage the percentage increased by 28%, giving opinions increased by 38%, answering questions increased by 43%, writing discussion results increased by 43%, good grammar increased by 42%, short and clear conversations increased by 42%, and clear voices increased 40 %. Therefore, it can be concluded that there is a relatively high or significant difference in students 'science communication skills between before and after treatment so that the

application of this interaction pattern triggers students to be active in conveying what is known so as to increase students' self-confidence and student learning outcomes even better.



**Figure 6.** Results of the mean test of science process communication skills for students in class VII, before treatment (SCS 1).after treatment (SCS 2).

Based on Figure 6, it can be seen that the percentage of the average score of science communication skills of students increases from before treatment and after treatment with a pretest average score of 40.8% and posttest average score of 80.2% so it can be concluded that there are significant differences in student communication skills between before and after treatment.

#### 4. Discussion

Based on the results of this study it can be seen that the application of patterns of science communication skills in inquiry learning can improve students' science communication skills. Inquiry method is a learning method that emphasizes the process of thinking critically and analytically to find and find out for themselves the answers to a questionable problem. In learning activities, students are directed to find something, form a hypothesis and even draw their own conclusions. In this pattern each student is required to give opinions or objections related to the results of the discussion with each group. The pattern of interaction learning in class can be seen in Figure 2, where after the discussion process is complete, students must individually argue with other students according to the code of each group. in one class will be divided into several groups, each consisting of 5-6 students with 1 person as group leader. Then each member of group 1A and group 1B will argue with each other from giving questions and answers to the first meeting, then groups 1C and 1D argue with each other from giving questions and answers to the second meeting, then groups 1E and 1F collide with arguments from giving questions and answers at the last meeting. The pattern of implementation of students requires students to be able to express their own opinions with good grammar, short, clear and clear voice. This can train students to be able to express their opinions so that students can think more critically, actively and learning materials can be better understood by each student. Verbal communication can facilitate learning, academic achievement, and ownership when students participate in class discussions, ask questions, seek help for problems they find [9].

The description of the results of applying the pattern of science communication skills of students in inquiry learning can be seen in Figures 3 and 4 according to 7 indicators of communication skills, namely discussion, expressing opinions, answering questions, writing the final results of discussion, good grammar, short and clear conversation, and voice heard clearly. The results of each indicator are different both before and after being given treatment. Changes in the communication patterns of students from before and after the application of the pattern of communication skills of students in inquiry learning have a mean difference of 38.4% and are included in the good category which shows that after being applied

the pattern makes students more active and brave to argue. In the first stage, the discussion has a percentage of 80% with good criteria, which means that students are able to do the stages and the division of the group discussion process well. The second stage is conveying opinions with the results of a percentage of 75% with good categories, which means students are able to give opinions actively and well. Then the third stage is answering questions with the results of a percentage of 78% with good categories, where students have been brave in answering and giving responses to questions given by their friends.

The fourth stage is writing the final results of the discussion with the results of 83% percentage in very good category, where students are skilled enough in writing the results of the discussions that have been conducted by each group. Furthermore, the fifth stage, which is good grammar with the results of 80% percentage included in the good category, where students have been able to give opinions in the order of sentence patterns and languages that can be understood by the opposing arguments so that the discussion participants can understand. The sixth stage is a brief and clear conversation with a percentage of 81% including very good categories, students have been able to express their opinions by composing short, solid and clear words. Then the last stage is clear voice with 85% percentage including very good category, where students have more courage to think so that they have high confidence and are loud and clear in conveying their arguments. Based on the results of the analysis, it was found that the science communication skills of students increased from before treatment and after treatment with a pretest mean score of 40.8% and the posttest average score of 80.2%. This learning pattern allows students to exchange ideas with other students, have opportunities in thinking, can decide or solve a problem, and present their project independently [10].

## 5. Conclusion

From the results and data analysis that has been done, it can be concluded that the pattern of science communication skills students in inquiry learning can and improve the communication skills of each student and foster students' confidence in expressing their opinions in a grammar that is brief, solid and clear.

## Acknowledgment

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## References

- [1] C Faikhamta 2018 Science Teacher Education in Thailand: A Challenging Journey. *Asia-Pacific Science Education* **4**(3) pp 8-9
- [2] Suratno and D Kurniati 2017 Performance Profile of the Coffee Plantation Area Students in Solving the Math-Science Problem. *Advanced Science Letter* **23**(2) pp 1-2
- [3] Smallhorn, Masha., Jeanne, Young, & Silva. 2015. Inquiry-Based Learning to Improve Student Engagement in a Large First Year Topic. *Journal Student Success*, **6**(2), 66-67
- [4] M Pedaste 2015 Phases of Inquiry-Based Learning: Definitions and the Inquiry Cycle *Educational Research Review* **14** pp 47-61
- [5] I Roux, Lynette & Nagel 2018 I Seeking the Best for Deep Learning in a Flipped Classroom-Viewing Student Perception Through the Community of Inquiry Lens *International Journal of Educational Technology in Higher Education* **15**(16) pp 7-10
- [6] S C J Long and B Yejun 2018 Action Research: First-Year Primary School Science Teacher's Conceptions on and Enactment of Science Inquiry in Singapore *Asia Pacific Science Education*, **4**(3) 15-18
- [7] F M Yusof 2014 Understanding Teacher Communication Skills *Procedia Social and Behavioral Science* 155
- [8] V Kareva 2017 The Influence of Classroom Communication on Student Commitment to the University *European Scientific Journal* **7**(26) pp 91-92
- [9] P Long and D N Kristin 2018 Self-Compassion is Associated with Reduced Self-Presentation Concern and Increased Student Communication Behavior *Learning and Individual Differences* **67** pp 223-231

- [10] J Sriarunasmee, S Praweenyaand Pimpan 2015 Virtual Field Trips with Inquiry Learning and Critical Thinking Process: A Learning Model to Enhance Students' Science Learning Outcomes *Procedia Social and Behavioral Science* **197**

