

# CHAPTER I

## INTRODUCTION

### 1.1 Background

Scientific literacy plays a significant role in helping individuals engage critically with everyday information and participate as informed citizens (Elhai, 2023). The rapid spread of hoaxes and misinformation on the internet emphasizes the urgent need for individuals to think critically, engage in evidence-based reasoning, and evaluate information carefully (Fiordelli et al., 2023).

Despite this importance, the Programme for International Student Assessment (PISA) 2022 factsheet reported that only 34% of Indonesian 15-year-old students reached at least Level 2 proficiency in science, a score significantly lower than the Organization for Economic Co-operation and Development (OECD) average of 76%. Indonesia's average science score also slightly declined from 396 in 2018 to 383 in 2022, indicating a persistent national challenge in fostering the reasoning and critical thinking abilities associated with scientific literacy.

Although scientific literacy has traditionally been associated with science education, its core principles, such as inquiry, evidence-based reasoning, and logical decision-making, are equally relevant to language learning. Learning a new language requires students to analyze linguistic structures critically and make informed choices based on evidence and context. Recognizing this interdisciplinary need, the national Merdeka Curriculum strongly emphasizes integrating 21st-century skills, particularly critical thinking, problem-solving, and inquiry, across different subjects, including English, to foster students' critical thinking and reasoning abilities, which are closely related to scientific literacy (Sari et al., 2023; Nugraha, 2022).

In the Indonesian context, the development of these skills faces a challenge, as English learning in junior high schools has been traditionally dominated by grammar translation and vocabulary memorization. Teachers often employ teacher-centered approaches that limit students' opportunities to engage in reflective dialogue or evidence-based arguments. The low

PISA performance suggests that students need more exposure to reasoning and critical thinking tasks. In this regard, the systematic integration of scientific literacy principles into English lessons could provide a valuable pathway to improve learning outcomes by encouraging students to analyze texts, differentiate facts from opinions, and connect language learning to real-world issues.

While existing studies have provided valuable insights into scientific literacy by measuring student proficiency (Saraswati et al., 2021; Silitonga et al., 2025) or evaluating instructional models within science subjects (Dewi et al., 2017; Hudha et al., 2023; Darmaji et al., 2023), the literature suffers from a critical descriptive gap. The current body of research largely fails to provide an empirical, detailed account of how the principles of scientific literacy, particularly the skills of reasoning, inquiry, and evidence-based argument, are manifested in non-science domains. Specifically, there is a distinct absence of qualitative evidence detailing the specific mechanisms through which these aspects are embedded within teacher discourse patterns and learning materials at the Indonesian junior high school level. This descriptive deficit is precisely where this research finds its relevance.

Therefore, this study is aimed at filling this descriptive gap by exploring, through qualitative analysis, how the four aspects of scientific literacy (knowledge, process, context, and attitude) are manifested in English learning activities and learning materials, comprising the mandated textbook and teacher-prepared resources at Grade 8 in SMP Muhammadiyah 11 Jakarta.

## **1.2 Research Questions**

1. How are the aspects of scientific literacy manifested in the English learning activities of grade 8 at SMP Muhammadiyah 11 Jakarta?
2. How are the aspects of scientific literacy manifested in the English learning materials used in grade 8 at SMP Muhammadiyah 11 Jakarta?

## **1.3 Objectives**

1. To analyze the way the aspects of scientific literacy are manifested in the English learning activities of grade 8 at SMP Muhammadiyah 11 Jakarta.
2. To analyze the way the aspects of scientific literacy are manifested in the English learning materials used in grade 8 at SMP Muhammadiyah 11 Jakarta.

#### **1.4 Scope of the study**

The investigation focuses specifically on two areas of inquiry. The first is learning activities, analyzed through the naturally occurring classroom interactions, teacher talk, and pedagogical discourse patterns (Research Question 1). The second is learning materials, comprising both the school-mandated textbook and supplementary resources prepared by the teacher, used to support and guide the language learning process during the lessons (Research Question 2).

To establish clear boundaries for this qualitative investigation, the following explicit parameters are applied. The analysis of learning materials targeted two categories of instructional resources used during the five observed meetings: the mandated printed textbook, Bahasa Inggris 2 untuk SMP/MTs Kelas VIII, provided by the school as part of the Kurikulum Merdeka; and supplementary materials prepared by the teacher, including PowerPoint presentation slides, the Spokabulary digital game, and printed worksheets. The researcher also acted solely as a non-participant observer throughout the data collection process, limiting the role to the objective documentation, transcription, and subsequent qualitative analysis of the naturally occurring classroom activities and materials.

#### **1.5 Significance of study**

This study is important both academically and practically. Academically, it contributes to the growing body of research on interdisciplinary approaches in language education by exploring how principles of scientific literacy typically associated with science education may be manifested within English instruction. Although scientific literacy has traditionally been connected to content knowledge in science, technology, engineering, and mathematics (STEM), this study highlights its broader relevance, particularly in shaping how students engage in reasoning, inquiry, and contextual understanding through language.

Practically, this research may benefit English teachers by offering insights into how their classroom activities and materials can implicitly support the development of students' scientific literacy. The results can encourage teachers to reflect on their learning methods and materials from a new perspective, promoting language proficiency, critical thinking, and problem-solving skills.

For curriculum planners and school administrators, particularly at SMP Muhammadiyah 11 Jakarta and similar institutions, the study provides a reference point for evaluating how existing language programs align with the competencies required in 21st-century education, including integrating cognitive and inquiry-based skills into language learning.

## **1.6 Previous Studies**

Previous research related to scientific literacy, classroom discourse, and language learning can be categorized into five main themes to position this study:

### **Studies on Classroom Discourse and Scientific Literacy**

Several studies have highlighted the relationship between classroom interaction, teacher talk, and the development of reasoning and inquiry skills, which are closely related to scientific literacy. Walsh (2011) emphasized that teacher talk is not merely a medium for delivering content but a framework that organizes classroom discourse and shapes students' opportunities for reasoning. Mercer and Howe (2012) further explained that dialogic interaction, characterized by open-ended questioning, clarification requests, and elaborative feedback, helps students articulate their thoughts, justify opinions, and engage in collaborative inquiry. Similarly, Soysal and Soysal (2022) found that teachers' questioning strategies play an important role in stimulating reasoning and inquiry during classroom activities. These findings collectively demonstrate that effective classroom communication can foster reflective and evidence-based thinking.

### **Studies on Scientific Literacy in Indonesian Context**

A number of Indonesian-based studies have examined scientific literacy, primarily focusing on its measurement and instructional strategies within science-related fields. Saraswati et al. (2021) and Silitonga et al. (2025) investigated junior high school students' literacy profiles based on various aspects, finding that most students performed at a moderate level and often struggled with contextual and analytical tasks. From an instructional perspective, Dewi et al. (2017) demonstrated that the discovery learning model improved seventh-grade students' ability to apply scientific reasoning, while Hudha et al. (2023) confirmed that project-based learning effectively promotes scientific literacy by encouraging inquiry. In addition, Darmaji et al. (2023) revealed a significant correlation between students' digital literacy and science process skills. Research on its integration into language learning,

such as that by Helyanti (2022) and Bilmona (2021), suggested that incorporating science-based narratives and blended learning strategies can enhance students' comprehension and cognitive development.

### **Studies on Scientific Literacy in EFL/Non-Science Context**

This category focuses on studies that specifically bridge scientific literacy and language learning. Yore and Treagust (2006) asserted that language serves as a cognitive tool through which learners construct and communicate scientific reasoning. Critically, Wijaya (2023) adapted the four scientific literacy aspects (scientific knowledge, process, context, and attitude) proposed by BouJaoude (2002) to analyze how English classroom activities can reflect scientific thinking. His study provided a conceptual foundation by revealing that tasks encouraging analysis, reasoning, and contextual understanding help students develop skills consistent with the principles of scientific literacy.

### **The Research Gap**

While the literature provides a solid framework for classroom discourse and outlines the national deficiency in scientific literacy, and offers conceptual adaptations for EFL settings, a significant gap remains. Most previous studies in Indonesia either measure proficiency levels (Saraswati et al., 2021; Silitonga et al., 2025) or evaluate specific instructional models in science subjects (Dewi et al., 2017; Hudha et al., 2023; Darmaji et al., 2023). Those exploring the SL-EFL link (Yore & Treagust, 2006; Wijaya, 2023) are often conceptual or preliminary. There is a lack of descriptive, empirical research that observes and details how (the specific mechanisms) scientific literacy is actually manifested in naturally occurring learning activities and the materials used in English classes at the junior high school level in Indonesia. This study seeks to fill that descriptive gap by exploring how the four aspects of scientific literacy are manifested in English learning activities and English learning materials used in Grade 8 at SMP Muhammadiyah 11 Jakarta.