CHAPTER I
INTRODUCTION

This chapter serves comprehensive explanations about the background of the research, research questions, purposes of the study, scopes of the study, significance of the study, and state of the art.

1.1 Background of the Study

Scientific literacy demonstrates the quality of the education in a country, which highlights an essential aspect for students. In this generation of globalization and information, students need to have scientific literacy skills that aim to be acceptable when encountering any particular issues for each individual (Shobib et al., 2021). Correspondingly, as stated by (Ajayi, 2018) An environment with higher science literacy would be able to make better decisions and judgments. Scientifically literate people will receive and analyze information appropriately. Thus, there is an urgency to promote scientific literacy, which in this research will be focused on higher education. Based on Ajayi (2018), a scientifically literate person is defined as a person who has the ability to: (1) Understand, experiment, and reason as well as interpret scientific facts and their meaning. (2) Ask, find, or determine answers to questions derived from curiosity about everyday experiences. (3) Describe, explain, and predict natural phenomena. (4) Read articles with an understanding of science in the popular press and engage in social conversation about the validity of the conclusions. (5) Identify scientific issues underlying national and local decisions and express positions that are scientifically and technologically informed. (6) Evaluate the quality of scientific information on the basis of its source and the methods used to generate it. (7) Pose and evaluate arguments based on evidence and apply conclusions from such arguments appropriately. In line with Ajayi (2018), this study incorporates all seven components mentioned.

Unfortunately, PISA (2022) stated that the scientific literacy score in Indonesia was 383 points. This score is below the average achievement of OECD countries, which stands at 476 points (Naura Ayu et al., 2025). Moreover, even scientific literacy research is widely conducted in Indonesia in science learning for

junior high school and high school students (Siti Maryam, 2025). The scientific literacy competence in high school students was indicated to be very low. The presentation showed that the average indicators were only 38% (Adhari et al., 2025).On the other hand, there were another research that supports this statement, Setiawan et al. (2025) found out that the scientific literacy in the knowledge aspects is in the “Very Poor” category (41,21%). It indicated that scientific literacy in ELESP should be instilled in the learning process to create scientifically literate students.

Inevitably, scientific literacy would be an issue for future educational research. Ajayi (2018) stated that literate people feel concerned about environmental and social problems, are responsible for acting on the problem, and are empowered to use science as a tool in addressing the problems. To solve those complicated difficulties, multidisciplinary educational techniques are necessary. (Kelp, McCartney, Sarvary, Shaffer, & Wolyniak, 2023) proposed that scientific literacy competence is essential for students to establish, whether they are trained or not, as people deal with science-related problems every day. Despite the remarkable roles of scientific literacy throughout the years, the gaps in infusing scientific literacy still need to be addressed.

One of the most often used learning models is the problem-based learning (PBL) model. PBL is using real-life applications. Based on this idea, PBL emphasized a student-centred learning approach by boosting students to actively engage in problem-solving tasks. (Cahyaningrum, Firdaus, & Mulyadi, 2023). Study from (Nisa, Ramadhan, & Thahar, 2023) Discussed there were the positive impacts of applying PBL in writing scientific journal articles for Language Education Study Program students. Moreover, as stated by (Doode & Shailaja, 2022) PBL may be more effective by allowing the students to be active in real-life problems, and collaborative inquiry, fostering students to have a critical thinking skills, being able to solve the problem, and a boarder comprehension of scientific concepts. From these previous studies, the effectiveness or benefits of PBL are worth looking into.

The recent development of the problem-based learning model in higher education for English language teaching (ELT) has shown advantageous results in

its application. The research found that problem-based learning potentially promotes essential abilities such as collaboration, communication, and creativity, which those aspects are vital for success in both academic and professional settings. (Doode & Shailaja, 2022). Besides, another research from Arab, in the language classroom, where English as a foreign language PBL can be very useful. Teachers can design problems to find the learners' needs, which can be useful to improve English practically in a social context. (Ali, 2019). These studies mentioned show that PBL in ELT has benefits in its implications for development.

In the future, problem-based learning (PBL) would be an issue for further research in the English Language Teaching field due to its effectiveness. It will help students build their problem-solving abilities and connect their prior knowledge with new information (Nisa, Ramadhan, & Thahar, 2023). Furthermore, in the research (Ali, 2019) Through PBL, students learn to work in groups, become peers in the teaching or learning process, where they can work successfully, and can address current situations and create lifelong learning skills. Hence, research and development of problem-based learning in English Language Teaching is still essential to be investigated.

On the other hand, academic writing is a formal and understandable written expression on a given topic, question or subject of someone's own evidence-based views (University of Leeds, 2019). According to Gabi (2022) The goal of academic writing is to convey the arguments to the readers. To convey to the reader, it must present a clarity of expression, breadth, depth, and cohesion of writing in the context of the discipline, subject, or topic. In line with scientific literacy, academic writing needs evidence to prove the statement is true.

The previous studies mentioned the effectiveness of scientific literacy and problem-based learning clearly. However, the research on the infusion of scientific literacy in problem-based learning has yet to be investigated. Thus, this research aims to fill the gap of scientific literacy and problem-based learning in ELESP in the context of academic writing. In addition, the study was conducted by (Cahyaningrum, Firdaus, & Mulyadi, 2023) Found out that the students have shown a specific improvement in their writing skills by applying problem-based learning. Accordingly, the researcher conducted the research entitled "Infusing Scientific

Literacy in a Problem-Based Learning Model in an Academic Writing Course for ELESP." The research is divided into five chapters: introduction, literature review, methodology, findings, and conclusion.

1.2 Research Questions

According to the background of the study, the research question is organized into main and sub-questions.

The main question of the research is:

How is the model of problem-based learning infused Scientific literacy in the academic writing course?

The sub-questions of the research are:

1. To what extent have the existing problem-based learning models infused scientific literacy in the academic writing courses of the ELESP?
2. How are the procedures to develop the problem-based learning model infused with scientific literacy in the academic writing course of the ELESP?
3. How is the development of the problem-based learning model infused with scientific literacy in the academic writing course of the ELESP?
4. How is the validity of a problem-based learning model infused with scientific literacy in the academic writing course of the ELESP?

1.3 Purposes of the Study

In line with the research question, the research's main and sub-purposes are formulated.

The main purpose of the research:

To infuse scientific literacy into an academic writing course using a problem-based learning model.

The sub-purposes of the research are:

1. To analyze the existing problem-based learning models infused with scientific literacy in academic writing courses of the ELESP.
2. To elaborate on the procedure of developing a problem-based learning model infused with scientific literacy in the academic writing course of the ELESP.

3. To develop a model of problem-based learning infused with scientific literacy in the academic writing course of the ELESP.
4. To measure the validity of a problem-based learning model infused with scientific literacy in the academic writing course of the ELESP.

1.4 Scope of the Study

The research concentrates on developing the problem-based learning and scientific literacy-infused learning model in the English Language Education Study Program (ELESP) for the writing course. The product of this research is a problem-based learning model and writing infused with scientific literacy for ELESP. This research employs the DDR method. The research used the data of the existing learning models acquired from class observation, lesson plans, and syllabus documents from two (3) different universities in Indonesia. Then, the data from the existing models of learning were analyzed to describe the usage of problem-based learning infused with scientific literacy in the existing learning models of writing content courses in ELESP.

This research occupies a framework for the problem-based learning model and the theories related to scientific literacy. The researcher makes up the indicators of scientific literacy and the problem-based learning indicators. Accordingly, this research is expected to serve and prepare a suitable problem-based learning model for ELESP that incorporates writing with scientific literacy.

1.5 Significance of the Study

The purpose of this research is explained beforehand. The researcher truly hopes this research may help lecturers, students, and some particular practitioners in English language teaching to be more sensible to scientific literacy in problem-based learning.

1. Theoretically

   In this research, the researcher serves theories discovery and justification through developing the problem-based and scientific literacy-infused learning model, especially in the English Language Education Study Program for the academic writing course, which might be beneficial for lecturers, students, and researchers who want to apply this learning model.

2. Practically

The practical aspect of the study is expected to apply the English writing materials infused with scientific literacy as a material in the class. It can encourage the students to be eager and open-minded with scientific literacy in the classroom and also in daily life situations. The practical aspect of the study specifically mentions:

1. This study cultivates and fosters the usage of the problem-based learning model infused with scientific literacy for the writing course of the English Language Education Study Program (ELESP)
2. This study applies the problem-based learning model in the teaching process.
3. This study supports English teachers' and lecturers' viewpoints on infusing scientific literacy throughout the English Language Teaching (ELT) process.
4. The study promotes the pedagogical activity by infusing scientific literacy.

1.6 Clarification of Related Term

- Scientific literacy: Stockwell (2016) Define scientific literacy as the ability to navigate, interpret, and criticize scientific information.
- Problem-Based Learning (PBL): According to Prasad & O'Malley (2022) Problem-Based Learning (PBL) is a learning modality that applies a student-centred approach. In the small group setting, PBL promotes learning by developing critical thinking and discussion as opposed to direct facts and concepts.
- Academic Writing: Academic writing is a formal and understandable written expression on a given topic, question, or subject of someone's own evidence-based views (University of Leeds, 2019).
- English Language Education Study Programme (ELESP): ELESP is a bachelor's degree study program that aims to train future English teachers or practitioners.

1.7 State of the Arts

This research aims to develop scientific literacy-infused problem-solving learning models for academic writing in a higher education level. According to Kelp et al. (2023) The scientific community is increasingly recognizing the necessity of addressing equality and inclusion in strategies aimed at enhancing scientific literacy. From their research (Afnan et al., 2023), found that scientific literacy is essential for students to understand, identify, explain, and use scientific findings to solve problems in modern society. Ajayi (2018) believed that a scientifically-literate person is oriented to the research as they feel the needs to search for something. The benefit of being a scientifically-literate people would be able to make better judgments and decisions. It also ensures a person receives and analyzes information in the proper manner.

Numerous research in problem-based learning presented mostly great result in its implementation. It highlighted the advantages of PBL in promoting deeper learning and engagement. In his study (Doode, 2022) The research was conducted in two cycles to prove students' ability in scientific literacy. Moreover, the result of the observation in both cycles showed that students' scientific literacy skills has increased by applying problem-based learning (PBL). Nasution (2019) showed that the application of PBL with reading-infused strategy can increase scientific literacy indicators, specifically in explaining phenomena scientifically and interpreting data and scientific evidence. These findings help widen the significance of problem-based learning, which is possible to be implemented in this research context.

PBL's significance is also shown in teaching writing. A research by (Dewi Cahyaningrum et al., 2024) found that the eleventh-grade student have shown significant progress in their writing competence with the introduction of PBL. Then, the research by (Wulandari & Hastini, 2024) has proven the effectiveness of PBL significantly contributes to developing writing skills in constructing procedure text. Another study that implemented PBL in writing was investigated by (Kumar & Refaei, 2017) was resulted positive impact for the students. They believed that PBL helps students to think more critically about their work as an author. Hence, this research is expected to have positive outcomes by implementing Problem-based learning in an academic writing course.

Despite the importance of PBL, its implementation that incorporates scientific literacy is notably restricted. Kumar & Refaei (2017) believed that the problem scenarios require students to focus on the audience and goals more than traditional teacher-driven assignments.

Hopefully, this study will provide light on the infusion of scientific literacy in PBL. The research hopes to shed light on its ideas and applications by creating scientific literacy-infused problem-solving learning models for the academic writing course of the English Language Education Study Program (ELESP).