STUDENT'S MATHEMATICAL COMMUNICATION SKILLS USING DISCOVERY LEARNING MODEL AIDED BY PROPS IN HANOI, VIETNAM

a final project

submitted in partial fulfillment of the requirements

for the degree of *Sarjana Pendidikan*

in Mathematics

by

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DECLARATION OF ORIGINALITY

I am Afifa Setya Himawati. hereby declare that this final project entitled *Student's Mathematical Communication Skills using Discovery Learning Model Aided by Props in Hanoi, Vietnam* is my own work and has not been submitted in any form for another degree or diploma at any university or other institute of tertiary education. Information derived from the published and unpublished work of others has been acknowledged in the text and a list of references is given in the bibliography.

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MOTTO

- ❖ Don't give up, the beginning is always the hardest. (Kemmy Nola)
- ❖ So be patient. Indeed, the promise of Allah is truth. And let them not disquiet you who are not certain [in faith]. (QS Ar Rum: 60)
- ❖ A person who never made a mistake never tried anything new. (Albert Einstein)

DEDICATION

- To my beloved parents, they are Mr. Poniman as my father and Mrs. Indrawati as my mother, and my one and only sibling that I have, he is Naufal Lukman Himawan.
- To my bestfriends.
- To my Mathematics Education' friends.

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The author also aware that in the preparation of this thesis is still not perfect yet. The author are expectation for suggestions and criticisms to the better of the preparation of this thesis. Author hopes this paper useful for the reader.

Semarang, 23 May2017

Writer

ABSTRACT

Himawati, A.S. 2017. *Student's Mathematical Communication Skills using Discovery Learning Model Aided by Props in Hanoi, Vietnam.* Final Project. Mathematics Department Mathematics and Natural Sciences Faculty, Universitas Negeri Semarang. First Advisor: Dra. Kristina Wijayanti, M.S. and Second Advisor: Dr, Wardono, M.Si.

Keyword: mathematical communication;props; discovery learning

The level of mathematical communication skills in Vietnam is still low, because the students have not been given a great opportunity to solve problems independently. Discovery Learning using props is a mathematics learning that has not been implemented in Vietnam, which is a learning that involves students actively in the learning process.

This research purpose to identify the difference and improvement of the student's mathematical communication skills who learn discovery learning using props and conventional learning model in Vietnam. This research is quantitative design. The population in this research are students of class VIII Pascal Secondary School, Hanoi Vietnam academic year 2016/2017. By random sampling technique, VIII B class was selected as the Experimental class and VIII A as the control class. This research use true Experimental design with pretest-posttest control design. The method of this research are test. The data analysis methods for this research are proportions test, t-test, gain normalized test.

The result of this research (1) the mathematical communication skills of students who learn discovery learning using props reached the mastery classical, (2) the mathematical communication skills of students who learn discovery learning using props is better than the mathematical communication skills of students who learn conventional learning model in Vietnam, (3) the improvement in mathematical communication skills of students who learn discovery learning using props is higher than the improvement in mathematical communication skills of students who learn conventional learning model in Vietnam.

Based on the results of research, discovery learning can be applied as an alternative learning models to develop students' mathematical communication skills, rectangular and triangle props can be used as an alternative learning media that can be integrated with discovery learning. Teachers should pay more attention to how discovery learning was going, so the learning process can be carried out in accordance with the specified time.

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CHAPTER 1

INTRODUCTION

1.1 Background of the Research

The key to the development of the future for a nation is education. Therefore, education plays an important role in creating an intelligent, creative, skilled, responsible and productive human being. One way to form an intelligent human being is through the learning process. According to Suherman, et al (2003: 8) learning is a process of functional communication between students and teachers and students with students, in order to change the attitude and mindset that will become a habit for students concerned. Learning activity is a main activity in the implementation of educational activities in school. Through this process is expected to realize the aim of education is change the behavior of students from previous condition. At school, teaching and learning activities are prepared in accordance with the curriculum then elaborated in the subjects. One of the subjects that is important and the basis for several other subjects is mathematics. Mathematics is taught at all educational levels ranging from elementary school, junior high school, senior high school, up to the level of college. Mathematics has a considerable role in daily life. Mathematics requires students on developing the mindset not only to solve mathematical problems but also problems in daily life. Mathematics is an abstract science that has an important role in a variety of other disciplines. Mathematics serve as the manifestation of the implementation of educational such

subjects. Mathematics is learned and developed in order to promote students' thinking to deal with the advance of science and technology (Hudojo, 2005: 5). Learning mathematics at school aims to prepare students to face changes in the dynamic world with an emphasis on logical reasoning, rational, critical and provide the skills to be able to use mathematics and mathematical reasoning in solving various problems in daily life as well as in the study of other disciplines. Hence, mathematics should be given to every student from elementary school to college level. Wardono et all (2016) mentioned that math proficiency is considered very beneficial for students to follow learning at levels more or to overcome problems in their daily lives. Mathematics studied and developed in order to equip students with the ability to think logically, analytical, systematic, critical, and creative.

Education in Vietnam is divided into five levels: Pre-school Education, Primary Education, Basic Secondary School, Secondary School and Higher Education/University Education. While the formal education consists of three levels: Primary Education *(Tieu Hoc*), Basic Secondary Education *(Trung Hoc Co So*), Secondary School Education *(Bang Tot Nghiep Pho Thong Trung Hoc*) or Secondary Vocational Education *(Bang (Tot Nghiep) Trung Hoc Chuyen*). Primary Education last for 5 years and compulsory for all children aged 6-11 years old. Secondary Education last for 4 years and compulsory for all teenage aged 11-15 years old. While the Secondary School Education and Secondary Vocational Education has the same level as what Indonesia has, it is the same as SMA and SMK. This level lasts for 3 years and compulsory for all teenage aged 16-18 years old. The Education System in Vietnam will be shown in the following Figure 1.1.

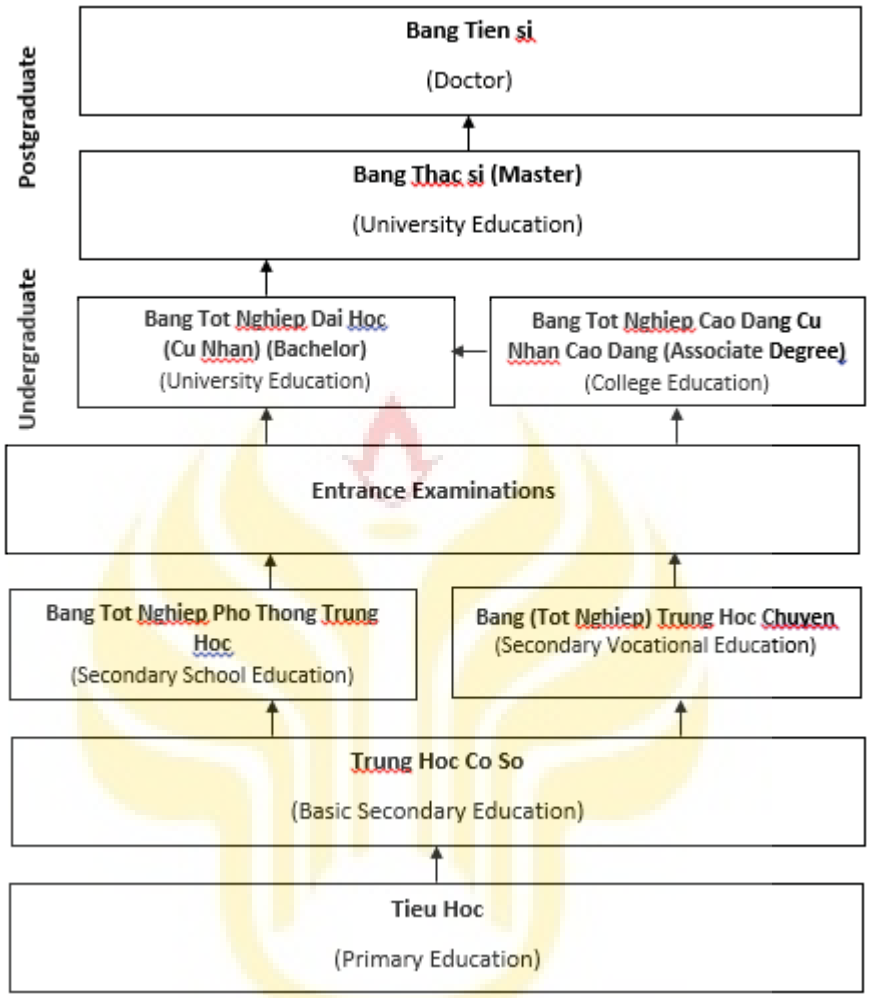

Figure 1.1. Education System in Vietnam

Vietnam national mathematics curriculum is designed and planned by the Ministry of Education and Training (MOET). Tuan Anh Le (2006) mentioned that the teaching and learning of mathematics has a very important role in the development process of education in Vietnam. In Vietnam, mathematics is often considered as the main subject of the school. Mathematics is learned from grade 1 to 12 in Vietnam schools. Moreover, mathematics has always appeared in testing of diploma school.

Based on data summarized from *International Mathematical Union* in the table below, it appears that there is a huge gap in the number of publications between Singapore and other countries in Asean.

Table 1.1 Understanding of Mathematical Concepts in ASEAN Countries

Country	Mathematics	Combinatoric	Algebra	Apl Math	Statistics
Brunei	450	3	56	184	739
Burma	111	3	8	54	933
Cambodia	152	-	12	72	2.027
Indonesia	3.022	85	246	1.579	11.569
Laos	1.196	41	152	651	4.642
Malaysia	6.911	116	683	4.184	16.133
Philippines	1.355	67	179	620	8.546
Singapore	14.864	502	4.804	7.524	27.307
Thailand	4.922	82	760	2.756	20.707
Vietnam	2.117	55	624	1.101	9.425

(Source : *International Mathematical Union*)

According to Table 1.1 shows that Singapore dominates the understanding of mathematical concepts compared to some other countries in Asean. This shows that Singapore has the high level of understanding of mathematical concepts. While Vietnam can not be said to have a high level of understanding of mathematical concepts.

National Council of Teachers of Mathematics, as quoted by Gordah & Astuti (2013) says that the purpose of learning mathematics, namely: 1) learn to communicate (mathematical communication); 2) learn to reason (mathematical reasoning); 3) learn to solve the problems (mathematical problem solving); 4) learn

to associate the idea (mathematical connections); 5) the formation of positive attitudes towards mathematics (positive attitudes toward mathematics).

The mathematical communication skills holds a very important role in the math class. Ontario Ministry of Education as quoted in Widjajanti (2015) the mathematical communication skills is an important process for learning mathematics because through communication, students can reflect, clarify and expand ideas and understand the relationship of mathematics and mathematical arguments.

Tran Vui, et al. (2007) states that through mathematical communication skills students can develop an understanding of mathematics when using correct mathematical language to write about math, representing mathematical ideas verbally, images and symbols. Tran Vui adds that mathematical communication skills of students in Vietnam is still low. Meanwhile, mathematical communication is very important for students to learn mathematics.

National Council of Teachers of Mathematics (NCTM, 2000: 60) mentioned that the communication of mathematics is the ability to organize and consolidate mathematics idea by communicating speaking and writing, communicate ideas about mathematics in a logical and clear to others, to analyze and evaluate the mathematics idea and strategy that used by others, and use the language of mathematics to express mathematical ideas exactly.

Based on the Principles of Teaching (NCTM, 2000: 20), which is quoted in Walle (2007: 3), to teach mathematics effectively requires an understanding of what students know and need to learn and then give a challenge and support them

to learn it well. So, in order mathematics learning to be effective is required tools such as props that is required to facilitate the learning. With the props students can more easily to understand the concepts and be able to develop the power of high-level thinking. According to Freudental quoted in Wardono et al (2017) science will be meaningful to learners if the learning process involves realistic problem.

In addition to the lack of a less interactive learning in the form of lack of learning media, problems faced by students can be caused of the way the presentation of the material used are still using a model of learning that has not been able to invite the active students. As conventional methods in Vietnam, which makes students less active because teachers are more active in presenting the material. This has relation with (Trần Thị Tuyết, 2013) which reveals that students in Vietnam are generally viewed as devout, shy and less active students in the classroom learning process. Thus, students only rely on teachers in the learning process in the classroom. Similarly, Nguyen Tuong Hung (2002) also points out that, Vietnamese students usually stay in class and wait until called by the teacher, not volunteers to answer questions. In Vietnam, Thompson (2009) states when a teacher still has authority and just gives knowledge directly to the student, the student will remain inactive, and sometimes they will not be involved in classroom activities. However, if the teacher gives lessons in a more interactive way in which students are encouraged to provide comments and suggestions, students will be more opened and actively engaged in classroom activities. It is required innovative learning model that can help students to become more active and is able to improve

students' mathematical communication that one of which is learning model Discovery Learning.

According to Bruner, as quoted by Dalyono (2007: 41), Discovery Learning is learning theory that is defined as a learning process that occurs when students are not presented with a lesson in its final form, but is expected to organize the materials are studied with a final form. In Discovery Learning, material or substance of lesson that will be studied by students is not presented in final form, but students are encouraged to identify which would like to note, followed by finding the information themselves, then organize or reshaping they met and then they serve in final form that they understanding. Discovery learning has the advantage of making students more active in learning, students can really understand the concept that has been studied, the answers which is obtained will lead to a sense of satisfaction in students. Besides that learning model of Discovery Learning can also change the original teacher-oriented learning become student oriented. While the use of mathematic props is an effort to facilitate the learning process of discovery learning. Through the props, the syntax in the discovery learning can be filled to the maximum. For example, during the second phase of the process of discovery learning, the identification of problems. In this phase, students are faced to a problem. The teacher gives a problem in the form of rectangular and triangle props, then students are asked to analyze how to solve the problem. Then the teacher gives students the chance to collect data in accordance with their problems using existing props. This phase is the third phase of discovery learning, namely data collection. Activities observe a model, form, and the use of props is

the fulfillment of the visual aspect, while the intellectual aspects indicated by the initial explanation linking students of teachers with new knowledge that is possessed so that they are able to acquire knowledge and new discoveries of the props.

Based on the description above, the researcher decided to do research under the title "The Student's Mathematical Communication Skills Using Discovery Learning Model Aided by Props in Hanoi, Vietnam"

1.2 Research Problems

Based on the description, the formulations of the problems proposed in this research are as follows.

1. Is the student's mathematical communication skills using discovery learning model aided by props reach the classical completeness ?
2. Is the student's mathematical communication skills using discovery learning model aided by props is better than the student's mathematical communication skills using conventional learning model in Vietnam ?
3. Is the improvement of the student's mathematical communication skills using discovery learning model aided by props is higher than the improvement of the student's mathematical communication skills using conventional learning model in Vietnam ?

1.3 Objectives of The Research

This research was intended to reach purposes as follows.

1. To identify the mathematical communication skills of students who learn discovery learning aided by props is reaching the classical completeness.

2. To identify the mathematical communication skills of students who learn discovery learning aided by props is better than the mathematical communication skills of students who learn conventional learning model in Vietnam.
3. To identify the improvement in mathematical communication skills of students who learn discovery learning aided by props is higher than the improvement in mathematical communication skills of students who learn conventional learning model in Vietnam.

1.4 Significances of The Research

1.4.1 Theoretical Significance

The theoretical significance of this research is to provide recommendations on the learning model of discovery learning use learning media as a means to improve the student's mathematical communication skills.

1.4.2 Practical Significance

1. For The Writer
   a. Add insight into the implementation of learning with discovery learning model aided by props.
   b. Get experience in choosing the right model for the learning process.
2. For The Students

The courage of students to express mathematical ideas and improve the cooperation between students in the group to eventually improve the skills of students' mathematical communication itself.

3. For The Teachers

a. As reference material or feedback about the learning model that can be used as an alternative in teaching in an effort to increase students achievement.

b. As a motivation to do simple study that is beneficial to the improvement in the learning process and improve the skills of the teachers (professionalism).

4. For the Schools

This research is expected to contribute a good idea for the school for the improvement and development of the learning process in schools to improve learning achievement and to enhance the completeness of student in mathematics learning.

1.5 Definitions of Key Terms

In this research, there are four important key terms which need to be clearly defined. The definitions of key terms are written in order to equalize the point of view and the interpretation of the title of the research. The definition of key terms are mentioned as follows.

1.5.1 Mathematical Communication Skills

Mathematical communication is the skills to communicate which includes writing, listening, analyzing, interpreting, and evaluating ideas, symbols, terms, and information of mathematics that is observed through the hearing, interpreting, and discussion process (Ramdhani, 2012: 47).

1.5.2 Discovery Learning Model

Brunner as quoted by Balim (2009) discovery is how to find from does not know to know by students themselves. Discovery learning is a mental process in

which students assimilate a concept or a principle Sund (in Suryosubroto, 2009). Discovery learning model is applied in this study include: (1) stimulation kind of motivation, (2) the students work in groups of four people to solve the problem, (3) the groups activities include the collection of information, reasoning and conclusions of the invention, (4) the teacher serving as a facilitator, which provides guidance to each group on a given problem.

1.5.3 Mathematics Props

Suherman (2003:43) the mathematics props of belongs to as an information carries as well as a tool to instill a concept. The aims is make students' learn more easily. Mathematics props in this research can be interpreted as a set of concrete objects are designed, manufactured, and arranged deliberately used to help inculcate and understand the concepts or principles in mathematics.

1.5.4 Minimum Passing Criteria (MPC)

Literally, the term of minimum passing criteria (MPC) in Vietnam, especially in Pascal Secondary School does not actually exist. Students are only required to get as well a score as possible. But according to observations and interviews with teachers of mathematics in class VIII in Pascal Secondary School, if there are students who scored less than 75 then it will be given extra exercises to do at home. Thus the term of remedial there is getting more exercises. In this research, the score of the student is said to be complete if the score obtained by the students of more than or equal to 75. Within the limits of a minimum score that is used in Pascal Secondary School, which is 75. So, if there are students who get score greater than or equal to 75, then these students otherwise completed. While

the classical completeness is (if the percentage of students who have completeness reached MPC) at least 75% of the number of students in the class.

1.6 Outline of the Report

In broad outline of this thesis consists of three parts, namely the beginning, part of the contents, and the final part, each of which is described as follows.

1.6.1 The Beginning

The initial part consists of a title page, a page approval, endorsement page, motto and offerings, abstract, foreword, table of contents, list of tables, and a list of appendix..

1.6.2 Part of the Contents

Part of the content is an essential part of the thesis consists of five chapters.

Chapter 1 : Introduces the general background of the research, limitation of the research, research problems, objectives of the research, significances of the research, definition of key terms and the outline of the report.

Chapter 2 : Presents the literature review consisting of review of the previous study, the theoritical reviews and the theoretical framework.

Chapter 3 : Discusses about the method of investigation. It includes research design, participants of the study, research variable, research instruments, procedure of data collection, and method of data analysis.

Chapter 4 : Covers the result of the research. It presents the research finding and discussion about the result analysis.

Chapter 5 : Gives the conclusion and suggestions for the future research.

1.6.3 Final part

The final part of thesis contains a bibliography and appendix.

CHAPTER 2

LITERATURE REVIEW

2.1 Theoretical Basis

2.1.1 Mathematical Communication Skills

Mathematical communication is an essential skill in mathematics, according to The Intended Learning Outcomes (in Armiati, 2009: 2), mathematical communication is the skills to express mathematical ideas coherently to friends, teachers, and others through the spoken or written language. This means that with their mathematical communication teachers can more understand the student's ability to interpret and express their understanding of the concepts they are learning. To develop mathematical communication skills, Baroody in Qohar (2011) suggests that there are five aspects of communication which need to be developed, namely: (1) representing, (2) listening, (3) reading, (4) discussing, and (5) writing. But in the mathematics curriculum standards NCTM (2000), the ability of the mathematical representation is no longer included in the communication but became one of its own abilities that should be developed in mathematics. Therefore, aspects of communication are no longer contains representations. Description of the aspects are as follows.

1. Listening

Listening is a very important aspect in communication. By listening, students can capture the essence of the topic are being discussed or discussed so

that they can give their opinions and comments. Baroody in Qohar (2011) adds that the listening well of friends statement in a group can help students construct mathematical knowledge is more complete and more effective of math strategies.

2. Reading

Reading is a complex aspect where there are aspects to remember, understand, compare, analyze, and relate what is contained in the reading. In reading, students can understand the mathematical ideas that poured another person in writing and may associate the information he read with the knowledge that he has had so that it can build its own new knowledge.

3. Discussion

In the discussion, students can express and express mathematical ideas about the topic are being discussed to others. In addition, student can ask the teacher or friend about things he did not know or whom he still doubted. With discussion with their friends to resolve the problem, student will be easier to build knowledge and exchange ideas on strategies to resolve the problem so that their skills in solving problems will increase. Huggins in Qohar (2011) suggests that one form of mathematical communication is speaking. It is identical to the discussion (discussing) proposed by Baroody.

4. Writing

Writing is an activity that is done consciously to reflect the mind set forth in the media, whether paper, computers, and other media. By writing, student can associate the concept are being he learned with the concept he had understood. It can help student to clarify and sharpen the understanding of mathematical thinking.

As noted in Qohar Huggins (2011) that writing about something that is thought to help the students to gain clarity and can reveal the level of understanding of the students.

In general, the skills of mathematical communication can be divided into spoken mathematical communication skills and written mathematical communication skills. Spoken mathematical communication skills are speaking, listening, discussing, and exchanging opinions. While written mathematical communication skills may include graphics, images, tables, equations or writing in answer to questions.

According to the NCTM (2000: 268) the skills of mathematical communication can be seen from the ability to: (1) organize and consolidate mathematical ideas through communication, (2) communicate mathematical ideas logically and clearly to friends, teachers, and others, (3) analyze and evaluate mathematical ideas and other strategies, (4) use the language of mathematics to express mathematical ideas exactly. Indicator of mathematical communication by NCTM as quoted by Fachrurazi (2011: 81) can be seen from (1) the ability to express mathematical ideas through speech, writing, and demonstrate and describe it visually. This ability emphasizes the students' ability in writing or sketching or drawing about mathematical ideas held to resolve the issue. (2) the ability to understand, interpret, and evaluate mathematical ideas, either orally, in writing, or in other visual forms. This ability emphasizes the students' ability to understand and evaluate what can be referred to on the matter and drawing conclusions from a given problem. (3) the ability to use terms, notations of mathematics and its structures to

present ideas, describe relationship by models of situation. This ability emphasizes the students' ability in writing the terms, notations of mathematical appropriately to facilitate problem solving.

Brenner (1998: 109), states three aspects of mathematical communication skills as follows.

Table 2. 1 The Framework of Mathematical Communications Indicators

Communication about mathematics	***Communication in mathematics***	***Communication with mathematics***
(1) Reflection on cognitive processes. Description of prosedures, reasoning, metacognition-giving reasons for procedural decisions.	*(1) Mathematical register. Special vocabulary. Particular definitions of everyday vocabulary. Syntax, phrasing. Discourse.*	*(1) Problem-solving tool. Investigation. Basis for meaningful action.*
(2) Communication with others about cognition. Giving point of view. Reconciling differences.	*(2) Representations. Symbolic. Verbal. Physical manipulatives. Diagrams, graphs. Geometric.*	*(2) Alternative solutions. Interprestation of arguments using mathematics. Utilizatical of mathematical problem solving inconjunction with other forms of analysis.*

The framework above shows that mathematical communication seen as three different aspects, namely: (1) Communication about mathematics is the skills to develop student's knowledge; (2) Communication in mathematics is the skills to use language and symbols in interpreting mathematics; and (3) Communication with mathematics is the skills to use mathematical problem solving. Mathematical communication framework used in this research is communication with mathematics. Communication with mathematics includes two basic communication, as follows.

1. Problem Solving Tool. Indicators of Problem Solving Tool is as follows.
   a. Investigation, which students can conduct investigation or inquiry to resolve the problem.
   b. Basis for meaningful action, which students can use the mathematical concepts with meaningful steps to resolve the problem.
2. Alternative Solution. Indicator of Alternative Solution is as follows.
   a. Interpretation of arguments using mathematics, which students can interpret their argument with mathematical concepts to solve mathematical problems.
   b. Utilization of mathematical problem-solving in conjuction with other froms of analysis, which students can use completion of mathematical problem associated with other forms of analysis to solve another mathematical problems.

Underlying the election of mathematical communication indicators in this research is that the mathematical communication skills are emphasized in this research are written communication research so that the selected indicators are indicators that appropriate to written communication. Therefore, the written mathematical communication indicators that will be used in this research are as follows.

1. The student's ability to write the material they have already known and the suitable question in the problem
2. The student's ability to write the formula, steps of work, and the reasons of problem solving

3. The student's ability to explain the problem in to mathematics form, the student's ability to explain the problem in to mathematics sketch, the student's ability to explain mathematics sketch in to mathematics form
4. The student's ability to writing the clonclusion based on the solution they have been obtained
5. The student's ability to utilize the mathematical problem solving in conjuction with other forms of analysis.

2.1.2 Discovery Learning Model

According to Sund in Suryosubroto (2009: 179), discovery learning is a mental process in which students assimilate a concept or a principle. The definition of the mental process is like observing, classifying, making allegations, explaining, measuring, making inferences. Here are the stages of the learning process using discovery learning model (Syah, 2008: 244).

1. Stimulation

   Students are faced to something that causes confusion, then proceeded to not give a generalization, that the desire to investigate itself. In addition, learning activities begins with asking questions, suggestions of reading books, and other learning activities that lead to the preparation of problem solving.

2. Problem statement

   Provide opportunities for students to identify as much as possible the agenda of issues relevant to learning materials, then one of them is selected and formulated in hypothetical form (temporary answer to the question problem).

3. Data collection

   Provide opportunities for students to gather as much information relevant to prove the correctness of the hypothesis.

4. Data processing

   Process the data and information that has been obtained by the students through interviews, observation, and so forth, and then interpreted.

5. Verification

   Do a careful check to prove whether correct or not the hypothesis set forth above, is connected with the results of data processing.

6. Generalization

   Make a conclusion that can be used as a general principle and applies to all event or the same problem, with notice the verification results.

Discovery learning model is more suitable when used in teaching and learning that are cognitive (Syah, 2008: 244). Model of discovery learning has advantages, namely (1) to build commitment among the students to learn, which is realized with the involvement, sincerity and loyalty to look for and find something in the learning process, (2) establish an attitude, creative, and innovative in the learning process in order to achieve teaching objectives, (3) establish a confidence (self-confident) and open (openness) of the findings.

The lack of the discovery learning model, namely (1) the relative takes a lot of time and often require more than one session (meetings/sessions), (2) create lesson materials become blurred and confused, especially if the learning process is less guided (Syah, 2008: 244). However, the lack can be overcome by using

mathematics props in learning. This is because the use of learning media can minimize the learning time.

2.1.3 Mathematics Props

Terms of props often replaces the term of learning media. Mathematics props can be interpreted as a set of concrete objects are designed, manufactured, and arranged deliberately used to help inculcate and understand the concepts or principles in mathematics. In trying to understand abstract mathematical concepts, children need props such as concrete objects (real) as an intermediary or visualization. In mathematics learning, the use of props can also improve students' motivation and can minimize the learning time. This is in accordance with the opinion of Erman Suherman which revealed that in mathematics we often use props, by using props, then.

1. The learning process is motivated. Both students and teachers, and especially students, the interest will arise. They will be happy, excited, interested, and therefore will be positive about learning mathematics.
2. The abstract mathematical concepts is presented in concrete form and therefore more able to understand and accept, and can be embedded at lower levels.
3. The relationship between abstract mathematical concepts with objects in nature around will be better understood.
4. Abstract concepts in concrete form it is presented in the form of a mathematical model that can be used as an object of study as well as a tool to examine the new ideas and new relations are getting a lot.

5. Props can be either real objects, pictures or diagrams. The advantages of props of real objects are objects that can be moved (manipulated), while the weakness is not be presented in the book (written).

Therefore, to the written form we create a picture or diagram, but the weakness can not be manipulated. There are several things that must be considered in making props, namely.

1. Durable (Made of a material that is strong enough)
2. Interesting form and colour
3. Simple and easy to manage (not elaborate)
4. The appropriate size (balanced) with the children's physical size
5. Can present (in real terms, pictures or diagrams) mathematical concepts
6. In accordance with the concept (note: if you create visual aids such as triangles with area or massive ball, the children may think it's not just the ribs of triangle but with area, that the ball was massive, not just the skin, this obviously does not suitable to the concept of triangles and the concept of the ball)
7. Can demonstrate mathematical concepts clearly.

In this research, the props that be used were the props of the area of rectangular and triangule. Using props is expected to make it easier for students to receive lessons. In addition, it can attract student's attention and can stimulate students to think.

2.1.4 Syntax of Discovery Learning Aided by Props

Syntax of learning model of discovery learning using props in this research like syntax in learning of discovery learning, but the learning is aided by props. The syntax can be presented with a table 2.2.

Table 2.2 Syntax of Discovery Leaning using the props

No	Phase	Syntax of *Discovery Learning*	The Use of Props
1	Stimulation	Teacher gives problems or questions and does not give a generalization that generate curiosity in the students	
2	Problem Statment	Student identify and analyze the problems that they found	Used to help students in analyzing problems concretely
3	Data Collection	Giving studnets the opportunty to collect a variety of relevant information	Help students to finding a concept when thet collect data and solve the prolems
4	Data Processing	Data processing and information that has been obtained by the students	Assist students to solving the problems
5	Verification	A careful examination to prove whether correct or not of the data that students collect through presentations	Used during the presentation so that every students knows how to use the props
6	Generalization	Make conclusions by students with the help of teacher	Teacher give example of using the right props

2.1.5 Learning Theory

2.1.5.1 *Learning Theory by Jerome S. Bruner*

Bruner divides the world of children into three modes, namely enaktif, iconic and symbolic (Ruseffendi, 2006: 151). The following is an explanation of the three models of Bruner.

Table 2.4 Model of Bruner

Mode	Characteristics
Enaktif	Serving the world of children which kind is motion
Iconic	Serving the world of children which kind is perception static
Symbolic	Serving the children which kind is language and symbols

2.1.6 Mathematics Learning

According to Gagne as quoted by Purwanto (2007: 84), learning occurs when a stimulus situation along with the contents of memory affect students such that their actions (their performance) change over time before they experienced the situation to the period after they suffered the situation. Learning is modification or reinforce behavior through experience (learning is defined as the modification or strengthening of behavior through experiencing) (Hamalik, 2011: 27). Thus, learning can be defined as the process to change human behavior and learning that includes everything thought out and done by the man himself. Changes in behavior is behavior that can be either visible (overt behavior) or behaviors that are not visible (inert behavior).

Learn is closely related to learning. According to Rifa'I & Anni (2012: 158), learning is an effort for educators to form the desired behavior by providing the environment, to enable the stimulus relationship (the environment) by the behavior of learners. Sugandi (2008: 9) states that learning is a process of collection of the individual, which is stimulus of one's environment into a number of information,

which in turn can cause learning outcomes in the form of long-term memory. From the definition of learning, learning is an effort to realize the learning process in the classroom. After following the study, students will acquire the learning outcomes that appropriate to the learning process is going through.

According to the NCTM (2000: 16) mathematics learning requires an understanding of students' knowledge and what they need to learn, and then help to meet their needs so that they can learn well. NCTM (2000: 20) adds that learning mathematics is learning that built the fundamental role of students' conceptual understanding, the provision of appropriate materials and procedures of student activity in the classroom. According to Kilpatrick (2001: 5), the learning of mathematics in students having 5 components are intertwined called mathematical ability (mathematical proficiency), which are (1) conceptual understanding, (2) procedural fluency, (3) strategic competence, (4) adaptive reasoning, and (5) productive dispotition. Thus, learning mathematics is a process or efforts of mathematics teachers in mathematics taught to learners with attention and understanding of the needs of students about mathematics that is very diverse so that students can learn mathematics well.

2.1.7 Teaching Materials

Referring to the education curriculum in Vietnam, the study is conducted on the material rectangular and triangle. This study will discuss about the area of rectanglular and triangle then use them to solving daily problems.

2.1.7.1 Rectangular

Figure 2.1 below is used to find the formula for the area of rectanglular.

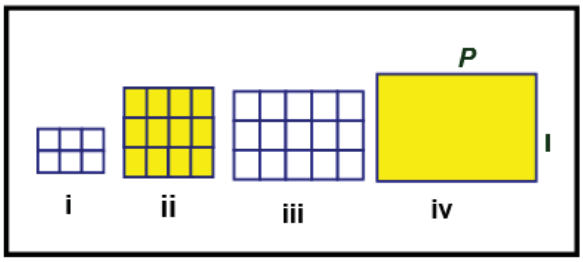

Figure 2.1. How to Find the Area Formula of Rectanglular.

The following table is a table for help to find a formula for the area of rectanglular based on Figure 2.1 above.

Table 2.5. How to Find the Area Formula of Rectanglular

Picture	Area (A)	Lenght (a)	Width (b)	$\boldsymbol{A = a \times b}$
(i)	6	3	2	$3 \times 2 = 6$
(ii)	12	4	3	$4 \times 3 = 12$
(iii)	15	5	3	$5 \times 3 = 15$
(iv)	ab	a	b	$a \times b$

From the table it can be seen that the results in the second and fifth columns are the same. Conclusion: if there is a rectangular with the length = a, width = b, and area = A, then $A = a \times b$

2.1.7.2 Triangle

Figure 2.2 below is used to find the formula for the area of the triangle.

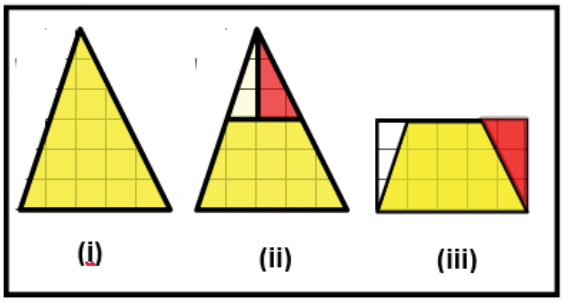

Figure 2.2. How to Find the Area Formula of Triangle

Model (i) and (ii) have the same area.

Base (i) = base (ii) = 5 units of length and altitude (i) = altitude (ii) = 6 units of length.

Model (ii) converted into model (iii), so that it becomes a rectangular which the area equal to the model (ii).

Length (iii) = 5 units of length, and the width = 3 units of length.

Area (ii) = area (iii) = 5×3

$$= \text{base (ii)} \times \frac{1}{2} \times \text{altitude (ii)}$$

$$= 5 \times \frac{1}{2} \times 6$$

$$= 5 \times 3$$

$$= 15$$

So area (ii) = area (iii) = 15 unit area.

Conclusion: The area of a triangle with the base = a, altitude = h and area = A is $A = \frac{1}{2} \times a \times h$.

2.2 Related Research

Discovery learning models applied in research Balim (2009: 16) states that an effective model of discovery learning for successful student learning outcomes. Students can describe concepts, information, and events through a discussion activity, ie ask, do discovery based on information that has been collected (reasoning), and find a solution.

Research by Ari Chusniyati entitled "Improvement in Mathematical Communication Skills with Mathematics Learning through Inquiry Approach Aided by Props". The results showed that student's mathematical ommunication with mathematics learning increased with the implementation of inquiry approach aided by props.

2.3 Thinking Framework

Communication ability are essential in daily life. Surely mathematical communication is needed in mathematics. Since the purpose of mathematical communication in mathematics itself is the students' ability to communicate mathematical objects that they learned to be free to communicate and express ideas and solutions of mathematical problems are being studied.

One of the factors that affect teachers in teaching and learning is a learning model used. A teacher needs to innovate and implement a model of effective learning and fun for students. It is intended that students can actively participate in learning activities. Learning model that should be used in accordance with the principle of Piaget is active learning through social interaction, and learning through experience itself. Discovery learning model of learning is one of the

innovative learning model that can provide active learning conditions for students. If students are faced with a problem, it is expected that students can construct their own knowledge and make students more independent. Discovery learning model provides wider opportunities to students to develop mathematical communication ability. This is because the model of discovery learning, students are taught to solve problems step by step in accordance with the syntax of discovery learning learning. In the learning is intended that students can communicate a student's mind about the idea clearly, precise and concise, in which students can be actively involved in discussions and get their own learning resources.

Learning media is also important in learning activities of students as it can be used to assist students in finding and understanding the concept of the material being studied. The use of media can also facilitate teacher at the time of delivering learning materials. The use of objects or media in learning aligned with the theory proposed by Brunner. There are three stages through which children learn, according to Bruner which enaktif stage, the stage of the iconic and symbolic stage. At this stage of enaktif learners can see, touch and manipulate objects directly . This shows that the use of the media in the form of visual aids in line with the theory of Bruner. Mathematics visual aids is one of the media that can make learning more meaningful because it can make a distinct impression on the students that pushed their memory of the material presented. The following thinking framework of researchers in this research.

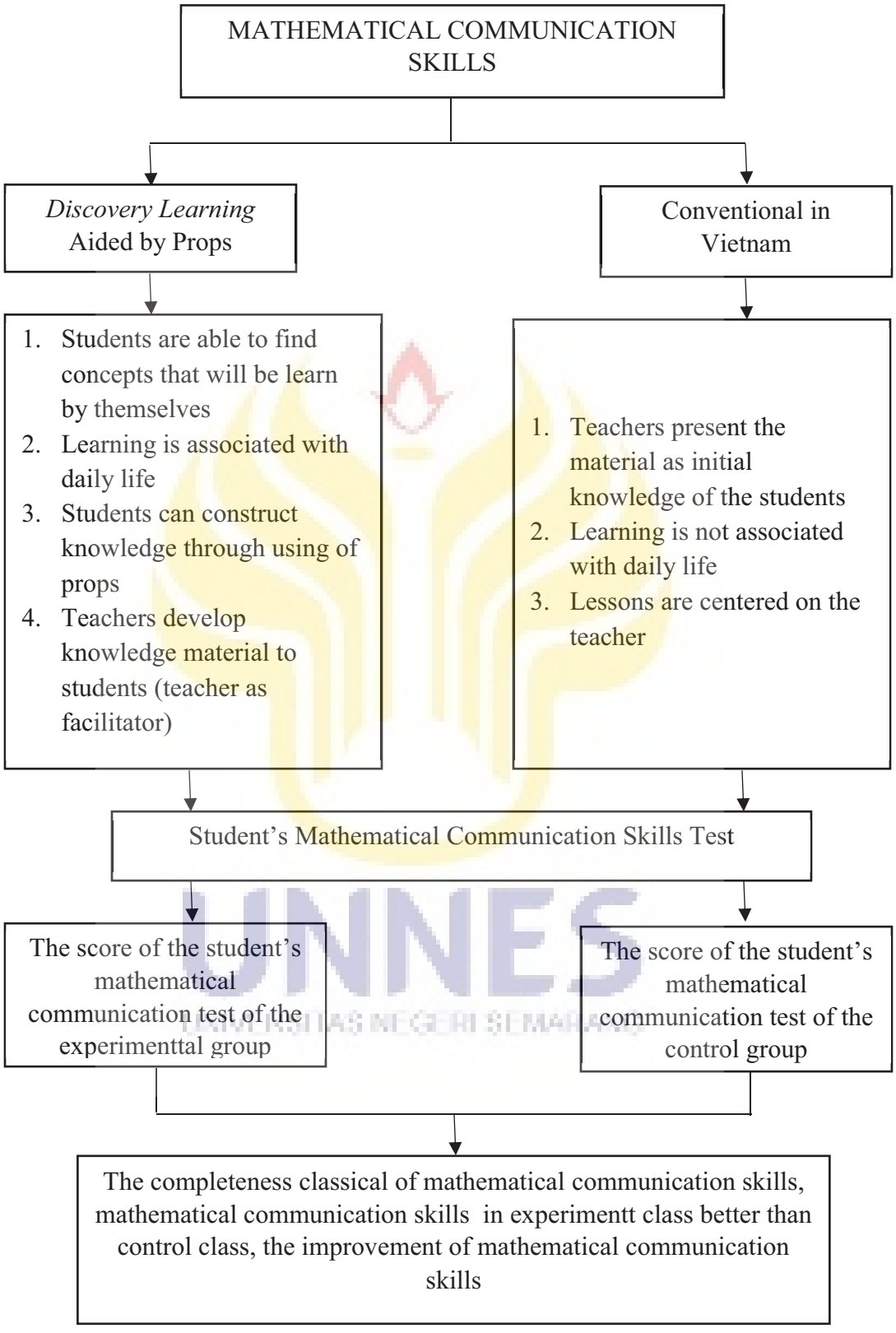

Figure 2.3 Thinking Famework

2.4 Hypothesis

Based on the thinking framework above, then the hypothesis in this research as follows.

1. The student's mathematical communication skills using discovery learning model aided by props reach the completeness classical.
2. The student's mathematical communication skills using discovery learning model aided by props is better than the student's mathematical communication skills using conventional learning model in Vietnam.
3. The improvement of the student's mathematical communication skills using discovery learning model aided by props is higher than the improvement of the student's mathematical communication skills using conventional learning model in Vietnam.

CHAPTER 5

CONCLUSION AND SUGGESTION

5.1 Conclusion

Based on the results of research and discussion about student's mathematical communication skills using *discovery learning* model aided by props in Hanoi Vietnam, be concluded as follows.

1. The student's mathematical communication skills used discovery learning model aided by props reach the classical completeness
2. The student's mathematical communication skills used discovery learning model aided by props was better than the student's mathematical communication skills using conventional learning model in Vietnam
3. The improvement of the student's mathematical communication skills used discovery learning model aided by props was higher than the improvement of the student's mathematical communication skills using conventional learning model in Vietnam

5.2 Suggestion

1. Based on the conclusions above, *discovery learning* can be applied as an alternative learning models to develop student's mathematical communication skills.

2. Rectangular and triangle props can be used as an alternative learning media that can be integrated with discovery learning to develop student's mathematical communication skills.
3. Teachers should pay more attention to how discovery learning was going, so the learning process can be carried out in accordance with the specified time.
4. This research needs to be developed further for other materials in order to the research can be developed and useful in learning activities.

BIBLIOGRAPHY

Aminarti. 2009. Komunikasi Matematis dan Kecerdasan Emosional. Makalah disajikan dalam *Seminar Nasional Matematika dan Pendidikan Matematika Jurusan Pendidikan Matematika*, 5 Desember 2009 di Universitas Negeri Yogyakarta.

Arikunto, S. 2012. *Dasar-dasar Evaluasi Pendidikan*. Jakarta: Bumi Aksara.

Brenner, Mary E. 1998. Development of Mathematical Communication in Problem Solving Groups By Language Minority Students. *Bilingual Research Journal*. 22: 2, 3, & 4. Tersedia di http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.119.5920 [diakses 01-08-2016]

Dalyono, M. 2007. *Psikologi Pendidikan*. Jakarta: Rineka Cipta.

Fachrurazi. 2011. Penerapan Pembelajaran Berbasis Masalah untuk Meningkatkan Kemampuan Berpikir Kritis dan Komunikasi Matematis Siswa Sekolah Dasar.

Fatimah, F. 2012. Kemampuan Komunikasi Matematis dan Pemecahan Masalah melalui Problem Based-Learning. *Jurnal Penelitian dan Evaluasi Pendidikan,* Vol. 16. No. 1.

Gordah, E. G., & R. Astuti. 2013. Meningkatkan Kemampuan Komunikasi Matematis Mahasiswa melalui Pengembangan Bahan Ajar Geometri Dasar Berbasis Model *Reciprocal Teaching* di STKIP PGRI Pontianak. Makalah disajikan dalam *Seminar Nasional Matematika dan Pendidikan Matematika*, 9 November 2013 di Universitas Negeri Yogyakarta.

Hamalik, Oemar. 2011. *Proses Belajar Mengajar*. Jakarta: Bumi Aksara.

Isnaeni & Maya. 2014. Meningkatkan Kemampuan Komunikasi dan Disposisi Matematik Siswa Sekolah Menengah Atas melalui Pembelajaran Generatif. *Jurnal Pengajaran MIPA*. 19(2): 159-165.

Kilpatrick, Jeremy, & Jane Swafford. 2001. *Adding It Up Helping Children Learn Mathematics*. Washington DC: National Academiy Press.

Kosko, K. & J. Wilkins. 2012. Mathematical Communication and Its Relation to the Frequency of Manipulative Use. *International Electronic Journal of Mathematics Education*, 5(2): 1-12.

Le, Tuan Anh. 2006. Applying Realistic Mathematics Education In Vietnam: Teaching Middle School Geometry. Dissertation Postdam University.

Maarif, S. (2016). Improving junior high school students' mathematical analogical ability using discovery learning method. *International Journal of Research in Education and Science.*

Muhamad, Nurdin. 2016. Pengaruh Metode *Discovery Learning* untuk Meningkatkan Representasi Matematis dan Percaya Diri Siswa. *Jurnal Pendidikan Universitas Garut* Vol. 09; No. 01

National Council of Teachers of Mathematics. 2000. *Principles and standards for School Mathematics.* Reston, VA: National Council of Teachers of Mathematics.

Nguyen Tuong Hung. 2002. Vietnam: Cultural background for ESL/EFL teachers. Review of Vietnamese Studies.

Purwanto, M. Ngalim. 2007. *Psikologi Pendidikan*. Bandung: Remaja Rosdakarya.

Qohar, A. 2011. Mathematical Communication: What And How To Develop It in Mathematics Learning?. *Proceeding International Seminar and the Fourth National Conference on Mathematics Education 2011*. Yogyakarta: Universitas Negeri Yogyakarta.

Rifa'i, R. C. A dan C.T. Anni. 2012. *Psikologi Pendidikan.* Semarang: Unnes Press.

Ruseffendi, H. E. T. 2006. *Pengantar kepada Membantu Guru Mengembangkan Kompetensinya dalam Pengajaran Matematika untuk Meningkatkan CBSA*. Bandung: Tarsito.

Sudjana. 2002. *Metoda Statistika*. Bandung: Tarsito.

Sugandi, A. 2008. *Teori Pembelajaran*. Semarang: Unnes Press.

Suharjana, Agus. 2009. *Pemanfaatan Alat Peraga Sebagai Media Pembelajaran Matematika*. Yogyakarta: Pusat Pengembangan dan Pemberdayaan Pendidik dan Tenaga Kependidikan Matematika. Tersedia di *https://mgmpmatsatapmalang.files.wordpress.com/.../p.* . [diakses 09-08-2016]

Suherman, dkk. 2003. *Strategi Pembelajaran Matematika Kotemporer.* Bandung: FMIPA Universitas Pendidikan Indonesia.

Sugeng, Kiki Ariyanti. Brief Survey on Mathematics in Southeast Asia: Challenges and Opportunities for Indonesia

Sugiarto. 2013. *Bahan Ajar Workshop Pendidikan Matematika I*. Semarang: FMIPA Universitas Negeri Semarang.

_____. 2014. *Bahan Ajar Workshop Pendidikan Matematika II*. Semarang: FMIPA Universitas Negeri Semarang.

Sugiyono. 2013. *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R & D).* Bandung: Alfabeta.

Suryobroto, B. 2009. *Proses Belajar Mengajar di Sekolah*. Jakarta: Rineka Cipta.

Syah, Muhibbin. 2004. *Psikologi Pendidikan dengan Pendekatan Baru*. Bandung: Remaja Rosdakarya.

Thompson, J. 2009. Changing chalk and talk: The reform of teaching methods in Vietnamesse higher education. The George Washington University.

Tran Vui. 2007. Enhancing Classroom Communication To Develop Students' Mathematical Thinking. *Hue University, Vietnam.*

Tuyết, Trần Thị. 2013. The Causes of Passiveness in Learning of Vietnamese Students. *VNU Journal of Education Research*, Vol. 29. No. 2.

Widjajanti, D. B. 2015. Mathematical Communication Skills For Postgraduate Student Of Primary Education Study Program: A Case Study. *Proceeding of International Conference On Research, Implementation And Education Of Mathematics And Sciences 2015.* Yogyakarta: Universitas Negeri Yogyakarta.

Wardono, Waluya, S. B., Mariani, S., & S. Candra.D. 2016. Mathematics Literacy on Problem Based Learning with Indonesian Realistic Mathematics Education Approach Assisted ELearning Edmodo. *Journal of Physics: Conference Series 693 (2016) 012014*. Semarang.

Wardono, S. Mariani, P. Hendikawati, & Ikayani. 2017. Mathematizing Process of Junior High School Students to Improve Mathematics Literacy Refers PISA on RCP Learning. *Journal of Physics: Conf. Series 824 (2017) 012049.* Semarang

Yani Ramdani. 2012. Pengembangan Instrumen dan Bahan Ajar untuk Meningkatkan Kemampuan Komunikasi, Penalaran, dan Koneksi Matematis dalam Konsep Integral. Jurnal FMIPAUNISBA, (online),vol 13, No. 1 (http://jurnal .upi.edu/file/6- yani ramdhani.pdf, diakses 10 Desember 2016)

Yang *et al*. 2010. The Effectiveness of Inductive Discovery Learning in 1: 1 Mathematics Classroom. *Institute of Network Learning Technology, National Central University, Taiwan*