

## CHAPTER I INTRODUCTION

### 1.1 Research Background

The future of a nation depends heavily on the quality of human resources and the ability of the participants to master science and technology. For decades, public schools prepared children to be good citizens and good workers. Students were expected to sit, listen, and do exactly as they were told.

Students nowadays should be work hard in order to increase their competitiveness in global competition. As economic and technological changes shape the quality of human resources outlook of today's students, schools have begun to prepare the 21st century workforce. No longer is it enough for Senior High School and Vocational School graduates simply to know basic facts and skills. To be successful, students must master decision-making, prioritizing, strategizing and collaborative problem solving started from the senior high school level (Five, 1993:53).

Science is a way of understanding the physical universe using observation and experimentation to explain natural phenomena. Science also refers to an organized body of knowledge that includes core ideas to the disciplines and common themes that bridge the disciplines. Physics is a branch of nature science that underlies the development of advanced technologies and the concept of harmonious life with nature. Physics is very necessary to learn at every level of education from elementary school, middle school to college (DEPDIKNAS, 2006).

Physics is composed more abstract concepts, which are central to further learning in both physics and other Sciences. Mathematical calculation also found in these Physics, means that students must have high level skill for understanding physics. Having appropriate knowledge of the concept in physics is probably one of the most important requirements in the study of physics, mathematics and also within fields of research where concepts are explained in mathematical terms as in engineering, economics and finance (Lauritzen, Pal : 2012).

Physics is one of the science lessons and it is a discipline that based on qualitative and quantitative measurements for understanding the natural phenomena around us. Physics is considered to be an exceptionally difficult subject among various students. The percentage of marks in middle and high school examinations in this subject is low in comparison to other subjects of the school curriculum. This backwardness in subject may be due to the lack of interest and wrong methods of learning (Meenakshi, Dahiya : 2011).

Students in physics courses solve problems largely using a process termed means-ends analysis, whereby they search for equations containing the quantities in a problem and try to reduce the “distance” between the goal state and their current state in the solution process. Students are not taught to solve problems simply by manipulating equations since instructors typically mention the concepts and principles that they are applying, but students rightly perceive the equations as being central to obtaining quantitative answers and tend to ignore conceptual information. This approach can be effective at getting answers, but falls short in understanding the conceptual underpinnings of the solution process. It is, therefore, not surprising that students learn or retain little conceptual knowledge following physics courses (Jennifer L, Docktor :2015).

Conceptual knowledge is static knowledge about fact, concept, and principles that apply within certain domain, conceptual knowledge functions as additional information that problem solver add to the problem and that they use to perform the solution . The process of learning concepts begins at an early age and continues throughout life as people develop more and more complex concepts, both in school and out (Arends : 2009).

According to Arends (2009) conceptual knowledge have learning outcomes are specific concept, nature concept, logical reasoning and Higher level thinking also communication. To built the learning outcomes the student must use their conceptual knowledge from the fundamental concepts of physics to qualitatively analyze a problem before solve by the mathematical formulas. Based the problem of learning in this paragraph we clearly conclude that the conceptual knowledge of student must be increased from the basic concept until the abstract concept.

Hooke's law and elasticity of concepts are particularly important to students for had conceptual knowledge especially in Elasticity subject matter. Further observations conducted by researcher at the class XII SMA with the topic of Elasticity found that the conceptual knowledge students of SMA N 1 Tanjung Morawa still below average, From 31 total students that given test and the number of test consist of 10 questions not all question they can solved. Majority students can find working with physics calculations difficult and frustrating to understand. With enough practice, they can memorize a pattern to complete the calculations but have a difficult time understanding the concept. Then, quickly losing their enthusiasm to work with these calculations.

From preliminary observation that have done by researcher through the direct observation by interviewing the teacher of physics and distributing questionnaires to students in SMA N 1 Tanjung Morawa the result shown that almost 100% of students are able to achieve minimum completeness criteria (MCC). With 75 point of MCC standard for grade X at second semester last year. However, many students are able to achieve minimum completeness criteria (MCC) only 38.70 % of students can answer analysis question that given by teacher.

The questionnaires also shown most of student confused when learning of Physics, but they still wanted to learn physics. Some students interested in physics and want to learn physics with another teaching method, they need more books' reference, more practice and more solving physics problems. While student need enjoyable teacher, process of teaching and learning physics in school is also far from being satisfactory. Students was taught verbal, teacher becomes the one and only informant, and using conventional model in learning that create students just memorize or mimic their acts in class, and the method is often used in conventional learning model is the lecture method.

SMA N 1 Tanjung Morawa is a school with structure and infrastructure supporters to learning activity like Science Laboratory, LCD, and another learning media. But the teacher not using optimally, especially physics laboratory. The teacher is rarely using the lab to learning process, so the students rarely doing

experiment and rarely taught by using media also. The students had two type of guide book that used in learning process, but they still want to listen their teacher and rarely reading their book. There are no laboratory practice book and worksheet, so the students only used the text books as long in learning process until one semester.

To face this problem is need to apply other learning models that can improve student conceptual knowledge. At the high school level, the models of teaching that impact of integrating conceptual knowledge by solved a problem (Jeniffer L, Docktor : 2015) and could build character become critically, logic, objective, creative and innovative then automatically can improve student learning outcomes in conceptual academic knowledge are cooperative learning type Group Investigation and Jigsaw (Arends : 2009).

Cooperative learning is a model where the student learns with group and they are work together. Psychologists generally agree that students easily understand the complex and abstract concepts when accompanied by concrete examples and in working together (Isjoni, 1992). According to Slavin cooperative learning is a learning model where student learn and work in small group consist of 4-6 people with heterogenic structure. Patterns of employment as mention above enable emergence a positive perception about what they have to do to success their group.

Cooperative learning type that accordance to that is Group Investigation. Group Investigation have goal and impact, the cognitive goal of group investigation are conceptual knowledge and inquiry skill, and the impact are students work cooperatively together, they learned to engage in processes of shared thinking which helped them to not only gain a better understanding of the perspectives of others but also to build on their contributions to develop new understanding and knowledge (Brown & Campione, 1994; Rogoff, 1994).

Based on all premises this is particularly relevant to teach student by Cooperative Learning Model using Group Investigation type, that focus on conceptual knowledge as a goal. However, group investigation developed by Shlomo Sharan and Yael Sharan in 1992, is a general classroom organization plan

in which students work in small groups using cooperative inquiry, group discussion and cooperative planning and projects. Moreover, it is said to be one of the most student-centered methods as students have much freedom to choose their topics of interest for investigation, plan and carry it out, present and evaluate the results.

Group Investigation (GI) technique was developed by Sharan and Sharan in 1989. In the technique firstly the class is divided into several groups that study in a different phase of general issue. After that, study of issue is divided into working sections among the members of the groups. It's provided to students that pair up the information, arrangement, analyzes, planning and integrate the data with the students in other groups. In this process, teacher must be the leader of the class and ensure that students need to the explanations Knight and Bohlmeier (in AKÇAY & DOYMUŞ, 2014:18)

Cooperative learning model type group investigation had been examined by Garonia L. Parchment (2009) with the title of "A Study Comparing Cooperative Learning Methods: Jigsaw & Group Investigation". She focus on academic achievement of students grade 9<sup>th</sup> from 2008 until 2009 and the result of the scores from previous traditional delivered instruction were used as control group.

In that research the GI activity focused on human impact on the environment. Student investigated different environmental topics in heterogeneous groups and created a poster that illustrated causes and effects of the assigned issue. Quizzes were utilized in both instructional strategies to obtain qualitative data. The data identified group investigation as the most effective method of instruction. The study also concluded that the implementation of both CL methods in a classroom does positively impact student performance, while traditional instruction yields unfavorable results.

The impact of Group Investigation nearly examined done by Bicerdi maylia (2014) and Sijinjak, Jovan (2015). Bicerdi, Maylia done research using cooperative learning model type group investigation to analyze the student's High Order Thinking as cognitive outcomes and research in MAN 1 MEDAN Senior High School in the topic of Dynamic' Electricity. The result of her research are :

Pretest score based on C4 (Analyze), C5 (Evaluate) and C6 (create) question in Experimental class is 47.97 and in the Control class is 47.51 when Experiment class teach using Group Investigation method and Control class teach using Conventional method, post test to measure High Order Thinking cognitive test in experimental class is 76.81 and in the Control class is 57.39 the result shown student' High Order Thinking in experiment class higher than in control class.

Sitinjak, Jovan (2015) using Cooperative learning type Group Investigation focus on student's learning outcomes consist of cognitive outcomes, affective and psychomotor and his research done in SMA SANTO THOMAS 3 Medan on the Linear Motion topic of physics. That were obtained: pre-test mean value of experiment class was 42.26 and 41.45 for control class and then post-test mean value of the experiment class was 80.48 and 64.03 was the mean value for control class. Then, based on observation that done by observers by using observation sheet of students` affective and psychomotor. Students` affective score on last meeting of experiment and control class are 91.83 and 87.10 and students` psychomotor score on last meeting of experiment and control class are 85.01 and 80.78. the result also shown student learning outcomes in experiment class higher than in control class.

Many researches about Group Investigation method in physics have done by previous scientist its method used in the learning process and its offers a proven, if Group Investigation is one of the great choices models of teaching to increase academic achievement, high order thinking and learning outcomes in the topic of physics. And there is still low research about conceptual knowledge of student and in elasticity topic also. Therefore, in this case the writer chose research entitled **“The Effect of Cooperative Learning Model Type Group Investigation (GI) to Students' Conceptual Knowledge on Topic Elasticity Grade XI First Semester in SMA N 1 TanjungMorawa A.Y 2016/2017”**.

## **1.2 Problem Identification**

Based on the background that already consider, so the problem identification in this research are:

1. Most student have some difficulties in understanding physics concept
2. Student's need more practice and solving problem in physics
3. Teacher less using various teaching method
4. In the teaching and learning process rarely doing an experiment
5. Less of various book's learning
6. The teacher rarely teaching physics using media
7. The physics teacher still using the conventional learning by lecture method.
8. Less number of students who can solve conceptual knowledge of instrument test.

### **1.3 Problem Limitation**

By considering subject matter in SMA N 1 Tanjung Morawa, this study is limited to the effect of Cooperative Learning model type Group Investigation to student' Conceptual Knowledge at Grade XI SMA N 1 Tanjung Morawa the expertise of Science in Elasticity subject matter compared with conventional model of learning.

### **1.4 Problem Formulation**

Based on the limitation problem, so the problem formulation are:

1. How is students' Conceptual Knowledge using cooperative learning model type Group Investigation (GI) in the subject Elasticity in Grade XI SMA N 1 Tanjung Morawa A.Y 2016/2017.
2. How is students' Conceptual Knowledge using and conventional learning in the subject matter Elasticity in Grade XI SMA N 1 Tanjung Morawa A.Y 2016/2017?
3. Is the students' Conceptual Knowledge by using cooperative learning model type group investigation (GI) greater than conventional learning model in the subject matter Elasticity in Grade XI SMA N 1 Tanjung Morawa A.Y 2016/2017.

### **1.5 Research Objective**

There are some research objective, namely:

1. To analyze students' Conceptual Knowledge by using conventional learning in the subject Elasticity in Grade XI SMA N 1 Tanjung Morawa A.Y 2016/2017.
2. To analyze students' Conceptual Knowledge by using cooperative learning model type group investigation in the subject matter Elasticity in Grade XI SMA N 1 Tanjung Morawa A.Y 2016/2017.
3. To analyze whether students' Conceptual Knowledge by using cooperative learning model type group investigation is greater than conventional learning in the subject matter Elasticity in Grade XI SMA N 1 Tanjung Morawa A.Y 2016/2017.

### **1.6 Research Benefit**

Once this study is completed then the expected benefits of this research are:

1. For School : can give a good contribution in order to improve the learning process and improve the quality of schools by increasing student Conceptual Knowledge and teacher professionalism.
2. For teacher : As a consideration in selecting learning model better than conventional learning model.
3. For students : Students are more motivated to learn physics, because the abstract concepts of physics can be more real through cooperative learning model Type Group Investigation So, the learning process becomes more interesting and more attractive to increase students' understanding.
4. For researcher : As a description to implement a more effective learning model and method that can be used as a reference.

