CHAPTER I
INTRODUCTION

1.1. Problem Background

The development of technology and science has progressed very rapidly (Asry, 2020). This is one of the characteristics of the 21st century which aims to produce quality human resources (González & Ramírez, 2022). This century is also referred to as the century of knowledge (Angga *et al*., 2022). This is in line with Mintasih's opinion (2022) which states that science plays a very important role in this century. The progress of the 21 st century is a challenge in all areas of life including education (Schoppe & Fagan, 2022).

Education is a means of creating generations who are skilled in their fields (Miftahurrohmah *et al.,* 2021). 21st century education requires students to have various skills. One of these skills is problem solving skills (Hulaikah, 2020). Wagner categorizes problem-solving skills as one of the seven skills that must be possessed in dealing with life and the world of work. Problem solving skills are steps taken to produce the right solution (Huang *et al*., 2020). Problem solving skills require students to be able to find problems and find solutions to a problem (Triani *et al.*, 2019).

The skills of thingking in solving problems must be accompanied by good reasoning skills. Good reasoning skills can be used to develop knowledge (Suariasumantri, 2005). Scientific reasoning skill is also a capskill that must be possessed by human resources in the 21st century, but the facts show that scientific reasoning still cannot be developed optimally in the learning process. Teachers are less able to facilitate students to apply their reasoning skills in learning in class (Adriani *et al*., 2015).

Another fact that scientific reasoning skills cannot be optimally developed in the learning process is supported by several studies. One of them is research conducted at a high school in West Bandung Regency, the results of this research indicate that the scientific reasoning skills of class XI students at the school as a whole are in the less category. Combinatorial reasoning skill is a reasoning skills that

is owned by many students with a percentage of 50% and the least possessed by students is proportional reasoning with a percentage of 5.9% (Mirawati, 2011).

The low scientific reasoning skills of Indonesian students at the international level can also be seen from the results of the 2018 Program for International Student Assessment (PISA) test for Indonesian children. In general, Indonesia's position is ranked 70 out of 78 PISA participating countries (OECD, 2018). This is also in line with the TIMSS (Trends in Mathematics and Science Research) assessment, which is one of the international studies in assessing students' mathematics and science achievements, stating that in 2015 Indonesia was ranked 45th out of 48 countries with a reasoning skill score of 390 while the average score from TIMSS is (Vebrian *et al.*, 2016).

The descriptions above show that learning is needed that is able to empower thinking skills in solving problems accompanied by students' scientific reasoning skills. Problem solving can be used as a basis for learning science models in class (Maskur *et al.*, 2020). The problem-based learning model encourages students to connect knowledge with application in solving a problem (Ulger, 2018). One learning model that is able to facilitate practicing problem-solving skills is Reading, Identification, Constructing, Solving, Reviewing and Extending (RICOSRE) (Mahanal & Zubaidah, 2017). The RICOSRE learning model has six syntaxes including Reading, Identifying Problems, Building Solutions, Solving Problems, Reviewing Solutions, and Expanding Solutions (Mahanal *et al.*, 2019). Models that have a problem solving syntax can be applied in schools, especially in Biology subjects (Setiawan *et al.*, 2021).

Learning biology is not only about concepts or theories, but students also learn to observe various natural phenomena in life so that they can formulate problems, provide solutions, and solve these problems. (Saxe & Summerfield, 2021). Biology topic that is suitable to be applied to problem-solving based learning models is the topic of environmental change (Tivani & Paidi, 2016). Environmental change is topic that is full of environmental problems that must be resolved. Students who learn about environmental change topics can obtain information and learning about problems contained in the surrounding environment (Markowitz *et al*., 2018).

Based on observations and interviews conducted with Biology teachers at MAN 1 Medan, it shows that in the learning process the teacher already uses a learning model but is still a conventional learning model, more often using the lecture method with the help of power point slides. Students are still not fully involved in the learning process and are not trained to explore students' prior knowledge, process information, make appropriate decisions and solve problems. Students are only involved as recipients of information during learning. This causes students to become bored, passive, less able to use the ideas they have. Students' scientific reasoning skills in problem solving are also still low because students are not fully involved in identifying problems, solving problems and finding appropriate solutions. This causes students' skill to reason is still not good and student scores in assignments given do not reach the Minimum Completeness Criteria (KKM). Therefore, to overcome these problems it is necessary to improve the learning process.

One alternative learning model that can improve students' scientific reasoning skills is the Reading, Identification, Constructing, Solving, Reviewing and Extending (RICOSRE) learning model. Scientific reasoning skills are needed in solving a problem (Fuziyah, 2020). The RICOSRE learning model is able to facilitate students in training in solving problems (Mahanal *et al*., 2019). By applying the Reading, Identification, Constructing, Solving, Reviewing and Extending (RICOSRE) model, students are expected to be able to improve scientific reasoning skills through problem-based learning.

Based on the description of the problems described above, it is necessary to conduct research on " **The Effect of Reading, Identification, Constructing, Solving, Reviewing, and Extending Learning Model on Students' Scientific Reasoning Skills on The Topic of Environmental Changes of Class X MAN 1 Medan**"

1.2. Problem Identification

Based on the stated background, several problems that can be identified include the following:

1. The era of globalization in the 21st century demands human resources who are able to reason scientifically.
2. Scientific reasoning skills are still not a concern by teachers and teachers are still unable to facilitate students to apply their reasoning skills in classroom learning.
3. Learning is still centered on the teacher (teacher center).
4. The learning model is still monotonous, namely by applying conventional learning models with lectures so that students become bored and passive.
5. Students' scientific reasoning skills are still classified as in the low category, especially in biology learning and are still not visible during learning.

1.3. Research Scope

The scope of this research is the application of the Reading, Identification, Constructing, Solving, Reviewing, and Extending (RICOSRE) model on environmental change topic to determine students' scientific reasoning skills after the learning process has been completed. The subjects of this research were students of class X. The research location was MAN 1 Medan, the time for conducting the research was the even semester of the 2022/2023 school year.

The limitations of this research are:

1. The object under research is students in class X MAN 1 Medan.
2. The learning model skills used are Reading, Identification, Constructing, Solving, Reviewing, and Extending (RICOSRE).
3. The results that are measured are students' scientific reasoning skills through Lawson's scientific reasoning pattern.
4. Learning materials are limited to Environmental Change topic.

1.4. Research Question

Based on the background that has been described, the formulation of the problem of this research is: Does The Reading, Identification, Constructing, Solving, Reviewing, and Extending Learning Model Affect The Students' Scientific Reasoning Skills on The Topic of Environmental Changes of Class X MAN 1 Medan?

1.5. Research Aim

Based on the formulation of the problem above, the purpose of this research is: Knowing The Effect of Reading, Identification, Constructing, Solving, Reviewing, and Extending Learning Model on Students' Scientific Reasoning Skills on The Topic of Environmental Changes of Class X MAN 1 Medan.

1.6. Research Benefits

The results of this research are expected to provide benefits, namely:

1. For students, the application of the RICOSRE learning model is expected to be useful for improving students' scientific reasoning skills.
2. For teachers, this research can be a useful reference to add insight into effective and optimal learning models to achieve learning objectives, especially the RICOSRE learning model.
3. For authors, this research provides valuable knowledge, experience and learning for authors as prospective professional educators, especially regarding the application of learning models.