

# CHAPTER I

## INTRODUCTION

### 1.1. Background of the Study

The rapid development of science and technology in the 21st century demands a better quality of human resources. Quality human resources will come from a quality education system. The Ministry of Education and Culture states that the learning paradigm in the 21st century emphasizes the ability of students to find out information from various sources, formulate problems, think analytically, and work together to solve a problem (Wijaya *et al*, 2016). This shows the importance of scientific literacy ability for students where PISA (Performance For International Student Assessment) in (OECD, 2019a) explains that scientific literacy ability is the ability of the person to use scientific knowledge to identify questions and draw conclusions based on sequential evidence to understand and make decisions in solving science-related issues in social life as a reflective civil.

PISA is a three-year program held by the Organization for Economic Cooperation and Development (OECD) in 1997. this program aims to assess the ability of 15-year-old students in scientific literacy, reading literacy, mathematical literacy, financial literacy and measure their ability to apply what they have been learned in the classroom in everyday life. Indonesia has participated in this program for seven rounds starting in 2000 until the last round in 2018. During these seven rounds, Indonesia showed a significant increase, especially in access to education, from 35% in 2000 increasing to 85% in 2018. However, Unfortunately, scientific literacy has decreased in 2018 In 2018 Indonesia itself was in the bottom 10<sup>th</sup> of the 79 countries that participated in PISA 2018. The average ability of students in Indonesia in the scientific literacy is below the average scientific literacy ability of ASEAN and countries with similar economic conditions such as Peru and Brazil (Kemendikbud, 2019).

Students's scientific literacy ability in two school at Kerinci city from the research by (Yanti *et al*, 2019) shows the same result as PISA 2018 result where students' scientific literacy ability was very low. Another study by (Utama *et al.*, 2019) also showed that the scientific literacy ability of students in high school was very low. (Permatasari and Fitriza, 2019) Conducted a more detailed analysis in which researchers analyzed three aspects of scientific literacy: content, context, and competence. The analysis results show that the scientific literacy ability in these three aspects is in the very low category, with the average scientific literacy ability of students in the cognitive domain also in the very low category. (Pakpahan & Hasruddin, 2021) They researched SMA Negeri 19 Medan in terms of content, context, and competence. This study shows the same results as previous studies where SMA Negeri 19 Medan students have very low literacy ability in these three aspects.

The results of research conducted by (Rizkita *et al*, 2016) show that the low ability of students' scientific literacy is due to the low ability of students to identify scientific opinions, do literature searches effectively, understand the elements in research design, create graphs appropriately from data presented, using quantitative ability in solving problems, interpreting basic statics, and drawing conclusions. Based on research conducted by (Sutrisna, 2021) the low scientific literacy ability of students is due to the unfamiliarity of students in working on questions that test students' analytical ability because the test instruments used in evaluating students during tests, midterm exams, and final semester exams using questions that only test students' memory of previously studied material. This is also confirmed by the report on the results of the analysis of scientific literacy based on the results of PISA 2006, which states that the low scientific literacy ability of students is thought to be due to the assessment carried out not supporting the achievement of scientific literacy (Istighfarin, 2016).

MAN 1 Medan school also does not applied scientific literacy bothin learning process or assessment. The physics teachers at MAN 1 Medan stated the school has not applied scientific literacy both in learning and assessment. Teachers are not familiar with the concept of scientific literacy. The teacher has also never developed scientific literacy questions. The questions used at the time of evaluation

still use questions that only test memory and concepts. The results of interviews and observations conducted at the MAN 1 Medan school show that the scientific literacy test instrument is still very rarely developed in schools.

The development of scientific literacy-based test instruments can be one solution to improve the scientific literacy ability of students. Students' low scientific literacy ability is because students do not have the opportunity to express their opinions or ideas that are in their minds, so students have difficulty answering the types of questions that ask them to express their opinions (Mardhiyyah, 2016). The low ability of student in doing the test based on scientific literacy also being a concerned of the Ministry of Education and Culture. One of the policy that made by The Ministry of Education and Culture is develope nasional assessment that refers to PISA where the question of test are also examine student' scientific literacy. This assessment will be participated by all school at Indonesia. Based on this background, the researcher wants to develop a physics test instrument based on PISA that is expected to improve students' scientific literacy

## **1.2. Problem Identification**

Based on the background, researchers can identify the problems that exist as follows:

1. The low achievement and scientific literacy ability of Indonesian students at PISA 2018.
2. The lack of development of scientific literacy-based test instruments, especially in high school physics learning.
3. Students have few opportunities to work on scientific literacy-based questions.

## **1.3. Research Question**

Based on the identification of the problem that have been described, the question of this study is how to produce a test instrument that meets PISA qualification standards and test standards.

#### **1.4. Scope of problem**

In this study, the development of the test instrument based on PISA is limited for students of MAN 1 Medan. The test instrument developed in this test tested students' scientific literacy ability in learning physics on motion, force, work, and energy.

#### **1.5. Study Objectives**

Based on the research question of the problem above, the objectives of this research are to produce a test instrument that meets PISA qualification standards and test standards.

#### **1.6. Research Purposes**

The benefits of this research are divided into two aspects, as follows:

##### **1.6.1. Practical Purposes**

1. Contribute to high school physics assessment.
2. Provide an overview of the quality of students' scientific literacy in learning physics

##### **1.6.2. Theoretical Purposes**

1. As a contribution and input in evaluating process in high school physics education, especially PISA-based tests.
2. As a material for consideration and study material for the development of further PISA-based test instruments

#### **1.7. Operational definition**

This research has several variables that can be defined as follows:

##### **1.7.1. PISA Test Instrument**

PISA test instrument is an assessment tool or evaluation tool used to collect data or information about students' ability to apply scientific literacy in real-life situations (OECD, 2019a).