CHAPTER I
INTRODUCTION

1.1. Problem Background

Law No. 20/2003 on the National Education System Article 1 defines education as a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character and skills needed by themselves, society, nation and state. In this context, education also plays a crucial role in shaping a generation that is aware of and able to face global challenges, including global warming, which has become a serious threat to the sustainability of life on earth.

Global warming is one of the most talked about topics these days. We can already feel its impact. Currently, the impact of global warming is one of the issues that is widely discussed in various state forums. Finally, in the G20 forum held in Bali, G20 member countries agreed to limit the value of greenhouse gas emissions so that the temperature rise is no more than 1,5^{o}C according to the Paris Agreement. However, on the other hand, G20 member countries are also the largest carbon emitters in the world (Jayawardana *et al*., 2023). Based on European Commission data, the volume of greenhouse gas emissions in Indonesia in 2022 reached 1,24 gigatonnes of carbon dioxide equivalent, making Indonesia the largest emitter in Southeast Asia. Shifting rainy seasons and crop failures due to extreme weather are clear evidence that the climate crisis has occurred and requires serious handling (Irma & Gusmira, 2024).

One of the strategies to minimise the impact of global warming is through public awareness, including education (Leu, 2021). Improving environmental literacy in students can be a strategic step, because environmental literacy has been identified as the point of inception to bring a change and form a positive and close nexus between environment, education, and health (Biswas, 2019). Environmental literacy in secondary school is an important skill that involves understanding,

responsibility, and action in protecting the environment, covering basic knowledge to critical thinking and wise decision-making on environmental issues (Saputri *et al*., 2024).

The environmental literacy test conducted on 30 students of class X SMAN 1 Dolok Batu Nanggar showed that the criteria for environmental literacy in the cognitive element were in the not good category (39,3%), the affective element was in the good category (75,7%), and the behavioral element was in the not good category (51,8%) (Appendix 5). The results of interviews with teachers also revealed that environmental behavior has not been shown well by students of SMAN 1 Dolok Batu Nanggar, such as sorting organic and inorganic waste, saving electricity, and others (Appendix 1).

The obstacles in implementing environmental literacy in secondary schools are the lack of applicable environmental education and students' low interest in environmental issues. Therefore, a more interactive and applicable approach is needed in learning environmental literacy to form a generation that not only understands, but also cares and plays an active role in preserving nature (Saputri *et al*., 2024).

The results of student needs analysis questionnaire distributed to 32 students of SMAN 1 Dolok Batu Nanggar showed that 92% of students preferred digital learning resources. However, the results of student questionnaires also revealed that teachers more often recommend textbooks provided by the school as learning resources, and still rarely provide digital learning resources (Appendix 2). Meanwhile, research conducted by Gemuruh *et al*., (2022) proved that the implementation of digital learning resources is more effective in improving learning outcomes compared to conventional learning resources. Research on the development of digital learning resources based on environmental literacy has been conducted by Nariswari *et al*., (2022) who developed an e-flipbook on environmental change material based on environmental literacy, which showed an average validity score of 86% (very feasible), a positive response from teachers, namely 93% (very feasible), and a positive response from students, namely 83% (very feasible).

Another potential digital learning resource is e-booklets, which are digital booklets designed to be used through electronic devices such as smartphones and laptops. E-booklets present material in a concise and interesting manner, with additional relevant images (Hoiroh & Isnawati, 2020). Research conducted by Ayunda & Lufri (2024) also showed that e-booklets have high validity in terms of content, language, presentation, and graphics so that they are very feasible to use in the learning process.

The results of the student needs analysis questionnaire showed that 33% of students did not know what an e-booklet was and all students had never used an e-booklet as a learning resource in biology subjects (Appendix 2). The results of interviews with teachers also show that environmental literacy-based learning resources have never been used in the learning process. Teachers and all students agreed to develop environmental literacy-based e-booklet learning resources on Global Warming material (Appendix 1).

Based on this phenomenon, research is needed on **"Development of Global Warming E-Booklet Based on Environmental Literacy as Learning Resource for Grade X Students of SMAN 1 Dolok Batu Nanggar"**.

1.2. Problem Identification

Based on the background of the problems that have been described, the following problems can be identified.

1. Students' environmental literacy especially in cognitive and behavior element is in not good criteria.
2. Digital-based learning resources are rarely used in teaching and learning activities.
3. Environmental literacy-based learning resources have never been used in teaching and learning activities.
4. Learning resources that have been used in learning do not match with students' preference.
5. There is a gap between students' environmental literacy knowledge and skills.

1.3. Scope of Research

Based on the identification of the problem, the scope of this research includes:

1. Development of environmental literacy-based Global Warming e-booklets.
2. Validation of the feasibility of environmental literacy-based Global Warming e-booklets.
3. Teacher and student responses to the environmental literacy-based Global Warming e-booklet.
4. Effectivity of the e-booklet tested with Wilcoxon Signed Rank Test and N-Gain Test.

1.4. Problem Limitation

In order for the research not to deviate from the research objectives, it is necessary to limit the problem as follows.

1. This research was conducted on Class X students of SMA Negeri 1 Dolok Batu Nanggar in the 2024/2025 academic year.
2. The environmental literacy-based e-booklet that will be developed is only on Global Warming material for Class X.
3. Product validation is seen in terms of material, learning, design, teacher response, and student response.
4. The instructional development used is the 4D (Define, Design, Develop, and Disseminate).

1.5. Formulation of the Problem

Based on the problem limitation, the problem formulation of this research is as follows:

1. What is the validity criteria of the Global Warming e-booklet product based on environmental literacy according to material experts?
2. What is the validity criteria of the Global Warming e-booklet product based on environmental literacy according to learning experts?

3. What is the validity criteria of the Global Warming e-booklet product based on environmental literacy according to design experts?
4. How do students and teacher respond to the Global Warming e-booklet product based on environmental literacy?
5. How is the effectiveness of Global Warming e-booklet product based on environmental literacy?

1.6. Research Objectives

Based on the formulation of the problem, the objectives of this study are as follows:

1. Knowing the validity criteria of the Global Warming e-booklet product based on environmental literacy according to material experts.
2. Knowing the validity criteria of the Global Warming e-booklet product based on environmental literacy according to learning experts.
3. Knowing the validity criteria of the Global Warming e-booklet product based on environmental literacy according to design experts.
4. Knowing the responses of students and teachers to the Global Warming e-booklet product based on environmental literacy.
5. Knowing the effectiveness of Global Warming e-booklet product based on environmental literacy.

1.7. Research Benefits

From the implementation of the research objectives above, the benefits expected after the research are as follows:

1. For students, training to learn actively, gaining environmental literacy-based learning experiences, and understanding the concept of global warming in the learning process.
2. For teachers, it encourages them to develop e-booklets as a learning tool for students.