CHAPTER I

INTRODUCTION

1.1 Background

Education is a process to influence students to be able to adjust to their environment and be able to cause changes in themselves. In another sense, education is preparing students. In its implementation, the strategy of implementing education is carried out in the form of guidance, teaching, and/or training activities (Hamalik, 2014). All educational activities, namely guidance, teaching, and/or training are directed to achieve educational goals. Where, the purpose of education is a set of educational outcomes achieved by students after the education activities are held.

The teaching and learning process or the teaching process is an activity carrying out the curriculum of an educational institution so that it can influence students to achieve the stated educational goals. To achieve these educational goals, a teacher as an educator has a very important role and influence for students in building student character at school and must be able to create an atmosphere of active learning, fun and impress students in learning activities so that students can absorb and receive knowledge they get as provisions for their lives later. Particularly in Physics subjects that have learning objectives, one of which is to deliver students to master Physics concepts and connect Physics concepts with daily life. So students have an understanding of Physics concepts that are in accordance with the literature and the agreement of the experts.

Physics learning is a teaching and learning process that studies natural events in everyday life. In studying physics, understanding student concepts is needed to get the maximum learning results. The concepts embedded in students must be in accordance with the actual concepts of physics scientifically (Rukmana, 2017). In learning physics, students' ability to solve

problems is still relatively low. In doing physics problems given by the teacher, students more often use mathematical equations directly without analyzing, guessing formulas used and memorizing examples of questions that have been done to do other problems. Students experience difficulties when dealing with complex problems. Students are able to solve simple quantitative problems but lack the ability to solve more complex problems. Students experience difficulties because the strategies taught in learning are only to solve problems that require mere mathematical calculations (Azizah et al, 2015).

One way to find out the weaknesses of learning in students is by diagnostic tests. The use of diagnostic tests at the beginning and at the end of learning can help teachers find weaknesses in student learning on the material being studied (Lin, 2004). For a diagnostic test, how to provide diagnostic feedback to test takers and teachers is of crucial importance. So the rating scale and the score reporting method should be given due attention. The essence of diagnostic testing lies in a comprehensive and creative feedback system (Zhao, 2013). A good diagnostic test can provide an accurate picture of the weaknesses experienced by students based on the information made mistakes. A good diagnostic question not only shows that students do not understand certain parts of the material, but can also show how students think in answering the questions given even though their answers are incorrect.

In reality in the field when observing 20 students. In the aspect of difficulty in solving physics problems at SMA Negeri 1 Sijamapolang, Kab. Humbang Hasundutan, as many as 66% of students find it difficult to analyze problems, 23% of students have difficulty connecting what is known to those that are administered, 9% of students do not understand the questions, and as much as 2% of students do not understand the material. This happens because students assume that physics is only focused on formulas in solving problems in physics. Lack of physical problems related to the nature and definition as

well as problems in everyday life. With this response, when solving physics problems as much as 57% of students felt unable to solve them because they were unable to analyze the images known in the questions. As many as 20% of students because they do not understand the concept, as much as 14% of students have difficulty in mathematical operations, and as many as 9% of students do not understand the units of each quantity known in the problem.

Based on the results of an interview with one of the physics teachers at SMA SMA Negeri 1 Sijamapolang, Kab. Humbang Hasundutan, information was obtained that the material of waves and sounds was one of the materials that was difficult for students to understand. The difficulty is motivated because the teacher at SMA Negeri 1 Sijamapolang, Kab. Humbang Hasundutan tests student understanding by giving questions that aim to measure student learning outcomes not with tests that aim to diagnose students' learning difficulties themselves. Questions that are always used by teachers in schools are questions to measure student learning outcomes in physical subjects rather than questions that aim to identify student learning difficulties in physics.

Based on the above background the researcher is interested in conducting research under the title "**The Development of Diagnostic Test in Waves and Sound for Senior High School**".

1.2 Problem Identification

Based on the background of the above problems, several problems can be identified, namely:

1. Low learning outcomes of Senior High School students
2. Lack of diagnostic tests available in Senior High School
3. The teacher has not seen and is not aware of the diagnostic test
4. Teachers rarely use diagnostic tests to improve student learning outcomes

1.3 Problem Limitations

This research is focused on the development of diagnostic test items on Waves and Sound material that meet the level of validity, reliability, level of difficulty and different power. Meanwhile, the diagnostic test in this research aims at the level of understanding of students physics concepts on Waves and Sound material in Senior High School.

1.4 Problem Formulation

The formulation of the problems in this study include:

1. How is the validity of the diagnostic tests developed on the concept of Waves and Sound in Senior High School?
2. How is the reliability of diagnostic tests developed in the concept of Waves and Sound in Senior High School ?
3. How is the effectiveness of the distracting index on the diagnostic tests developed in the concept of Waves and Sound in Senior High School?
4. How is the difficulty level of diagnostic tests developed on the concept of Waves and Sound in Senior High School?
5. How is the distinguishing power of diagnostic tests developed in the concept of Waves and Sound in Senior High School?
6. What is the level of students' understanding of physics concepts in material of Waves and Sound in Senior High School?

1.5 Objectives

The objectives of this research include:

1. To find out the validity of diagnostic tests developed on the concept of Waves and Sound in Senior High School
2. To find out the reliability of diagnostic tests developed on the concept of Waves and Sound in Senior High School

3. To find out the effectiveness of the distracting index of diagnostic tests developed on the concept of Waves and Sound in Senior High School
4. To find out the difficulty level of diagnostic tests developed on the concept of Waves and Sound in Senior High School
5. To find out the distinguishing power of diagnostic tests developed on the concept of Waves and Sound in Senior High School
6. To find out the level of students' understanding of physics concepts of Waves and Sound in Senior High School

1.6 Benefits Of Research

The benefits of this research include:

1. Diagnostic tests developed can be a medium for students to practice in understanding the concepts of Waves and Sound material
2. Diagnostic tests developed can be a teacher's reference in knowing students' level of understanding of Waves and Sound material

1.7 Operational Definition

1. Validity is the level of accuracy of an evaluation tool in measuring what should be measured
2. Reliability is the level of consistency of the results of measurements with the same test at different times
3. Distinguishing is the ability of items to distinguish students who master the material based on certain criteria
4. Difficulty level is an opportunity to answer a problem at a certain level of ability
5. The effectiveness of the deception is the function of the deception in making the test participants fooled by the alternative answers available

6. The two-tier diagnostic test is a test used to determine the cause of students' learning difficulties based on the reasons given by students