

CHAPTER I

INTRODUCTION

1.1. Background

Learning Natural Science (IPA) relate with natural phenomena which are arranged systematically, regularly, and through standardized methods so as to produce a collection of knowledge in the form of facts, concepts or principles. Learning is processed in such a way that students gain direct knowledge and experience from studying the surrounding natural phenomena. Learning Natural Sciences (Science) at the junior high school level aims for students to master knowledge, facts, concepts, principles, discovery processes, and have a scientific attitude, which will be useful for students in studying themselves and their environment or the natural surroundings. Learning Natural Sciences (IPA) cannot only be conveyed through concepts and formulas to gain knowledge but emphasizes providing direct experience to see, find out and find knowledge through direct experience from studying natural phenomena so that you can understand the natural surroundings scientifically, improve knowledge and can improve students' scientific literacy abilities (Budiarso et al., 2020).

Through Scientific literacy individual can apply their knowledge to identify questions, provide scientific explanations or understanding, compile or construct new knowledge, draw conclusions based on various scientific evidence, and the ability to develop a hypothetical mindset so that they can participate and overcome various ideas and issues related to science (Pertiwi et al., 2018).

Scientific literacy one of the most important keys to responding to challenges in the era of globalization. By implementing scientific literacy in science learning in junior high school, students are expected to have the ability in terms of knowledge and understanding of scientific concepts. Students are expected to be able to recognize and overcome problems faced in everyday life. Through scientific literacy, students are also expected to be able to meet the demands of different times, namely having competitive, innovative, creative, cooperative and character traits that are in line with the development of 21st century competencies (Erayani & I Nyoman Jampel, 2022). An individual able to apply their

knowledge to identify questions, provide scientific explanations or understanding, compile or construct new knowledge, draw conclusions based on various scientific evidence, and the ability to develop a hypothetical mindset so that they can participate and overcome various ideas and issues related to science (Pertiwi et al., 2018).

The results of the PISA assessment of Indonesian students over the last four years, namely 2006, 2009, 2012 and 2015, have a low average achievement of scientific literacy scores in the score range of 382-403. Then in 2018 it experienced another decline, producing a scientific literacy score of 396. Then in 2018 it experienced another decline, producing a scientific literacy score of 396 (OECD, 2019)

There are several factors that cause low student scientific literacy in Indonesia, including students' low understanding of the nature of science, students are not yet able to apply scientific concepts in everyday life, students are only able to understand science to the extent of theory, students' low ability to read and interpret data in the form of pictures, diagrams and tables, low ability to think critically, reason scientifically, think creatively, and solve problems (Sopandi, 2019). Other factors that influence students' low scientific literacy are the choice of learning methods and models, facilities and infrastructure. One of the factors that really influences low scientific literacy is the choice methods and models of learning by teachers.

This is supported by Aqil, (2018) who stated that the choice of learning resources is the cause of students' low scientific literacy. Learning resources in science learning so far are still limited to open books or texts rather than direct learning. This is in line with research conducted by Suparya et al., (2022) which suggests several factors causing low student scientific literacy, including science learning which is carried out not contextually and is not linked to things related to everyday life, low reading ability. and interpreting reading, science learning has not been supported by an adequate learning environment, both in the family, school and community environment, the lack of equipment to monitor the learning process will cause learning to not run optimally, the quality of teaching staff in

schools, the role of school principals in facilitating teaching staff and education to improve the professionalism of teaching staff.

Based on the results of observations carried out at SMP NEGERI 27 Medan, it was found that students' scientific literacy was still low. Based on interviews with teachers, students' scientific literacy skills are still low, including connecting scientific concepts with everyday life during the learning process and also on student tests.

This is due to the lack of utilization of the models and learning media used. The learning process is still teacher-centered and the method used during the learning process in the classroom is the lecture method which only focuses on theory, causing a lack of student interest and motivation to learn. who tend to listen, memorize and copy the contents of the learning material provided by the teacher without finding the meaning and understanding its application. Students' low scientific literacy is caused by limited understanding of concepts in science learning, where students only focus on memorizing rather than understanding concepts. Learning resources in science learning so far are still limited to student textbooks, the application of scientific literacy which only relies on textbooks has not fully touched the souls of students, as a result lessons become boring and students do not understand the subject matter (Fuadi et al., 2020). Apart from that, most teachers do not connect science learning directly in the classroom with natural phenomena, whereas science learning is closely related to nature.

The solution that researchers can provide to help increase scientific literacy is through integrated ethnoscience phenomenon-based learning. Phenomenon-based learning is learning that encourages students to study a topic or concept through a holistic approach which can help improve the quality of learning activities by presenting new things to students in real contexts (Mattila & Silander, 2015).

Phenomenon-based learning is based on constructivist learning theory which prioritizes the process of constructing students' understanding of the material. Learning according to this theory is a learning method that qualifies students to be active in developing new concepts, understanding and insight based on the facts

obtained. Thus, learning methods must be prepared and implemented as well as possible in order to be able to motivate students to organize their own experiences as meaningful knowledge (Rizkyanda et al., 2013).

Science is very close and closely related to culture. Culture and education are two elements that support each other. Culture has various aspects that support educational programs. With this effort, supporting culture also means supporting education. Indonesia has a diverse and different local culture in each region. Quality learning can be implemented by linking local culture into science learning (ethnoscience). Local culture can be useful as a learning stimulus to provide motivation and help students construct knowledge. The importance of integrating culture in science learning (ethnoscience) is one of the important lessons carried out in schools, connecting culture in various sectors determines the meaningfulness of professional services, including educational services, so teachers must be able to highlight cultural elements to be accommodated in learning (Erayani & Jampel, 2022). The importance of integrating culture in science learning is in accordance with explaining the social constructivism theory of the importance of integrating cultural competence in education.

By using ethnoscience-based phenomenon based learning with a problem based learning model, students will be able to connect their problems with the culture around them. So that students will feel confident that they can do and solve the problems they have faced. By using an ethnoscience-based phenomenon based learning approach, students can get to know and become closer to the natural, social and cultural environment, providing abilities and skills as well as knowledge about their area that is beneficial for themselves and the community environment. (Yulianto et al., 2023).

The Ethnoscience-based Phenomenon Based Learning is a learning approach that is expected to develop students' scientific literacy abilities in the dimensions of scientific competence (Junita & Yuliani, 2022). The Ethnoscience-based Phenomenon Based Learning approach can provide opportunities for students to be directly and actively involved in scientific activities and provide students with direct experience of science learning in the context of local wisdom so that the

concepts students receive will be easy to remember and students will also easily understand the material studied. The ethnoscience approach places great emphasis on original knowledge and the unique characteristics of society in maintaining their lives and identifying various phenomena in the environment. By applying local culture or wisdom to science learning, students can make direct observations and train students to find their own concepts comprehensively and meaningfully, as well as encourage students to explore scientific knowledge contained in local wisdom values.

This is supported by research (Santoso et al., 2023) the results of the implementation of learning in this study by applying phenomenon-based contextual learning show effective results to improve students' science literacy. Students give a very positive response to the application of this learning because they more easily understand the material because it is related to the phenomena of everyday life. This is supported by research (Milanto et al., 2023) that has been carried out on Students in the physics education undergraduate program at Universitas Negeri Surabaya who took thermodynamics courses were the research subjects. The results showed that students' scientific literacy abilities before participating in the learning were already in a reasonably good category, and these students scientific literacy abilities experienced an increase after participating in contextual learning.

This research is based on the lack of models used in classroom learning, resulting in students' low understanding of the material and the lack of application of learning that links indigenous knowledge of society with modern scientific knowledge, causing students to be less sensitive to the surrounding environment. Students cannot explain events related to science concepts well. Limitations in explaining these concepts are an indicator of students' low understanding in the context of science. The Ethnoscience-based Phenomenon Learning learning model is a learning strategy that provides students with the opportunity to think more critically, be active and learn independently to solve problems.

Based on the description above, researchers are interested in conducting research with the title **The Effect of Ethnoscience Integrated Phenomenon**

Based Learning with PBL to Improve Students' Scientific Literacy on Temperature, Heat and Expansion at SMP Negeri 27 Medan 2023/2024 Academic Years.

1.2.Problem identification

Based on the background above, several problems can be identified as follows:

1. Science learning is not yet based on the application of natural phenomena in everyday life.
2. Low level of student scientific literacy regarding temperature, heat and expansion in aspects of students' scientific literacy.
3. The implementation of the learning model is not yet oriented towards increasing students' scientific literacy abilities
4. Learning is not linked to ethnosience or local culture which can be useful as a learning stimulus to provide motivation and help students construct knowledge.

1.3.Scope of study

1. This research was conducted in class VII of SMP Negeri 27 Medan in the even semester 2023/2024 academic years.
2. The research carried out was integrated ethnosience phenomenon-based learning on the material Temperature, Heat and Expansion.
3. The integrated ethnosience phenomenon that is raised in science learning is the culture of North Sumatra, one of which is the traditional Karo house, namely siwaluh jabu to measure temperature.
4. The research measures students' scientific literacy abilities in based on the influence of the treatment given to the experimental class and compares it with the control class.

1.4.Research question

Based on the identification of the problem above, the problem formulation in this research will be "Does the ethnosience-integrated phenomenon based learning affect students' scientific literacy on temperature and heat and expansion in Grade VII SMP Negeri 27 Medan 2023/2024 academic years ?

1.5.Problem Limitation

The problems in this study need to be limited so that the researcher can focus on specific aspects of the problems that have been identified. The researcher set the boundaries of this study as follows:

1. The material that will be taught is temperature, heat and expansion
2. Scientific literacy abilities aspect consist knowledge, context and competences based on PISA framework 2018

1.6.Research objective

The purpose of this research is to "Find out the effect of the ethnoscience-integrated phenomenon based learning approach on students' scientific literacy abilities on temperature and heat and expansion material in class VII SMP NEGERI 27 Medan TP 2023/2024.

1.7.Benefit of Research

The benefits obtained from this research are as follows:

1. For students, it is hoped that this research can increase students' scientific literacy through implementing an interesting and fun learning approach and model.
2. For teachers, as input and consideration to be able to choose the right learning model so that it can increase students' scientific literacy
3. For schools, it is hoped that this research can be used as material for evaluating learning in schools regarding the use of good approach and model for teachers to use in science learning, especially regarding temperature and heat.
4. For researchers, as input for prospective teacher students to be able to apply the integrated ethnoscience phenomenon model well so as to improve students' scientific literacy skills.