CHAPTER I
PRELIMINARY

1.1. Background

Education has an important role in developing knowledge, skills and values that can be used for future contributions. Education also prepares students with skills to be more active, responsible and able to solve surrounding problems (OECD, 2018; 4) by giving students the opportunity to reflect on their ideas, hone analytic skills, and enhance student creativity. The transformation of 21st century education ensures students are ready to compete with high skills (Scott, 2015: 8).

The learning process must prioritize creativity, inquiry, experiment, collaboration problem solving, and innovation (Howard, 2018: 9). Students who are ready to face the future need to practice their ability to solve problems, where students are more active in the learning process. There are two factors to improve students' ability to solve the problems they find: 1) a learning environment that motivates students' enthusiasm with students' experiences, designs projects and student learning processes in collaboration with peers; 2) building basic skills that remain important namely literacy and arithmetic (OECD, 2018: 4).

Physics learning prioritizes connecting physics concepts and the way physics governs reasoning and knowledge in everyday life and students' perspectives by trying to explore and analyze physics concepts around students. Discussing physics in a broader context will achieve the goal of learning physics by empowering students to find ideas of phenomena related to physics (Ingerman, Booth, & Linder, 2007: 170).

When analyzing the relationship between concepts, the conceptual blending framework provides an overview for students to construct their understanding of abstract concepts. Activating knowledge is the first stage of the sense-making process for conceptual blending, in which knowledge is not yet integrated with one another but represents a knowledge framework. Students' fragmented knowledge moves them to the second stage of the sense-making process, in which students realize that certain relationships are missing or gaps exist in their

knowledge framework. Students have created a fully functional conceptual blending that combines two distinct conceptual spaces. This is the third stage of sense-making. Students generate explanations for knowledge inconsistencies. The blend that students make has given them explanations that bring together different pieces of knowledge. The conceptual blending can act as a cognitive mechanism to help students understand complex ideas in science. Instructors can take an active role in helping students build and implement conceptual integration (Odden, 2021).

Based on research conducted by Van de Eynde et al (2020), equations and graphs are considered blending elements, namely elements that combine mathematics and physics and when used give meaning to concepts that represent blending. What may happen is that students use the equation in a mathematical way and then in their reasoning give a physical breakdown of the equation. Dynamic conceptual blending is used to describe the level of integration and diagnose and find difficulties in students' reasoning. The conceptual blending allows for a powerful framework for investigating student reasoning in combining mathematics and physics.

The blended process serves to characterize the cognitive processes involved in modelling when students reason. This characterization is very important so that teachers can better assist students in acting with blended. The researchers' findings show that students' ability to engage in blended processing can be supported by practicum that emphasize mathematical expressions derived from descriptions of chemical phenomena (Bain et al, 2018).

The results of research by Richards et al(2020) stated that if teachers can encourage students to use various resources, student learning outcomes can be improved. Teachers must find a connection between the new knowledge they want to convey and the students' previous experiences. To help students activate the p-prims obtained from everyday experiences, teachers need to relate new knowledge to students' experiences in everyday life. The conceptual resources cover more advanced physics-specific ideas. To activate it, students must relate new knowledge to ideas they have learned through previous experiences and integrate them. To activate epistemological resources, students must be

encouraged to reflect on how new knowledge fits into existing patterns. Thus, students' creativity and innovation skills can be maximized by developing, implementing, communicating new and useful ideas that can be raised using problems or questions.

Based on the observation sheets regarding sound waves given to 63 eleventh grade students, the test results showed that only 26,98 % of students knew what the problem was, 20,24 % of students obtained knowledge or concepts regarding sound waves based on questions, 37, 34 % students who students who have investigative abilities based on the problems presented, 16,43 % of students who had a good level of problem solving, and 18, 25 % of students who found ideas or information about how sounds are produced by musical instruments. This shows the low ability of student inquiry to solve problems and will affect student learning outcomes. Presenting the problem will raise further questions to investigate and find a solution. Students will explore, discover, create and learn from problems (Trilling and Fadel, 2009).

Solving the problems above requires the implementation of an appropriate learning model to improve the problem solving abilities and the learning outcomes of students. Learning that can be done to overcome the above problems is inquiry learning with a blended learning approach. Inquiry learning is learning based on questions or problems. The inquiry model provides an opportunity to build students' knowledge, using concepts they already have to solve problems, so that existing knowledge will be linked to new information and produce meaningful learning (Andrini, 2016: 41).

Based on the results of Wenning and Khan's research (2011: 19) the inquiry learning model in science teaching provides an instructional framework that helps students to develop broader their scientific and intellectual process skills. Inquiry learning is proven effective in learning and deepens understanding.

Community of inquiry emphasizes inquiry-based teaching with learning that identifies teaching activities, presenting cognitive, social and practice processes for developing content and blended learning processes (Cleveland-Innes & Wilton, 2018: 13). Based on the descriptions above, the title of this research is **"The Effect of Inquiry Learning Model Based on The Conceptual Blending**

Towards Students' Learning Outcomes on Sound Waves Class XI SMA Negeri 14 Medan Academic Year 2022/2023 ".

1.2. Identifications of Problems

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

1. Students have low inquiry abilities.
2. Students have low creativity to find ideas in learning physics.
3. Students do not learn physics concepts based on existing products in everyday life.
4. Students do not learn to use existing concepts to form new concepts in solving problems resulting in low student's learning outcomes.

1.3. Limitations of Problems

Based on the identification of the problems that have been described, the problem limits in this study are as follows:

1. Inquiry learning model based on the conceptual blending is applied in the experimental class and conventional learning in the control class.
2. This research is focused on students' learning outcomes accompanied by observing activities on sound waves.
3. The subject of this research is students on even semester in class XI of SMA Negeri 14 Medan academic year 2022/2023.

1.4. Formulations of Problems

Based on the problems that have been described, the formulations of the problem in class XI of SMA Negeri 14 Medan academic year 2022/2023 with sound wave are:

1. How the learning outcomes of students with inquiry learning model based on the conceptual blending and conventional learning on sound waves in class XI SMA Negeri 14 Medan academic year 2022/2023?

2. Is there the effect of inquiry learning model based on the conceptual blending toward students' learning outcomes on sound waves in class XI SMA Negeri 14 Medan academic year 2022/2023?

1.5. Objectives of Research

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

1. Determine the learning outcomes of students with inquiry learning model based on the conceptual blending and conventional learning on sound waves in class XI SMA Negeri 14 Medan academic year 2022/2023.
2. Knowing the effect of inquiry learning model based on the conceptual blending and conventional learning towards the learning outcomes of students on sound waves in class XI SMA Negeri 14 Medan academic year 2022/2023.

1.6. Benefits of Research

Based on the research objectives, the benefits of this study are as follows:

1. Can help students in building students procedural knowledge, increasing creativity and the ability to find students' ideas in solving physical problems around them and improve student learning outcomes in physics.
2. An input for teachers in developing knowledge and concepts regarding inquiry learning model based on the conceptual blending to use in the learning process to improve student learning outcomes.
3. Providing experience to researchers in applying inquiry learning model based on the conceptual blending.
4. Become a reference for further research.

1.7. Operational Definitions

To avoid different interpretations of the problems in this study, several operational definitions are put forward as follows:

1. Inquiry learning is a process where students are involved in learning, formulating questions, investigating more broadly then building understanding,

and new knowledge that can be used to answer questions, develop a solution or support an opinion (Alberta Learning, 2004: 1).

2. Conceptual blending is a way of understanding how one uses simple concepts and schemes to build new conceptual and how the same conceptual arrangements are then used to construct additional concepts and agree on appropriate actions (Troolin, 2012: 2).
3. Learning outcomes are behavioural changes that occur after participating in the teaching and learning process in accordance with educational objectives (Purwanto, 2013: 54).