CHAPTER I

INTRODUCTION

1.1 Background

Education plays an important role in this modern world. Education is designed to ensure a stable and secure development of society. Educators and education reformers have been using the term "21st-century education" since 2000. This term has been used to describe the changing landscape for educators for over a decade (Gajjar, 2013). The importance of 21st-century skills is emphasized in the new Indonesian national curriculum. Critical thinking and problem-solving, communication, collaboration, creativity, and innovation are all characteristics of 21st-century skills (Astuti, Sugirayto & Ikhsan, 2020).

Based on *Undang-undang Sistem Pendidikan Nasional (UUSPN)* No. 20 of 2003 Chapter 2 article 3, National education serves to develop the ability and shape the character and civilization of a nation dignified in order to enlighten the life of the nation, aimed at developing the potential of learners to be a human who believes and fears God Almighty, virtuous, healthy, knowledgeable, speak, be creative, independent, and be a democratic and responsible citizen. Ki Hajar Dewantara firmly stated that education is an effort to promote the growth of character (inner strength, character), mind (intellect), and the child's body (Ismadi 2014). Students should improve their participation in learning, increase their communication and cooperation abilities, increase their critical thinking abilities, access and evaluate information communication technologies, and find a concept through their creativity by developing scientific attitudes to solve problems with 21st-century skills (Saavedra & Opfer, 2012)

Individuals' science understanding, science process skills, and scientific attitudes are all developed through science (Meera & Revati, 2017). Scientific Attitude is the most important outcome of science teaching,

through some educationalist view that scientific attitude as a product of teaching science, yet a majority of educationalists consider it to be major product or the aim of science teaching. Attitudes are something that can be developed, they are not inborn. Attitudes can be changed or develop over the time (Panneerselvam & Muthamizhselvan, 2015).

Scientific attitude is a benchmark of research ethics for scientists engaged in scientific activities. If there is no scientific attitude on the part of students to carry out the experiment, it will have a negative impact on the products they produce (Sardinah, Tursinawati & Noviyanti, 2012). Students' scientific attitude in learning can have an impact on student learning outcomes, and can support scientific learning and enhance the performance of scientific activity. By developing the potential of each individual, education has an important role in developing the life of the nation.

Addressing the difficulties and needs of the twenty-first century, boosting the competitiveness of Indonesian students in international assessments such as PISA, TIMMS, and others, as well as preparing the golden human resource potential in the decades ahead (Kadarwati, A. & Suroso, 2016). However, assessing scientific attitude as an affective dimension is more difficult than the other two. Its research ammount are not expand accordingly (Punia & Bala, 2014), because of the hesitation to employ affective measures for grading reasons and the slow development of results when compared to cognitive assessments (Arnstine, 1965). This lack of assessment in scientific attitude has led (Md Zain, Samsudin, M.A, Rohandi, & Jusoh, A., 2010) to believe that it is this lack of assessment in scientific attitude that is causing poor scientific orientations among science students, resulting in a decrease in several aspects of students' daily activities in society, such as productivity, development, and values.

Knowledge and skills is one of the important potential to define the ability of the individuals to solve problem (Atta, Vlorensius, Aras & Ikhsanudin, 2020). An attempt to use knowledge and understanding to solve daily life problems aims to improve the standard of living and foster the idea

(Triyuni, 2016).

It is not possible to separate learning science from applying and incorporating all science concepts in daily contexts (Juleha, Nugraha & Feranie, 2019). This type of skill is called scientific literacy (Holbrook & Rannikmae, 2009). Literacy has recently become familiar to us. After different surveys conducted by PISA and TIMSS, the word literacy became the centre of attention, indicating that Indonesian students were low-ranking (Ni'mah, 2019). Pellini (2016) claims that Indonesian students have a poor scientific attitude because, according to the Program for International Student Assessment (PISA) Report 2015, their performance in science, mathematics, and reading is the worst in the world, with Indonesian students ranking 62nd out of 69 countries. It was because, in comparison to other PISA participants, only a tiny percentage of Indonesian students expect to pursue a career in science.

Quoted from TIMSS (Trends in Mathematics and Science Study) in 2015, science comprehension is important for students as they progress toward becoming twenty-first-century citizens (Jones, Wheeler & Centurinom 2015). Science is the accumulation of knowledge through the process of learning. The learning process entails gathering information through the scientific method, inference, or deduction in order to describe and explain observed natural signs (Afriana, Permanasari & Fitriani, 2016).

The learning content (knowledge) and process (procedural) skills are emphasized in early scientific literacy core values. The focus now is on the integration of knowledge and skills required to solve basic and complex real-world problems. (Homer & Ryder, 2015) Students must understand how basic scientific theories can be used to solve problems in areas such as agriculture, climate, resources, welfare, economy, security, and awareness, among others (Chanapimuk, Sawangmek & Nangngam, 2018).

The scientific attitude enquires into specific scientific acts or ideas. The ability to react consistently, rationally, and objectively in specific ways to a novel or troublesome circumstance is known as scientific attitude. It is the capacity to carry out tasks in a way that is based on tested rather than

untested ideas. However, the term "attitude toward science" refers to a person's general good or negative feelings regarding science, as well as whether they like or despise it (Olasehinde & Olatoye, 2014b).

The main topic to be discussed in this research is Biotechnology, which has an important role in human life, is one of the important topics in the modern science curriculum and is growing fast in the 21st century. The rapid development of biotechnology requires students to improve their scientific literacy so that they can determine how biotechnology can develop in life and society (Chabalengula, Mumba & Chitiyo, 2011). In a study published by Nugraheni & Paidi (2020), which looked at senior high students' scientific literacy in Biology, it was discovered that boys had the greatest and lowest scores. Tjalla (2010) found that male students (boys) in Indonesia performed better in terms of scientific literacy than female students (girls) (Treacy & Kosinski-Collins, 2011). The disparity could have emerged because the second study's measurement of scientific literacy was limited to the Biology area (Nugraheni & Paidi, 2020).

The outcome can be explained by the fact that girls spend more time learning science than boys, resulting in their superior ability to explain scientifically. Science is frequently linked to technology, engineering, and mathematics (STEM). Girls favored disciplines such as biology, pure science, health, and medicine. These job preferences appear to be influenced in part by the gendered tendency of students' scientific knowledge (OECD, 2017).

When it comes to the issue of parental utility maximization, it is widely assumed that parents choose schools primarily based on outcome-based factors such as academic excellence, self-discipline, critical thinking skills, the development of high moral standards, and the improvement of student self-esteem (Foreman, 2017). There are very few research concerning school choice in developing countries, particularly in the South Asian region and Bangladesh, where school enrollment has risen dramatically in the previous decade (Chowdhury & Synthia, 2021).

Following the discovery of the current urgency of scientific literacy and

scientific attitude, this study intends to represent the scientific literacy of students in junior high school based on school type and gender. The development of an instrument for assessing scientific attitude and scientific literacy should be pursued in order to achieve these goals. The results of this study can help parents to understand the abilities that must be possessed by their children in the 21st century era, so that they can help choose the right school.

1.2 Research Problem

The research problem of this study is "How is the students' scientific attitude and scientific literacy in learning learning biotechnology?"

1.3 Research Question

Detailing from the research problem, this research tries to investigate the following questions:

a) How is the profile of junior high school students' scientific attitude in learning learning biotechnology based on types of school?

b) How is the profile of junior high school students' scientific attitude in learning learning biotechnology based on gender?

c) How is the profile of junior high school students' scientific literacy in learning learning biotechnology based on types of school?

d) How is the profile of junior high school students' scientific literacy in learning learning biotechnology based on gender?

1.4 Limitation of Problem

In order to this research more focused, the problem is limited as below:

1. Scientific Attitude

Based on Indonesian curriculum application, there are several scientific attitudes such as (1) curiosity; characterized by high interest and children's curiosity about every natural behaviour around them, (2) objectivity; Students must always present data according to those obtained during observation and make decisions based on existing facts,

the results of an observation or experiment should not be influenced by personal feelings, (3) critical thinking; that process allows students to evaluate the evidence, assumptions, logic, and language that underlies the statements of others, (4) open mindedness: students are get used to accept the opinions from others and want to change their opinion of the opinion is not right, and (5) Perseverance; is the ability to continue working despite many obstacles. One is determined to see that one's work is over.

2. Learning biotechnology

   The learning biotechnology to be chosen is for grade 9th secondary school students as written in Indonesia Curriculum 2013.

3. Scientific Literacy

   Three aspects of scientific literacy consist of scientific competencies, which consist of explain phenomena scientifically, evaluate and design scientific inquiry, and Interpret data and evidence scientifically. The second aspect is scientific knowledge consist of content, procedural, and epistemic. The thirs aspect of scientific literacy is attitudes toward science which consist of interest in science, valuing scientific approaches to enquiry, and environmental awareness.

1.5 Research Objective

The objective of this research, based on research questions, is set out as follows:

1. To analyze the junior high school students' scientific attitude in learning learning biotechnology based on types of school

2. To analyze the junior high school students' scientific attitude in learning learning biotechnology based on gender

3. To analyze the junior high school students' scientific literacy in learning learning biotechnology based on types of school

4. To analyze the junior high school students' scientific literacy in learning learning biotechnology based on gender

1.6 Research Benefit

The results of this research are expected to make a positive contribution to many parties as follows:

1. Teacher

   This research finds out more students' scientific attitude and scientific literacy in learning biotechnology. The result of this research may add insight teachers to develop and improve their teaching method and learning style which encourages the students' scientific attitude and scientific literacy to achieve the objective of the learning.

2. Student

   This research gives students a description of their current state of scientific attitude and scientific literacy during the Biotechnology class. Furthermore, the results of this research can be used to motivate them to study science more.

3. Another Researchers

   Other researchers may also use the data from this research as reliable information and recommendations for future studies.

1.7   Organization of Research

a. Chapter I: Introduction

   This chapter discusses the research background, research problems, research questions, limitations of problem, research objective, research benefits, research benefits, and research paper systematic structure.

b. Chapter II : Literature review

   This chapter discusses the literature review of the theories that were used in this study. The scientific attitude, scientific literacy, and followed by learning biotechnologys were the theories used in this study.

c. Chapter III: Research Methodology

   This chapter describes and explain the research methods that were in

this research. The research method, research design, population, sample, hypothesis, assumption, and data analysis are all covered in detail in this chapter.

d. Chapter IV: Result and Discussion

This chapter focuses on the data collected during the research process, and it describes in detail how this research analyzes and processes the data collected, which can be used to answer the research question.

e. Chapter V: Conclusions, Implications and Recommendations

This chapter summarizes the findings after the data has been gathered, processed, and the recommendations for other researchers, teachers, and students.