

# CHAPTER I

## INTRODUCTION

### 1.1. Background of Problem

Physics is part of natural science which consists of a collection of facts, concepts, principles, laws, postulates, and theories related to natural phenomena. Physics is a field of science that studies phenomena through a scientific process based on a scientific attitude, the result consists of a scientific product consisting of three key components, namely universally applicable concepts, principles, and theories (Trianto, 2010: 137). However, in learning physics students are not only expected to master the concepts but also apply the concepts they already understand in solving physics problems (Sujarwanto *et al.*, 2014: 65).

In the process of learning physics, students must be active, often practice questions, discuss and ask questions and the teacher plays an active role as a facilitator in group work, class discussions, and experimental activities, and can associate existing problems with the material being taught according to the learning steps which has been made. In addition, teachers are required to have skills in designing teaching strategies and methods so that the implementation of learning can run optimally (Hastuti *et al.*, 2016: 129).

The results of the student questionnaire at SMA Negeri 14 Medan showed that 84% of students stated that teaching and learning activities still used conventional learning models where students only listened to explanations, took notes, worked on memorizing questions, and copied the contents of learning material provided by the teacher. As many as 60% of students stated that learning activities could improve the ability to think about students' physics concepts. As well as 56% of students stated that the learning model used could make students work on various variations of physics questions independently.

Based on the results of interviews with physics teachers at SMA Negeri 14 Medan stated that teachers had not fully used learning models that helped students understand physics concepts. The physics learning process that is commonly used tends to be teacher-centered. The teacher has implemented student centered learning such as discussions, questions and answers, and experiments but has not

been able to improve students' abilities and learning outcomes because, at the evaluation stage, students have not been able to solve problems in the given physics questions and problems. Even though it has been explained that SMA Negeri 14 Medan applies the 2013 curriculum with a scientific approach.

Moving on from the problems that have been described, we need a solution that can overcome these problems so that students work actively and scientifically in solving physics problems presented during the learning process. Because by being able to solve physics problems, students will have the provision to maximize learning outcomes. Students who have problem solving abilities are not only able to understand a concept that has been studied but students are also able to apply it in real life. In addition, this problem solving ability is one of the important skills that students must have in 21st-century learning.

The ability to solve problems is the process of finding the best answer to something that is not yet known and becomes an obstacle by synthesizing knowledge and abilities that have been previously possessed to be applied to these problems (Juliyanto, 2017: 37). The stages of problem solving start from identifying problems, collecting and analyzing data and information, selecting alternatives and planning actions that aim to find solutions (Hastari, 2019: 35).

Therefore, the Problem Based Learning (PBL) model can be employed to facilitate the learning of physics. The PBL model is centered on a series of genuine problems that demand actual solutions to concrete issues (Al-Tabany, 2014: 62). Problem Based Learning (PBL) is a learning model that aims to equip students with fundamental knowledge, problem solving skills, learning strategies, and teamwork abilities. Moreover, it employs a systematic approach to resolving problems and addressing challenges that students may encounter in their daily lives (Kemendikbud, 2014: 41). The essential steps in the PBL model, as noted by Sufairroh (2016: 124), include introducing students to problems, organizing learning activities, guiding independent and group investigations, developing and presenting work, and analyzing, examining, and evaluating the problem solving process.

This research builds on prior research that utilized the Problem Based Learning (PBL) model to enhance problem solving abilities. Firmansyah's (2022) findings indicate that the use of the PBL model has a significant positive impact on

students' ability to solve physics problems. Similarly, Radika's (2022) research revealed that the PBL model influenced students' problem solving proficiency in the sound wave domain. This aligns with Ammalia Nurjannah's (2017) study, which demonstrated that the PBL model is effective in boosting students' problem solving abilities in physics.

Given the above description, the author intends to investigate "The Effect of Problem Based Learning Model on Students' Problem Solving Ability in Momentum and Impulse Materials at SMA Negeri 14 Medan".

## **1.2. Identification of Problems**

Based on the background of the problems described above, the identification of the problems in this study are:

1. The learning process is still dominated by educators (*teacher center*).
2. The learning model used in the physics learning process has not made students able to understand physics concepts.
3. Learning activities have not been able to improve the abilities and results of students' physics learning.
4. Learning activities have not been able to make students able to work on the variations of physics questions given.

## **1.3. Scope of Study**

To avoid problems in the research to be carried out, it is necessary to make a research scope, namely this research was conducted in high school in class X IPA in Medan.

## **1.4. Scope of Problem**

Due to the breadth of the problem and limited time and funds, the researchers made the scope of the problem in this research, namely:

1. The learning model used in this research is the Problem Based Learning (PBL) model.
2. The subject matter used in this research is Momentum and Impulse.
3. The subjects studied were class X IPA students at SMA Negeri 14 Medan.

### **1.5. Formulation of Problem**

Based on the background above, the formulation of the problem in this research is:

1. Does the Problem Based Learning (PBL) model affect students' problem solving ability in Momentum and Impulse material in class X IPA SMA Negeri 14 Medan?
2. What is the level of students' problem solving ability by applying the Problem Based Learning (PBL) model to Momentum and Impulse material in class X IPA SMA Negeri 14 Medan?

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

Based on the formulation of the problems researched, the purposes to be achieved in this research are:

1. Knowing the effect of the Problem Based Learning (PBL) model on students' problem solving ability on Momentum and Impulse material in class X IPA SMA Negeri 14 Medan.
2. Knowing the level of students' problem solving ability by applying the Problem Based Learning (PBL) model to Momentum and Impulse material in class X IPA SMA Negeri 14 Medan.

### **1.7. Benefits of Research**

After this research is completed, the expected benefits of this research are:

1. Enhancing students' problem solving abilities can be achieved by utilizing the Problem Based Learning (PBL) model in learning experiences.
2. Expanding teacher knowledge through learning models to optimize students' abilities, improve teacher performance, and expedite the delivery of physics learning, especially Momentum and Impulse material.
3. Making a positive contribution to improving education standards at SMA Negeri 14 Medan.
4. Researchers can enhance their observational research knowledge, insight, and experience by adopting the Problem Based Learning (PBL) model.