The Implementation of Reading to Learn (R2L) Method and Summary Writing to Enhance Students' HOTS-Literacy Science on Hydrocarbon Materials

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Abstract : The Implementation of Reading to Learn (R2L) Method and Summary Writing to Enhance Students' HOTS-Literacy Science on Hydrocarbon Materials. This study aims to determine the effect of applying the Reading to Learn method and summarization on students' HOTs-Literacy Science abilities in the Materials of hydrocarbons. The population in this study consists of students from grade XI at SMA Negeri 1 Tanjung Beringin, totaling 6 classes. The sampling technique used is Purposive Sampling, with the sample being class XI-A1.1, consisting of 34 students. This study used a test instrument with 12 questions, including essays, multiple choice, and true-false items. Based on data processing, the average HOTs-Literacy Science score of students was 83.14 ± 4.98. The initial distribution of students' abilities was still below the KKM value, categorized as low (>55), and improved in the final distribution with a score range of 77-91. Hypothesis testing using Multiple Linear Regression showed a significance value of $0.01 < \alpha$ (0.05), meaning H_a is accepted and H_0 is rejected, indicating an effect of the Reading to Learn method on students' HOTs-Literacy Science abilities. Testing on summarization showed a significance value of $0.04 < \alpha$ (0.05), meaning H_a is accepted and H_0 is rejected, indicating an effect of summarization on students' HOTs-Literacy Science abilities in the hydrocarbons topic. Testing on the simultaneous effect of the Reading to Learn method and summarization showed a significance value of $0.00 < \alpha$ (0.05), meaning that the Reading to Learn method and summarization together have an effect on students' HOTs-Literacy Science abilities in the hydrocarbons materials.

Keywords: Reading to Learn Method, Summarization, HOTs-Literacy

Abstrak: Implementasi Metode Reading to Learn (R2L) dan Pembuatan Rangkuman untuk Meningkatkan Kemampuan HOTs-Literacy Sains Siswa pada Materi Hidrokarbon. *Penelitian ini bertujuan untuk mengetahui pengaruh penerapan metode Reading to Learn dan pembuatan rangkuman terhadap kemampuan HOTs-Literacy Sains Siswa pada materi hidrokabon. Populasi dalam penelitian ini adalah siswa kelas XI SMA Negeri 1 Tanjung Beringin yang berjumlah 6 kelas. Teknik pengambilan sampel menggunakan Purposive Sampling, dalam penelitian ini adalah siswa kelas XI-A1.1 yang berjumlah 34 orang. Penelitian ini menggunakan instrument tes sebanyak 12 butir soal yang terdiri dari essai, pilihan ganda, dan benar-salah. Berdasarkan pengolahan data diperoleh rata-rata nilai kemampuan HOTs-Literacy sains siswa sebesar 83,14 ± 4.98. Sebaran kemampuan awal siswa masih berada dibawah nilai KKM dengan katagori rendah >55 dan mengalami peningkatan pada sebaran kemampuan akhir dengan rentang nilai 77-91. Uji hipotesis menggunakan model Regresi Linier Berganda dengan hasil penelitian diperoleh nilai sig 0,01 < α (0,05) artinya Hₐ diterima dan H₀ ditolak, yang berarti terdapat pengaruh penggunaan metode Reading to Learn (R2L) terhadap kemampuan HOTs-Literacy Sains siswa. Pengujian pada pembuatan rangkuman diperoleh nilai sig 0,04 < α (0,05) dengan*

ini, H_a diterima dan H_0 ditolak, terdapat pengaruh pembuatan rangkuman terhadap kemampuan HOTs-Literacy Sains siswa pada materi hidrokarbon. Pengujian pada metode Reading to Learn dan pembuatan rangkuman secara simultan diperoleh nilai sig $0.00 < \alpha$ (0,05), artinya metode Reading to Learn dan pembuatan rangkuman secara simultan (bersama-sama) mempengaruhi kemampuan HOTs-Literacy Sains siswa pada materi hidrokarbon.

Kata kunci: Metode Reading to Learn, Rangkuman, HOTs-Literacy.

- **INTRODUCTION**

Scientific literacy is a body of knowledge and scientific skills in which students can identify questions or problems, acquire new knowledge, explain scientific phenomena, draw conclusions based on existing facts, understand the characteristics of science, recognize how science and technology concepts influence the natural environment and intellectual development, and demonstrate a willingness to engage directly with scientific issues (Sutrisna, 2021). Scientific literacy is something that is crucial for every individual to master, especially for the educated generation. Therefore, scientific literacy plays a crucial role in creating quality education and producing Human Resources (HR) capable of applying knowledge and skills to solve science-related problems (Enjelly & Fadilah, 2024).

The level of science literacy in education in Indonesia remains an issue, as evidenced by the data on the science literacy achievement of Indonesian students in the 2022 Science Literacy Assessment or PISA (The Program for International Student Assessment), which was officially released on December 5, 2023. As a result, Indonesia ranked 68th with scores of 379 in mathematics, 398 in science, and 371 in reading (OECD, 2023). National reading literacy activities also remain in the low category, as indicated by the Literacy Culture aspect in the National Cultural Development Index in 2022, which stood at 57.40. This is primarily influenced by the low dimensions of access to reading materials and reading culture (reading habits). Furthermore, based on the results of the 2022 National Assessment, the literacy skills of students in Indonesia are below the minimum competency level. This means that less than 50% of students have reached the minimum competency level for reading literacy (Kemendikbudristek, 2022). The low science literacy scores of students indicate that their scientific aptitude is generally limited to the ability to recall and identify scientific information based on basic facts. Students can be considered to have science literacy if they are able to apply the concepts learned to make decisions related to the environment and daily life (Siam, 2024).

Literacy skills are closely related to Higher Order Thinking Skills (HOTS), as literacy enhances HOTS. Higher Order Thinking Skills refer to the ability to critically and creatively connect, manipulate, and transform existing knowledge and experiences to make informed decisions and solve problems (Razak et al., 2021). The primary objective of 21st-century education is to develop and enhance students' higher-order thinking abilities. However, the higher-order thinking skills of students in Indonesia remain low, which corresponds to their low literacy levels (Tijari & Mutakim, 2022).

Literacy skills are essential for students in facing the global era to meet their life needs in various situations. Scientific literacy refers to the ability to understand science, communicate scientific concepts, and apply scientific knowledge to solve problems. Scientific literacy is not merely about memorization but also about utilizing scientific concepts in everyday life to address issues and effectively communicating them (Muspika et al., 2024). Similarly, higher-order thinking skills (HOTS) enable students to transform

their prior knowledge into new understandings. Students are expected to clearly select ideas, construct arguments, solve problems, develop explanations, formulate hypotheses, and simplify complex concepts. Thus, higher-order thinking skills are one of the key factors influencing scientific literacy (Rudibyani & Prabowo, 2020).

The primary goal of developing scientific literacy is to equip students with the ability to understand social debates on issues related to science and technology and to actively participate in these discussions (Hasasiyah et al., 2020). Scientific literacy focuses on building students' knowledge to meaningfully apply scientific concepts, think critically, and make well-balanced and informed decisions regarding issues relevant to their lives (Putra et al., 2024). However, it is still frequently observed that science education practices in various countries often overlook the social dimension of science education and the need to foster students' skills necessary for active participation in society (Oktafiana et al., 2024).

SMA Negeri 1 Tanjung Beringin is a senior high school located in Serdang Bedagai Regency. In the chemistry learning process, the method used is still centered around board explanations with limited interaction between the teacher and students. The lack of active engagement in the learning process has affected the students' science literacy. This issue is influenced by inadequate comprehension of reading materials, limited reasoning skills, and difficulties in interpreting the chemical symbols found in the subject matter.

The learning method that can facilitate science literacy learning is one of them, the R2L method or reading to learn. The R2L method is a learning approach that helps students understand a reading by identifying key words and then explaining the text using their own language (Nasrullah et al., 2024). This method significantly supports the learning process because, currently, students may be able to interpret a sentence in a text, but they might not grasp the meaning or fully understand the sentence. Furthermore, the use of social media today is closely related to reading and writing (Ningsih et al., 2024). Therefore, the implementation of the Reading to Learn model in teaching is considered relevant, as it can help enhance students' understanding through a more structured and systematic reading strategy (Sriwedari et al., 2023).

In addition to R2L, summarization activities have also been shown to positively impact student learning. The Reading to Learn activity will be carried out at the beginning of the lesson, followed by a summarization activity at the end. Summarization is defined as the process of re-presenting a long text in a more concise and shortened form by extracting the main ideas from the explanatory sentences, without losing the original text's meaning (Prayogi et al., 2022). The summarization activity performed by students at the end of the lesson aims to reinforce and evaluate their understanding of the material that was read, studied collaboratively, and their ability to analyze, classify, and present the text in a different version.

- **METHOD**

The research design employed in this study is a quasi-experiment, specifically the One Group Pretest-Posttest Design (Wagiran, 2013). The population of this study includes all students of kelas XI at SMA Negeri 1 Tanjung Beringin in the second semester of the 2024/2025 academic year, consisting of 6 classes. The sample for this study is kelas XI-A1.1. Data collection techniques involved observation, interviews, and HOTs-Literacy ability tests (pretest and posttest). Teknik pengumpulan data yaitu observasi, wawancara, lembar R2L, lembar rangkuman dan instrumen tes kemampuan HOTs-Literacy (pretest dan posttest) siswa.

The instrument used for data collection was a test instrument consisting of 12 questions in the form of essays, multiple-choice, and true-false questions. The test items were designed to cover nine HOTs-Literacy indicators: identifying information and data, utilizing information and data, generating explanatory models, distinguishing scientifically investigable questions, formulating hypotheses, making predictions, analyzing data, interpreting data, and drawing or presenting conclusions. The test instrument analysis was conducted by expert validators.

Table 1. Question Grid

Indicator	Question Type	Number of Questions	Question Number
Identifying information and data	Multiple Choice	1	6
Utilizing information and data	True-False	1	12
Generating explanatory models	Essay	1	2
Distinguishing scientifically investigable questions	Multiple Choice	2	5 and 7
Formulating hypotheses	Essay	1	1
Making predictions	Essay	1	3
Analyzing data	Multiple Choice	1	8
Interpreting data	True-False	1	10
Drawing or presenting conclusions	Essay and True-False	3	4, 9 and 11

The research was conducted by first administering a pretest to a sample class to assess students' initial HOTs-Literacy abilities. The pretest results were then analyzed to determine the distribution of students' initial skill characteristics. Subsequently, the experimental class received treatment using the Reading to Learn method, during which students were asked to create summaries at the end of the lesson. Finally, a posttest was administered to measure students' scientific literacy skills.

Data analysis was conducted using Multiple Linear Regression to test the hypotheses. The hypothesis tests used in this study are the t-test and the F-test. The t-test was applied to test the hypothesis regarding the partial effect of R2L and summarization on students' HOTs-Sci-Literacy abilities. The F-test was used to examine the hypothesis regarding the simultaneous or combined effect of R2L and summarization on students' HOTs-Sci-Literacy abilities. The analysis was conducted using SPSS 26 for Windows with a significance level of 5% (0.05).

- **RESULT AND DISCUSSION**

The research was conducted from November to January in the 2024/2025 academic year at SMA Negeri 1 Tanjung Beringin. The data collected from the study included R2L scores, summarization scores, as well as pretest and posttest results. The R2L scores were obtained from the completion of the R2L worksheets given to students at the beginning of the lesson as a substitute for the apperception activity, while the summarization scores were derived from the students' summarization tasks at the end of the lesson as a substitute for the conclusion in the closing activity. After the data were collected, prerequisite testing or classical assumption testing was conducted before hypothesis testing. The testing was performed at a significance level of 5% or 0.05, and in this study, multiple linear regression analysis was used.

In this study, the R2L (Reading to Learn) sheet was used as a substitute for the apperception activity. The R2L sheet contained learning materials on hydrocarbons that had been studied in the previous session. The apperception activity using R2L was conducted for 20 minutes. The assessment results of the R2L sheet were categorized into three types: the ability to identify keywords in the reading text, the ability to interpret the keywords, and the ability to connect the keywords into meaningful paragraph sentences. The R2L sheet from the first session, belonging to a student with respondent code (S-29), who obtained the highest score, is presented in Figure 1 below.
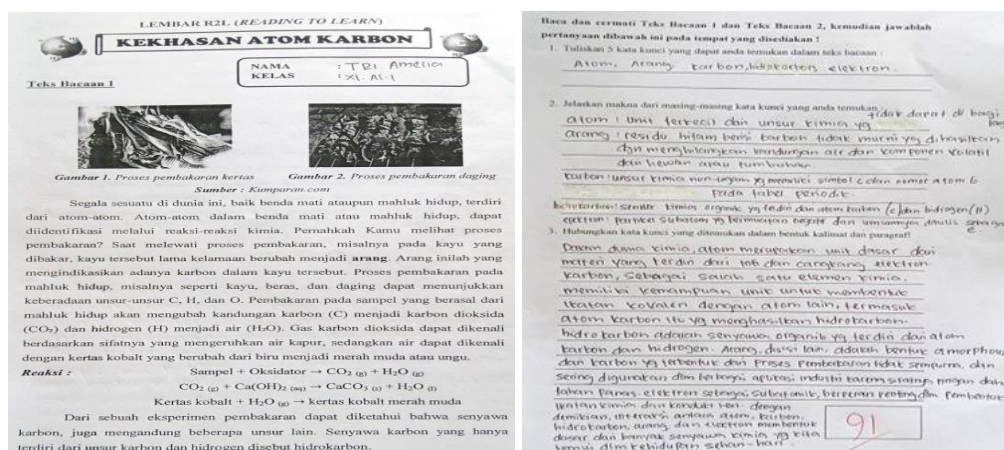

Figure 1. Student's Reading to Learn (R2L) Worksheet

In the detailed reading stage, the student accurately wrote five keywords. Similarly, in the note-making stage, the student interpreted the keywords based on their understanding of previously learned material. In the Joint Construction from Note stage, student S-29 was able to construct keywords into nearly meaningful sentences. Based on the assessment results of the Reading to Learn (R2L) sheet conducted over three sessions, the data from the R2L assessment is presented in Table 2 before further processing.

Tabel 2. Assessment Results of the R2L Worksheet

	Meeting 2	Meeting 3	Meeting 4
$\bar{x}$	80,76	81,58	82,29
s	8,08	7,14	6,27

Based on the average scores over three sessions, there was an increase in the average score in each session. The assessment results of the Reading to Learn (R2L) sheet indicate that nearly all students demonstrated stable and improving scores.

The summarization activity was conducted at the end of the lesson. This activity served as a concluding task, replacing the usual oral summary presented by students. The assessment of the summaries was carried out by comparing the main ideas outlined by the author in the summary assessment rubric with the main ideas identified by the students in their summaries.

Table 3. Summary Assessment Results

	Meeting 2	Meeting 3	Meeting 4
$\bar{x}$	83,5	85,2	86,8
s	9,11	8,93	7,29

Based on the average summary assessment results, students' scores tended to remain stable and showed improvement in each session. One of the factors contributing to the increase in the average summary score was the consistency in the number of main ideas assigned in each session. The greater the number of predetermined main ideas, the higher the likelihood that students would achieve outstanding scores.

As a requirement for research data to be used in parametric testing, prerequisite testing (classical assumption testing) was first conducted. This included normality testing, multicollinearity testing, and heteroscedasticity testing using posttest data, Reading to Learn (R2L) worksheets, and summary sheets. The prerequisite test results indicate that in the normality test, the residual data obtained an Asymp. Sig. (2-tailed) value of 0.183, which is greater than the significance level α (0.05). This suggests that the data follow a normal distribution (Purwaningtyas & Devi, 2022). In the heteroscedasticity test, the significance value for the Reading to Learn method was 0.536, which exceeds the significance level α (0.05), indicating that the data are free from heteroscedasticity. Similarly, the significance value for the Summary variable was 0.782, which is also greater than α (0.05), confirming that the data are free from heteroscedasticity and meet the required assumptions. In the multicollinearity test, the Variance Inflation Factor (VIF) was 1.337, with a tolerance value of 0.748. Therefore, it can be concluded that there is no indication of multicollinearity, as the tolerance value is greater than 0.100 and the VIF is below 10.00.

Once the prerequisite tests confirmed that the data met the necessary assumptions, hypothesis testing was conducted. The hypothesis test aimed to examine the effect of Reading to Learn and Summary Writing on students' HOTs-Literacy skills. The analysis was performed using multiple linear regression in SPSS 26 for Windows with a significance level of α (0.05). If the obtained significance value (sig) is less than α (0.05), then H_a is accepted, and H_0 is rejected, and vice versa (Syihabudin & Najmudin, 2021). The hypothesis testing results are presented in Table 2.

Table 4. Hypothesis Test Results

Hypothesis Testing	Model	Sig	Information
t-test	Reading to Learn (R2L)	0.001	H_a accepted
t-test	Summary	0.004	H_a accepted
f-test	Reading to Learn (R2L) and Summary Simultaneously on HOTs-Literacy Skills	0.000	H_a accepted

Based on the data from Table 1, the significance value for the Reading to Learn method was $0.001 < 0.05$, indicating that H_a is accepted and H_0 is rejected. Therefore, it can be concluded that the implementation of the Reading to Learn method significantly influences students' HOTS-Literacy in Science on hydrocarbon materials. The obtained significance value for summarization was $0.004 < 0.05$, meaning that H_a is accepted. Thus, it can be concluded that summarization has a significant effect on students' HOTS-Literacy in Science on hydrocarbon materials. Meanwhile, the simultaneous hypothesis testing for the Reading to Learn method and summarization resulted in a significance value of $0.000 < 0.05$, confirming that H_a is accepted. This indicates that the combined implementation of the Reading to Learn method and summarization has a significant effect on students' HOTS-Literacy in Science on hydrocarbon materials.

The results of the study indicate that the Reading to Learn method and summary writing can enhance students' HOTS-scientific literacy. The test was conducted with a significance level of 5% or a confidence level of 95%. This study aligns with previous research; however, several differences serve as additional influencing factors, including the subject matter taught (hydrocarbons, which are generally abstract and conceptual), the combination of instructional models applied in the study, the curriculum, the use of student worksheets (LKPD), and laboratory activities utilizing the Small Scale Chemistry approach. Based on the calculated average scores obtained from the Reading to Learn sheets, summary sheets, and post-test results, the findings are presented in Figure 2 below.
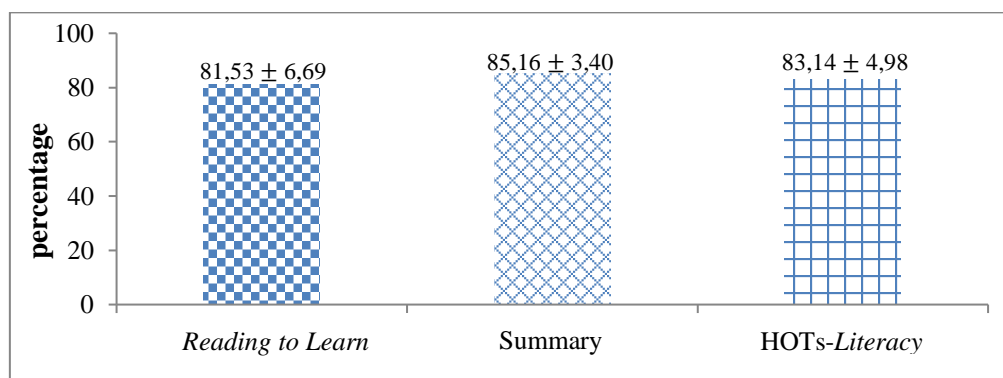
Figure 2. The Average R2L Score and Summary Score on Students' HOTs-Literacy

The average score ranges for Reading to Learn, summaries, and post-tests appear to be closely related. The average score range between Reading to Learn and summaries is 3.63, between Reading to Learn and HOTS-literacy is 1.61, and between summaries and HOTS-literacy is 2.02. Based on these average score ranges, the differences among the three are not significant, indicating a relationship between the independent and dependent variables.

The positive influence of the Reading to Learn method and summary writing is due to the interactive learning stages of the Reading to Learn approach, which facilitate active engagement between students and teachers in reading and understanding texts. This interaction strengthens the connection between teachers and students, making the teaching and learning process more effective and enjoyable. Additionally, several other factors contribute to the relationship between the Reading to Learn method, summary writing, and HOTS-literacy, including instructional models, curriculum, learning media, and other variables beyond those defined in this study.

This study aligns with previous research conducted by Degeng (as cited in Ismail, 2011), which stated that assigning students to create summaries has an effective influence on learning outcomes and can enhance students' potential while facilitating their learning process.

The interaction between students and the teacher (researcher) was highly effective, as evidenced by the results of observations conducted by the observer. Students were able to identify the problems presented by the researcher and evaluate the information obtained from the literature. This process continuously stimulated students to practice higher-order thinking skills (HOTs). In line with this, Simaremare and Suyanti (2024) stated that HOTs-Scientific Literacy refers to the ability to think critically in solving challenging situations, involving activities such as analyzing information, evaluating problems, and

generating solutions for communication. This ability is not acquired directly but is developed through a learning process that emphasizes complex problem-solving and open-ended inquiry (Simaremare & Suyanti, 2024).

- **CONCLUSION**

Based on the data processing and analysis results, it can be concluded that the hypothesis test for Reading to Learn obtained a significance value of $0.01 < 0.05$, meaning that H_a is accepted and H_0 is rejected. Therefore, the Reading to Learn method has an effect on students' HOTS-Literacy skills in the Hydrocarbon material. The hypothesis test for summary writing resulted in a significance value of $0.04 < 0.05$, meaning that H_a is accepted and H_0 is rejected. Thus, summary writing has an effect on students' HOTS-Literacy skills in the Hydrocarbon material. The simultaneous hypothesis test for Reading to Learn and summary writing yielded a significance value of $0.00 < 0.05$, indicating that H_a is accepted and H_0 is rejected. Therefore, the Reading to Learn method and summary writing simultaneously influence students' HOTS-Literacy skills in the Hydrocarbon material.

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