CHAPTER 1
INTRODUCTION

1.1. Background

Education is a conscious and structural effort to create an atmosphere of learning and the learning process so that learners are actively developing the potential for them to have the spiritual strength of religious, self-control, personality, character, skill needed for themselves, society, nation and state In other words, education is an important requirement for every human being. Without education will be difficult to adjust to the environment and will not function optimally in public life. As Tirtarahardja (2005) states that in process of personal formation, education is defined as a systematic and directed activity to the formation of the learners' personality.

Progress of a country can be measured by the progress of education in the country. Especially in this era of globalization, the progress of a country tends to be determined by the progresses of science and technology, such progress experienced by United States, Japan, China, and India. One of factors that affect progress of science and technology is the success of science learning. The success of science learning is influenced by several factors, namely: the curriculum, the four pillars of education, resources, learning environment, and evaluation of learning.

Based on the Regulation of Ministry of National Education of Indonesia No. 22 Years 2006 about the content standards for units of primary and secondary education, science learning should be taken in scientific inquiry method to foster the ability to think, work and scientific attitude and communicate it as an important aspect of life skills.

Beside it, UNESCO considers that education as a building that is supported by four pillars: learning to know, learning to do, learning to live together and learning to be. So, good science learning should be able to apply to the four pillars, is not enough to simply referred to the course or books (learning to know), but it must be equipped with experiment tools (learning to do), and are associated with the environment (learning to live together). Thus, students will be

encouraged to develop the skills and scientific attitude in useful learning for continuing education and to live in their communities (learning to be).

But in fact, until to the 21st century, Learning Science has not been able to apply to each of the four pillars, especially in Indonesia. Learning Science in Indonesia still tend to only apply the "learning to know". The main orientation of learning considered only on completion of the materials to be delivered according to the allocation of appropriate curriculum time available. This statement is supported by the Balitbang Depdiknas research (Rustad et al., 2004) which showed that about 51% of junior high school science teacher and approximately 43% of high school physics teachers in Indonesia can not use the tools available in the school laboratory, consequently, the level of utilization of the tool in learning tends to be low. Thus, science is supposed to be taught through lecturing or demonstration only. When that happens, then the science of learning can not be optimal for developing students' potential.

The low of quality of science learning in Indonesia also can be seen from the decline of Indonesia position in the world rankings. Based on the results of study conducted by PISA (Programme for International Student Assessment) in 2012 to 65 participating countries, in terms of students' performance in Science, Indonesia is at position 64 with a mean score of about 382. This result is still very far below the OECD's average score 500. And if we compare this result to the four researches before at year 2000, 2003, 2006, and 2009 Indonesia still got average mean score 394, so there was a decline about 3% . In addition, an ironic thing again in term of student's performance in Science, around 30% of Indonesian students are below level 1 from 6 levels of assessment categories (OECD Volume I, 2014). Beside it, from the study results of PISA 2012 in terms of conceptual understanding and problem solving skills, students in Indonesia are still likely to only apply the concept of "learning to know" and have not been able to know and understand the lessons well, even not able to apply it in any various problems. (OECD Volume V, 2014)

That data confirmed also by the observation results obtained by researcher while were implementing the PPLT (teaching training) program in school SMA N 1 Tebing Tingi as long as 3 months. For physics lesson, student's outcome is still

low. From any test and observation result, researcher gets four important information.First, for physics lesson, student's outcome is still low. It is caused of student tend not been able to resolve the problems, even theoretical problem or their problem solving skill is very low. Students tend to memorize formulas and equation, do not understand the concept. Whereas, from results of questionnaire which had been given to 40 student, 80% of the students are interested in Physics subject, but they had difficulty to understand lesson because the learning system which was not engaged them.Second, they almost never done the experiment, even though the school facilities are adequate, especially for Physics Laboratory, there are almost complete experiment instruments and tools like a kid mechanic, optics, electricity, sensors.Third, learning process did not engage them and students were still afraid to give their opinion and to ask something, they still do not understand. Or in other word, students tend to be more passive.And the last, researcher indicates that the students of this school have a good creativity and innovation. It can be seen from their activity in daily life, for example in every morning, students have to make a show in group or personally in English and Indonesian language such as short drama, stands up comedy, singing a song, dance, debate, and etc. In addition, they had ever made a simple house design from wood and a Christmas tree from air mineral bottle. From this information, researcher wants to improve their problem solving, creativity, innovation, and critical thinking.

Problem-based learning (PBL) is an instructional approach that provides learners with opportunities to identify solutions to structure, real-world problems. Problem-based learning (PBL) is an instructional approach that enables learners to conduct research, integrate theory and practice, and apply knowledge and skills in order to develop a solution to a defined problem (Savery, 2006). According to Barrows (2002), the key components of PBL are , unresolved, ill-structured problems that will generate multiple thoughts about the cause and solution, a student-centered approach in which students determine what they need to learn , teachers serve as facilitators and tutors, and problems are authentic and reflect professional practice. Barrows (1996) also suggests that learning in a PBL environment should be integrated from a wide range of disciplines or subjects

such that students study and integrate information from diverse disciplines that might relate to understanding and solving a particular problem. In short, PBL is an approach to learning in which students work together to find solutions to complex problems (Ferreira & Trudel, 2012).

In summary of many researchs, which had been collected by CELL (Center of Excellence in Leadership of Learning) indicates that PBL: (a) has a positive effect on student content knowledge and the development of skills such as collaboration, critical thinking, and problem solving; (b) benefits students by increasing their motivation and engagement; and (c) is challenging for teachers to implement, leading to the conclusion that teachers need support in order to plan and enact PBL effectively while students need support including help setting up and directing initial inquiry, organizing their time to complete tasks, and integrating technology into projects in meaningful ways. (CELL, 2009)

Researcher now want to put an Interactive simulation inside problem based learning model.There is considerable evidence that interactive simulations can be powerful tools for achieving student learning of science. Recent research conducted with Interactive simulations has focused on the specific aspects of simulations that help students build a conceptual understanding of the science; specifically the value of showing the invisible, the use of analogy and effective levels of guidance with simulations. Educators have found that use of heavily guided activities does not elicit deep thinking and learning from students; while other studies have found that with pure discovery learning students are not able to “discover” the science for themselves. Recent studies reveal that appropriate scaffolding of the material is needed to help students build a mental framework about concepts. Then students can construct their own understanding within this framework. Our work has focused on understanding how students use simulations to construct this mental framework and the effect levels of guidance have on students’ use of simulations. Hundreds of individual student interviews have been conducted during which the students describe what they were thinking as they interact with simulations. Careful analysis reveals that showing the invisible and use of analogy both facilitate students’ construction of their understanding; while

the nature of guidance influences the amount of student engagement.(W. K. Adams, 2010)

Based on explanations above, researcher was interested to do research about: "**The Effect of Problem Based Learning Model using Animation toward Student's Critical Thinking skill about Heat and Temperature at Grade X-Science in First Public Senior High School of Tebing Tingi Academic Year 2015/2016."**

1.2. Problem Identification

Based on the explanation about background of problems above, the relevant problems which identified are:

1. Student's learning achievement in SMA N 1 Tebing Tinggi for Physics subject was still low.
2. The low student's learning achievement caused by poor conceptual understanding, critical thinking, problem solving skills of students and unattractive learning process.
3. Learning process was still teacher-centered (student is not active).
4. Students tend to memorize formula (considering physics is only about mathematical operation).
5. Student was rarely to do experiment.
6. Student was almost never or afraid to give their opinion.
7. Learning process less involved creativity and innovation of students.

1.3. Problem Limitation

To give scope clearly in discussion, then researcher limited the problems as following as:

1. Research done to develop the student's Critical Thinking skills about Heat and Temperature.
2. Learning model should be used is Problem Based Learning (PBL) model.
3. The research location in SMA N 1 Tebing Tinggi grade X-Science Academic Year 2015/2016

1.4. Problem Formulation

Based on the problem identification above, so the problem formulations in this research are:

1. Does the implementation of PBL models using animation in the learning process has an effect to improve critical thinking of students about the Heat and Temperature?
2. How is the critical thinking of the students during the learning process using the learning model of problem based learning with animation?

1.5. Research Objective

Based on problem formulations above, so the objectives of this research are:

1. To analyze critical thinking of student during the lesson with problem based learning model using animation and conventional learning.
2. To compare between student's critical thinking that is taught with problem based learning and conventional learning.

1.6. Research Benefit

The benefits of this research are:

1. For any educational units and teachers especially for high school level, as additional suggestion in choosing the proper learning model to increase the actual and active learning especially in teaching and learning physics.
2. For SMA N 1 Tebing Tinggi, as additional information what kind of learning suitable for students in there to create meaningful learning process.
3. For State University of Medan, as additional literature about this Problem Based Learning Model using Animation.
4. For researcher, to increase knowledge and experience how to make a good research, how to prepare being a good and professional teacher, and especially to increase knowledge about problem based learning using animation.