CHAPTER I
INTRODUCTION

1.1 Background

Education is an educational process that is a process in order to influence students to be able to adjust as well as possible to the surrounding environment so that it will changes in themselves. In an education there is an interaction process that encourages learning. Teaching learning process includes the components of learning approach and various of teaching models then developed in the learning process. The activity of teaching and learning in schools is an effort to improve the quality of education or to improve the achievement of student, include in learning mathematics (Marianti Purnama.2013:107).

Mathematics subjects is said to be queen of science because mathematics is widely used in other fields of science and itself then mathematics cannot be separated from the daily application of human life. Mathematics is one of the most important subjects in education, because by learning mathematics students are expected to develove ability to think,reason, communicate ideas and to develove creativity and problem-solving activities.As suggested by Cockroft (1982:2) that:

> *"Mathematics needs to be taught to students because (1) it is always used in all aspect of life; (2) All fields require appropriate mathematics skill; (3) a powerful means of communication, concise, and clear; (4) can be used to present information in various ways;(5) increase the ability of logical thinking, accuracy, and spatial awareness; (6) Giving satisfaction to solve challenging problems."*

In general, the problem is the gap between expectations with reality, between what they want or what is intended with what is happening or facts. A problem usually contains situations that encourage someone to solve it, but do not know firsthand what is to be done frist to solve them. To obtain the ability in problem solving, one must have a lot of experience in solving various problems. A question or a math problem is said to be a problem if the solution requires some creativity, understanding and thinking / imagination of everyone facing the problem (Edy Surya.2017:139).

The Principals and Standards for School Mathematics (NCTM.2000) includes a discussion of the necessity for learning mathematics content through the

processes of problem solving, reasoning and proof, communication, connections, and representation. That means that it is important for teachers to carefully plan their focus on not only what the students need to learn but also how the students acquire the mathematics contents such as knowledge and procedures during the class.

There are two important skills that students need in order to be prepared for 21st-century careers and citizenship which are critical thinking and problem solving. According to Balim (2009) (in Edy Surya.2017:322) The lack of mathematical problem solving ability should not be allowed because the problem solving ability is one of the main principles of science and technology and also teaching crucial to the progress of mathematics education itself. Pinter (in Edy Surya.2017:322) states that problem-solving ability is a very important skill. With problem-solving skills, students will be able to arrange real-life situations in mathematical models. The problem-solving ability itself is not just a goal in mathematics learning, but also something that is very meaningful in everyday life, and in the world of work, being a problem solver can provide benefits or benefits. In addition, increased problem-solving skills will improve student learning outcomes themselves, and thus will advance math education quality.

Problem solving in mathematics is the activity to find the solution of mathematical problems by involving all the stock of knowledge (the concepts have studied). Learning problem solving in mathematics , students will find the ways of thinking, persistency, curiosity, and confidence in unusual situation, as they will face outside the mathematics classroom. Cooney (1985) also stated that teaching problem solving to students, allowing the students to be more analytical in making decisions in their lives. In other words, when the students are trained to solve the problem, then students will be able to make decisions because the students have become skilled at gathering relevant information, analyzing information, and realize how necessary to re-examine the results that have been obtained. In daily life and the world of work , being a good problem solver can bring great benefits.

Based on the description above, a student's ability to solve mathematical problems when students reach certain criteria or commonly known have an indicators. There are four indicators of mathematical problem solving according to

Polya (1973) , namely: (1) Understanding the problem, i.e able to make what (data) is known, what is unknown (asked), what information is adequate, what conditions must be met, and the original problem in the operational form is solved, (2) Devising a plan, i.e. the problem that has been resolved, to search for pattern or rules, and to prepare a settlement procedure (make conjecture), (3) Carrying out the plan, ie to execute the procedures that have been made to obtain the settlement and see clearly each procedure or step correct, and (4) Looking back, i.e. checking how the results are obtained, checking the rebuttal, searching for results in another way, see if the data is used to solve the problem and check whether the results can be used other questions.

Based on the observation that had been made to student grade XII in SMA Swasta YPI Dharma Budi showed that students' mathematical problem-solving ability are still low and the majority of teachers teach by conventional method. Low mathematical problem-solving ability was founded in XII Mia 2 which the class is consists of 36 students that did diagnostic test. Diagnostic test was conducted by the researcher by giving the problem to see students' mathematical problem-solving ability. In this research, the researcher choose three dimention topic.

Question :

Dalam suatu kamar berukuran 4m x 4m x 4m dipasang lampu tepat ditegah-tegah atap. Kamar tersebut digambarkan sebagai kubus ABCD.EFGH. Berapa jarak lampu ke salah satu sudut lantai kamar tersebut?

a. Determine the information from the problem!
b. How do you solve the problem?
c. Solve the problem!
d. Is the distance of the lamp wiht the one of the corner of floor is $2\sqrt{7}$? Explain your answer!

The expected answer to student's answer in the worksheet as follows:

1. Students could not understand the problem clearly

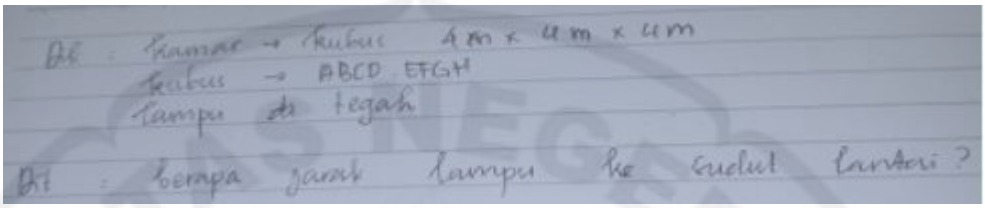

Figure 1.1 Student's answer in understanding the problem

From Figure 1.1 shows that students can't understand clearly about the problems. Students can't write the corect known and about the asked they can't mensioned it for especially for one of the corner of cube in their answer. In this step, there are 15 of 36 students couldn't understand the problem clearly.

2. Students could not devise the problem plan

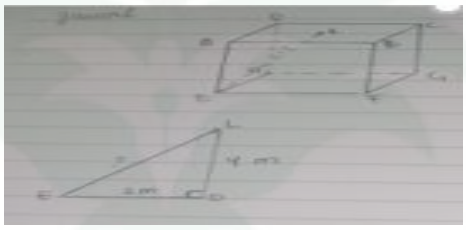

Figure 1.2 Student's answer in devising plan

From Figure 1.2 shows that student can make a plan clearly for solving a problem like making a cube but for making the lamp in the middle, student make it random and not make a triangle in the cube but can draw triangle for solve the problem with every value sothat student get wrong value for the leght of EO. there are 18 of 36 students could not able to understand the relation between data that given and the question.

3. Students could not carry out the plan in problem-solving

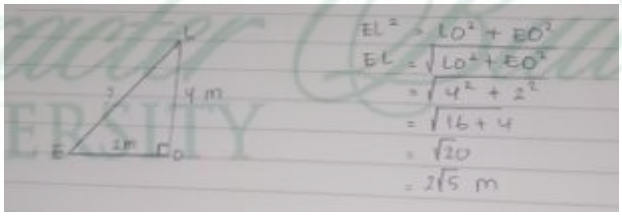

Figure 1.3 Student's answer in carrying out the plan

From Figure 1.3 shows that student didn't understand how to carry outand student not make sure to calculate or make the answer to the simple

algebra. There are 10 of 36 students could not able to implement the problem-solving strategy.

4. Students didn't look back to the solution carefully and they could not derive the solution differently

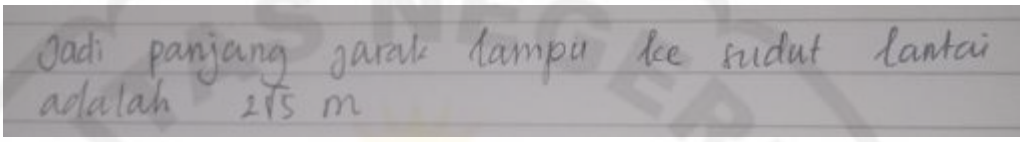

Figure 1.4 Student's answer in looking back

From Figure 1.4 shows that students didn't look back to their task carefully even though they answer the question is. They could not give the reason why the answer is $2\sqrt{5}$ by deriving the solution differently with $2\sqrt{7}$. In this step there is 5 of 36 students didn't look back to the solution.

This situation stated that word problem in mathematics was very difficult for students. It was also found that many students did not like mathematics because mathematics was too difficult for these students. Difficulties in solving problem in mathematics are evident inside the classroom. Some students were impeded in their progress in solving the problem as they did not comprehend the problem at all. Several students also committed erroneous solution owing to careless computations. Students sometimes identify an appropriate operations or sequences of operating but do not know the procedures necessary to carry out these operation accurately. Their problem particulary in solving is confounded by the difficult terminology. These students have difficult understanding written or verbal direction or explanation and find words problem especially dificult to translate into mathematical form and inability to use the corect mathematics (Richard Rusczyk.2017).

An efforts that need to improve the student's problem-solving is through innovation of teaching models which is line with the material being thought that focuses on learning objectives as required by curriculum. Innovation in education is very urgent especially in producing new teaching model that yield better learning result, escalate teaching efficiency and effectiveness. Innovation in education is tacit with it's renewal that originated from creative thinking, findings and modification that contains ideas and method used to address education

problem.Good learning should be able to function as a communication tool in the delivery of course materials (Ropinus Sidabutar:10).

One of the learning model that can be made new innovative to increase interest students to learn is cooperative learning model. Cooperative learning is the instructional use of small groups in such a way that student's work together to achieve shared goals. Johnson & Stanne (2000) sees cooperative learning as one of the best studied pedagogical strategies in the history of educational research, with over 1,000 research studies and hence noted that cooperative learning have been demonstrated in countless studies and several meta-analyses. Cohen (1994) suggest that cooperative learning strategies contribute to the promotion of higher order thinking, socially acceptable behaviour, and interracial acceptance. Tanner & Marr (1997) have shown that cooperative learning model has significant effects on academic peer relationships and social development, importantly peer instruction significantly enhances mastery of the original material. Active learners help each other to comprehend and accomplish the task as well as put in more effort and criticize if necessary. However group goals, rewards, and equal chance are the main aims of cooperative learning model.

One of cooperative learnig model is applying cooperative learning model of NHT type is The learning model containing the discussion activities to solve the problem (Sari.2015:41 in Harini.2018:25).The method is often used by teachers to keep the students active in the discussion and come to the front of the class. NHT model can be one of the group models that share the reasons and consider the right answers to solve a problem. The NHT model which is part of the cooperative learning model to improve student learning outcomes. Teaching and learning activity with the implementation of NHT method affecting the students' outcome in the teaching and learning process (Nisa.2018:5) in line with (Lie, A. 2010: 59) said thatthis NHT learning model is one type of special structural cooperative learning designed to influence the interaction patterns of students in obtaining the material enclosed in a lesson and check their understanding of the content of the lesson. Numbered Head Together (NHT) provides students with opportunities to share ideas and consider the most appropriate answers.

Basically NHT type of cooperative learning model is variations of group discussion with a special characteristics namely every students in the group have their own number and when evaluation teacher ask a student as representative to presenting the group discussion result. According to Huda (2014) (in Hesty Prayekti.2019:233) NHT learning strategy is a strategy that gives students the opportunity to share opinions in a small group where each group member gets a different numbeThe chosen number is without an announcement in the beginning, so it can guarante that all of students are active during learning process.

Numbered Head Together (NHT) type of cooperative learning model has advantages when compared to other types of cooperative learning model. Namely every student be ready all, can conduct discussion in learnest, the high ability students can teach the low ability students and there is no students in the group that dominates. In cooperative learning model type STAD, all member who presented the result of the group discussion was appointed by group itself so it does not ensure that all members of the group involved. The weakness of cooperaive learning model type Team Games Tournament (TGT) is the low ability student feel is imbalance of ability between him and his group member. In Jigsaw cooperative learning model, if the number of group members is less then it will cause problems and in this model, student tend just learning about the subtopic which are the responsibility of their group (Riny Purba.2014).

Based on the background described above, the researcher feels need to conducting the research with the title ,"**The Implementation of Cooperative Learning Model NHT Type to Improve Student's Problem-Solving in Grade XII at SMA Swasta YPI DHARMA BUDI".**

1.2 Problem Identification

Based on the above background, then that becomes problem identification in this study are:

1. Mathematical problem solving students' ability is still low
2. Students find many difficulties to understand the subject matter and problem given
3. Students are not interested to mathematics learning

4. Teacher use less varied learning models in the learning process, the teacher still uses convensional learning model.
5. The student's answer process fixed with concept on book and the opinion the other people

1.3 Problem Limitation

Problem limitation need to this research so that the problems are more focused. From the above problem identification, then becomes problem limitations are:

1. Student's problem-solving in mathematics is low which is shown by observation test and the result of the worksheet's student
2. The student's answer process just focus to the concept of book the opinion of the other people

1.4 Problem Formulation

Based on the background above, the writer formulates the problems as follows:

1. How does Numbered Heads Together (NHT) model can improve mathematic student's Problem-Solving in senior high school?
2. How does students' answers process related to students' problem solving skill taught by theNumbered Heads Together (NHT) model in senior high school?

1.5 Research Objectives

The purpose of the research conducted on the students of grade XII-MIA 1 at SMA YPI DHARMA BUDI Semester I Academic Year 2019/2020 with the basic matter of statistic are:

1. Improving student's Problem-Solving in mathematic through Numbered Heads Together (NHT) in senior high school
2. Knowing students' answers process related to students' problem solving skill taught by theNumbered Heads Together (NHT) model in senior high school

1.6 Research Benefits

Result of this research are expected to provide contributations as follows:

1. For student, to improve student's problem-solving and to know the indicator of students' answers process
2. For teacher, as input to improve mathematics learning of student by implementating various learning model
3. For school, as input in take the right decision to improve teaching quality by using some cooperative learning model and knowing the students' answers process
4. For writer, as knowledge in teaching mathematics in the future

1.7 Operational Definition

To avoid differences or lack of meaning clarity, the following operational definitions are important term in this research:

1. Mathematical problem solving ability is students' abilities in understanding the problem, planning to solve the problem, implement solving and looking back or checking the truth.
2. The students' answers process in the problem solving have 4 indicator namely (1) understanding the problem, (2) devising the plan, (3) carrying out the plan dan (4) looking back
3. Cooperative learning is a learning structured in an effort to increase student participation, facilitate students in leadership experiences and make decisions in group, and provide opportunities for student to interact and learn together with students of different background.
4. The learning model type NHT is a cooperative learning model that used to involve more students in reviewing the material covered in the lesson and check their understanding of the lesson content, consists of four stages which are used to review the facts and basic information that serves to regulate the interaction of students. The stages are numbering, ask questions, think together, and answered.