

CHAPTER 1 PRELIMINARY

1.1 Background

The scientific literacy skills of students in Indonesia are still relatively low. The average PISA results in 2022 fell compared to 2018. The 2018 PISA scores in Indonesia for reading and science were 371 and 396 and decreased in 2022 with scores for reading and science of 359 and 383. This score is still below the OECD country average, which is 476 for reading, and 485 for science (OECD, 2023). The elements of science literacy include fundamental literacies, knowledge of content, comprehension of scientific practices, the ability to recognize and evaluate relevant scientific expertise, epistemological knowledge, cultural awareness of science, as well as attitudes and thought patterns (Sharon & Tsabari, 2020). Students' low levels of scientific literacy can be attributed to several factors, such as the curriculum design, the learning methods employed, the learning models implemented, the availability of learning facilities, and the teaching materials used. Additionally, the application of learning strategies that do not align well with the elements of scientific literacy competencies also contributes to this issue (Amini & Sinaga, 2021).

Low scientific literacy is also influenced by students' low interest in reading (Widyastuti et al., 2020). The decrease in reading interest is attributed to a growing engagement with various forms of electronic media, such as the Internet, video games, and handheld digital devices (Todd, 2021). Students with low levels of scientific literacy will be less responsive to rapid developments in science and technology and lack the skills needed in the 21st century. As a result, students will not be able to compete globally in the future (Amini & Sinaga, 2021). The low interest in reading in Indonesia undoubtedly affects writing productivity. Writing activities among students are also still relatively low in line with the problem of writing difficulties (Widyastuti et al., 2020).

The importance of scientific literacy skills for Indonesian students to have from an early age, because the competition of technology and information in the

21st century requires individuals to compete and follow global trends (Yusmar & Fadilah, 2023). Scientific literacy is important for students to understand the environment, health, society, technology, and economy so that students have the competence and skills to apply to solve problems in real life (Safrizal et al., 2020) Safrizal et al., 2021). Good scientific literacy helps students make everyday decisions, both at the personal and social levels such as climate change, pollution, and energy resources (Safrizal et al., 2021; Sharon & Tsabari, 2020).

The ability to solve problems is influenced by a person's ability to think at a high level. Critical thinking skills (HOTS) are one of the goals of education in the 21st century. By having critical thinking skills, students can open up opportunities to have various life skills that are to the needs of the 21st century (Sarah et al., 2022). To develop high-level thinking skills (HOTS) students must actively participate in the learning process (Yusuf et al., 2020). An interactive, inspiring, fun, and challenging learning process motivates students to actively participate (Widiningsih & Abdi, 2021).

Literacy skills can be categorized into low, medium, and high. (Lestari & Effendi, 2022). Students who have high literacy skills tend to have high HOTS achievements as well (Alviah et al., 2020). This aligns with the views of Kucirkova, Rowe, Oliver, and Piestrzynski, who emphasized that educating students in literacy skills should involve teaching and evaluating them with high-order thinking skills (HOTS). By incorporating HOTS into literacy instruction, students effectively learn to interpret various implicit perspectives within the text. The literacy assessments based on high-order thinking skills support implementing the Merdeka Belajar program. These assessments are intended to help teachers create exam questions and equip students to tackle complex challenges in their daily lives (Setyarini et al., 2021). By employing high-order thinking skills, students are anticipated to analyze, reflect on, evaluate, and justify the texts they read in relation to the contexts they encounter (Pramartha et al., 2023; Setyarini et al., 2021).

Efforts made to improve the HOTS scientific literacy of students were carried out by Wulandari & Jahro (2023) who implemented learning with the Reading to Learn (R2L) method. The results of the study obtained there was an influence on students' HOTS scientific literacy abilities partially and

simultaneously with the application of the R2L method which helped students read and understand the contents of the reading, and make summaries allow students to write down what they know about the material they receive through reading and writing. However, in a study conducted by Azwar & Jahro, 2023 to improve students' HOTS scientific literacy by applying the R2L method, the results showed that there was no effect of the R2L method on students' HOTS scientific literacy abilities. This is because the R2L worksheets used are printed and less interactive, and the time for students to work on the R2L sheets is short so the results are less than optimal.

In today's era of globalization and digitalization, the ability to solve problems quickly and accurately is needed (Fitria et al., 2022). Training in learning activities can help students develop their HOTS. Students can be trained to use technology (Yusuf et al., 2020). Utilizing technology will offer attractive and creative student worksheets (Farzana et al., 2024). E-LKPD can be used during online and face-to-face learning (Ningsih et al., 2023). Paper-based learning has been replaced by online learning which only offers sufficient internet connection. In line with government policies that are now actively voicing paperless. Therefore, the creation of digital-based student E-LKPD (Farzana et al., 2024).

The learning process using E-LKPD will be more effective because its use can narrow space and time. The presentation of attractive E-LKPD will also make students more enthusiastic about learning (Suryaningsih & Nurlita, 2021). The implementation of E-LKPD in the teaching and learning process can transform student engagement from being monotonous to enjoyable and stimulating. This approach fosters a more interactive learning environment, encouraging students to feel more motivated and enthusiastic about their studies (Puspita & Dewi, 2021).

Most students still consider chemistry to be a difficult subject. This is because chemistry consists of abstract concepts and requires mastery of mathematical operations and strong memory. Students have difficulty with the material on reaction rates which are abstract chemical terms. Conceptual understanding is crucial to learning because students can develop their abilities in each subject matter. Students' conceptual understanding affects students' ability to solve problems (Amanda & Azra, 2023).

Based on the description of the problem above, the researcher will develop an interactive E-LKPD that can be used by educators and students to support the chemistry learning process to improve students' HOTS science literacy skills. Therefore, the researcher is interested in conducting a study entitled "**Development of Interactive E-LKPD Based on The Reading to Learn (R2L) Method to Improve Students' HOTS Science Literacy on Reaction Rates**".

1.2 Problem Identification

Based on the background explained above, the problem identification as follows.

1. Science literacy skills are low in Indonesia, even the literacy and science scores have decreased in the 2022 PISA results.
2. High Order Thinking Skills (HOTS) is still low in Indonesia
3. The reading culture in Indonesia is low.
4. The need to develop interactive electronic student worksheets based on the Reading to Learn (R2L) method.

1.3 Scope of Research

Based on the problem identification above, the scope of the research as follows.

1. The development of electronic Student Worksheets is carried out using the 4D development model which includes the stages of defining, designing, developing, and disseminating.
2. The Student Worksheet designed through this research is an Interactive e-LKPD using the liveworksheet website based on the Reading to Learn (R2L) method and HOTS Science Literacy is only for reaction rate material.

1.4 Scope of Problem

The researcher limits the problem in this study as follows.

1. The assessment of the interactive e-LKPD eligibility being developed is limited to assessments by material experts', chemistry teachers and student responses.
2. Interactive e-LKPD based on the Reading to Learn (R2L) method on the reaction rate material is designed to test the influence and effectiveness of HOTS students' science literacy.
3. The research was conducted on high school students in class XI IPA of SMA Negeri 5 Medan in the 2024/2025 Academic Year

1.5 Problem Formulation

The researcher formulated the problem in this study as follows.

1. What are the need analysis results of interactive E-LKPD based on the Reading to Learn (R2L) method to improve Students' HOTS Science Literacy skills on Reaction Rates?
2. What is the feasibility level of Interactive e-LKPD based on the Reading to Learn (R2L) method towards Students' HOTS Science Literacy on Reaction Rates based on the National Education Standards Agency (BSNP)?
3. How does the influence of interactive E-LKPD based on the Reading to Learn (R2L) Students' HOTS Science Literacy on Reaction Rates?
4. How effective is the interactive E-LKPD based on the Reading to Learn (R2L) method to improve Students' HOTS literacy skills on Reaction Rates?

1.6 Research Objectives

This research has the following objectives.

1. To find out data and information about students' needs of Interactive e-LKPD based on the Reading to Learn (R2L) method to improve Students' HOTS Science Literacy on Reaction Rates.
2. To find out data and information on the level of feasibility of interactive E-LKPD developed based on the Reading to Learn (R2L) method for students' HOTS literacy skills.
3. To determine the influence of the implementation of interactive E-LKPD based on the Reading to Learn (R2L) method on students' HOTS literacy skills on the Reaction Rates.
4. To determine the level of effectiveness of interactive E-LKPD based on the Reading to Learn (R2L) method on students' HOTS scientific literacy skills in improving students' science literacy skills on the Reaction Rates .

1.7. Benefits of Research

The expected benefits of this research are:

1. Theoretical

The interactive e-LKPD created in this study for eleventh-grade high school students can assist chemistry teachers in conducting learning activities related to the topic of reaction rates.

2. Practical

a. For Researchers

Adding real knowledge and experience as well as research results that can be used as consideration and input for further research.

b. For Schools

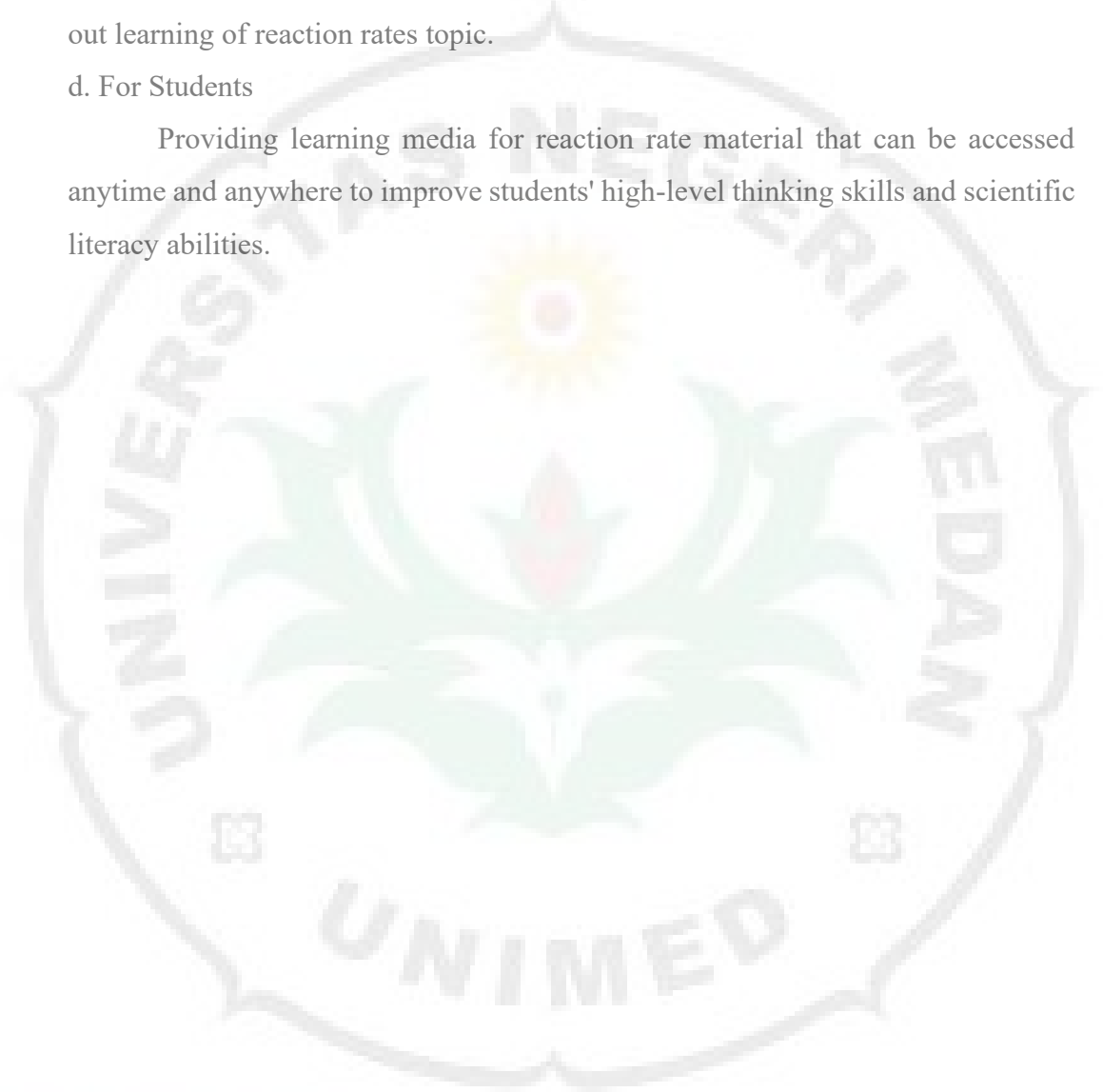
Obtaining Interactive e-LKPD which will be developed based on the R2L method on the reaction rates topic as additional learning following the criteria set by the National Education Standards Agency (BSNP).

c. For Teachers

Adding variety to learning tools and making it easier for teachers to carry out learning of reaction rates topic.

d. For Students

Providing learning media for reaction rate material that can be accessed anytime and anywhere to improve students' high-level thinking skills and scientific literacy abilities.



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