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DEVELOPMENT OF E-LKPD BASED (R2L) TO IMPROVE STUDENTS' HOTS SCIENCE LITERACY SKILLS

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Abstract: *Science literacy is the one very important skill that students must have. Students' ability to read is still classified as low. This reflects that level of higher-order thinking skills (HOTS) in scientific literacy has not been adequately developed. This research used kinds of development known as R&D (Research and Development) research. The product developed that is Interactive E-LKPD based on the R2L method on chemical equilibrium material. The result of need analysis that has been carried out state requires Interactive E-LKPD based on Reading to Learn (R2L) on chemical equilibrium material to increase HOTS Literacy students get data 100% students agree that using the interactive E-LKPD based on Reading to Learn (R2L) to be developed as a learning support. It was found that very feasible to used Sig <0.05, therefore Ha is accepted and H0 is rejected. Result give an interactive influence of E-LKPD based on Reading to Learn (R2L) on chemical equilibrium material on student learning outcomes and shows a increase in students' HOTS Science Literacy abilities also E-LKPD suitable to used.*

Keywords: *Interactive E-LKPD, HOTS Ability, Literacy, R2L*

INTRODUCTION

Science literacy is the one very needed skill that students should have. Students who have science literacy skills will able to apply the knowledge they have learned to solve problems in everyday life well. Mastery of scientific and technological literacy in this digital era plays an important role in educational success (Irsan, 2021). Applying scientific literacy skills to understand, communicate, and implement scientific skills in solving problems in everyday life (Latif et al., 2022).

Students' scientific literacy skills can be measured according to PISA (Program for International Student Assessment), by measuring students' performance in three main areas, namely reading, mathematics, and science. Showed from results of the PISA research (2022), Indonesia ranked 68 out of 81 countries with scores; science (398), mathematics (379), and reading (371). Based on this research, students' ability to read is still classified as low. This reflects that the level of higher-order thinking skills (HOTS) in scientific literacy has not been adequately developed.

Higher-order thinking is a strategy to increase critical thinking skills and clinical reasoning, both of which are higher-order thinking skills (HOTS) (Jarvis & Baloyi, 2020). According to Antonio & Prudente (2023) HOTS science literacy can be generate valuable insights into the 21st century of literacy on inquiry-based approaches and capable students' higher-order thinking skills especially in science learning. In an effort to develop students' higher-order thinking skills, several challenges have been faced by teachers.

Some information was obtained through an observation with one of the Chemistry teachers in MAN 1 Medan, namely the existence of school literacy activities implemented by the school and the library as an infrastructure for student's literacy activities. However, for chemistry learning itself, literacy is still rarely carried out. The absence of student literacy activities has an impact on students looking passive, students' mastery of the material is limited from the

teacher's explanation and they are less able to train critical thinking skills. This raises new problems for teachers because students are less capable to analyses and identify the concept of chemical equilibrium with everyday life.

Various efforts that implemented by teachers in schools to increase students' HOTS Science Literacy skills are still ineffective. Some of the methods that have been given include giving students time to discuss to improve their science literacy skills, dividing students into small groups and providing printed LKPD. The results of Azwar's (2023) research also show that the R2L method has succeeded in improving students' literacy skills in several countries, one of which is Indonesia. This is also proven application of the R2L method give positive influence on student learning outcomes and increases students' interest in critical thinking because it requires students to apply high-level skills. However, in Azwar's (2023) research, it is still less than optimal because it still uses the R2L display which seems monotonous and does not attract students' interest in analysing a problem in learning. This is evidenced by the less attractive appearance of the R2L-based worksheet in Azwar's (2023) research and is less able to stimulate students' HOTS Literacy skills.

Therefore, because of these problems, researchers propose a new way to increase students' HOTS literacy skills through by used of R2L-based E-LKPD. This method is expected to be more effective than printed LKPD because it can stimulate students' HOTS literacy skills. The use of R2L based E-LKPD is also emphasized because progressive in the world of education special in modern era 5.0 has given rise to various challenges that require a greater mastery of technology in its application in the scope of education in the 21st century (Budiyono & Haerullah, 2024). The development and progress of technology creates new way learning spaces that are needed to facilitate learning activities (Sari & Atmojo, 2021).

In order to maximize students' high-level scientific literacy skills, it can be collaborated with applications in the form of E-LKPD so that the form of learning and student analysis is not boring and attracts students' interest and motivation to be more careful in drawing conclusions with this R2L technique in LKPD (Siregar, 2023). This is collaborated with its application which is arranged through of E-LKPD.

According to the description, the researcher proposes a method to improve students' scientific literacy which will be carried out in a study entitled "Development of E-LKPD Based on the Reading to Learn (R2L) Method to Improve Students' HOTS Science Literacy Skills on Chemical Equilibrium".

METHOD

The goal of this research is to create a learning resource that will be applied in the educational field. The method used in this study based on quantitative method. The subjects of this study were two expert lecturers, two Chemistry subject teachers and 32 students of class XI Science 7 MAN 1 Medan. The object of this study was the interactive E-LKPD based on Reading to Learn (R2L) on the Chemical Equilibrium material for class XI Science 7.

One form of research and development is the design that was implemented (Research and Development). The process of creating a new product or refining an old one that can be accounted for is known as research and development. An Interactive E-LKPD based on the R2L approach on chemical equilibrium material is the end result. The 4-D model (Define, Design, Development, Disseminate) is used in this study.

The research instruments are divided into two, namely: 1) non-test

instruments and 2) test instruments. To see the data on the applicability and legitimacy of the usage of interactive E-LKPD based on R2L based on before use, each instrument was consulted with a chemist to obtain valid data, including:

Non-Test

The instrument non test include the material expert's validation sheet to assess the content's depth and viability in respect to the required capabilities.

Test

This test is conducted to students before (pretest) and after (post-test) using E-LKPD based on R2L in the learning process.

The data collection technique divided interviews by conducted to support the findings in the form of issues that teachers and students encounter during the educational process so that the suggested solutions meet their demands.

The research procedures carried out to produce interactive E-LKPD based on R2L for class XI odd semester leads to the 4D development model.

1. Stage identification and definition (Define)
2. Design Stage
3. Development Stage
4. Disseminate Stage

The data used in the validation of the interactive E-LKPD based on R2L is qualitative data using a Likert scale that refers to the 5 assessment criteria.

Tabel 1. Scoring on the Validation Sheet is based on a Likert Scale

No	Assessment criteria	Score
1.	Strongly Agree (SS)	5
2.	Agree (S)	4
3.	Enough (C)	3
4.	Less (K)	2
5.	Very Less (SK)	1

Student response data was got from the results of filling out the questionnaire sheets given to all students after students provided responses and observed the distributed R2Lbased interactive E-LKPD.

Tabel 2. Scoring on the Student Response Sheet is based on a Likert Scale

No	Assessment criteria	Score
1.	Very Interesting (SM)	5
2.	Interesting (M)	4
3.	Quite Interesting (CM)	3
4.	Uninteresting (TM)	2
5.	Very Uninteresting (SK)	1

The quantitative data analysis divided by validity test that counted by using SPSS 23.0 version. Before check the hypothesis testing, firstly check parastatistical parametric by check by using SPSS 23.0, the normality and homogeneity tests were conducted at a significance level of 0.05.

One sample T-test was employed for the hypothesis testing. There is a substantial influence on the variation in treatment given to each variable if the significance value (2-tailed) <0.05 shows a significant difference between the starting and final variables.

N gain Test, to check the effectiveness of Interactive E-LKPD Based on R2L, the average value of normalized gain can be used. Normalized gain is a comparison between the class pretest-post-test gain score and the maximum gain that can be achieved with formula:

$$g = \frac{S_{post-test} - S_{pre-test}}{S_{max} - S_{pre-test}}$$

RESULT AND DISCUSSION

Define Stage

According to the findings of a conversation with a chemistry instructor at MAN 1 Medan, it was found that MAN 1 Medan has used the independent curriculum to support the learning process at school. Specifically for chemistry subjects, the teacher said that chemistry is actually not a complicated material, this

depends on the teacher's teaching style in class and the students' interest in chemistry lessons, because there are some children who feel that chemistry is less interesting because it consists of many calculations. One of them is chemical equilibrium material which is a complicated material for students at MAN 1 Medan. Based on this, teachers are interested in implementing Interactive E-LKPD based on Reading to Learn on chemical equilibrium material because by using this method, students are not monotonous in only calculating the questions but can train students' literacy skills through the E-LKPD provided. The researcher gets the data at MAN 1 Medan used independent curriculum.

The use of interactive E-LKPD based on R2L on chemical equilibrium material is carried out by following the ATP standards made by the teacher.

Design Stage

Design stage consists of 2 parts, that is the media selection and format selection adapted of procedures to make interactive E-LKPD based on R2L on chemical equilibrium material. In the material selection. by developing interactive E-LKPD based on R2L on chemical equilibrium material consisting of several menus covering learning achievements and learning objective flow associated with the R2L method.

The selected learning media format is one that meets the desired criteria in the form of interactive E-LKPD based on R2L on chemical equilibrium material to help students understand the material contained in the Liveorksheet

Development Stage

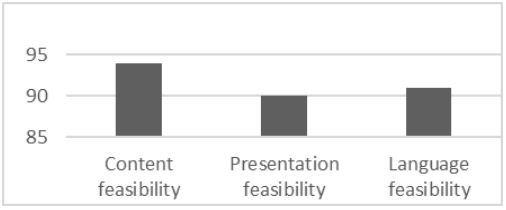
After design the interactive E-LKPD based on R2L on chemical equilibrium and then add the E-LKPD to the Liveworksheet. The results that developed were validated by 2 validators before testing to students. Below the result of interactive E-LKPD based on Reading to Learn (R2L).

After design the interactive E-LKPD based on Reading to Learn (R2L) on chemical equilibrium and then give to 2 validators and 2 chemistry teachers. Below the result of the interactive E-LKPD based on Reading to Learn (R2L) on chemical equilibrium accordance by BNSP feasibility in the table 4.

Tabel 4. Result Validation E-LKPD

Aspect Assessment	Average Score	Value (%)
Content feasibility	4.718	94
Presentation feasibility	4.5	90
Language feasibility	4.577	91
Feasibility Level Criteria	**4.598**	**91**
Percentage Interpretation		**Very high**
Feasibility Level Criteria		**Feasible**

Based from table 4 the result of validation by lecturers and teachers, it can be shown that the average score that is 4.598 and the percentage obtained 91%, that means the material in interactive E-LKPD based on Reading to Learn (R2L) on chemical equilibrium material obtained “Feasible” with percentage interpretation very high criteria based on BNSP so means that the interactive E-LKPD can stimulate students' HOTS science literacy skills.



Gambar 1. Graph of Validator Assessment Result

The percentage of responses per statement to student responses is computed by multiplying by 100% after dividing the statement's overall score by the maximum score. The following student responses result in table 5.

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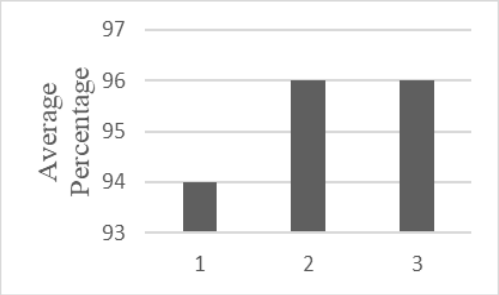
Tabel 5. Student Responses Result

Aspect	Value (%)
Display of Interactive E-LKPD Based on R2L	94
Presentation of Interactive E-LKPD Based on R2L	96
Components Interactive E-LKPD Based on R2L in Improving Students' HOTS Science Literacy Skills	96
Average	**95.33**
Criteria for Interpretation of Questionnaire Results	**Very Interesting**
Display of Interactive E-LKPD Based on R2L	94

Based from table 5 the result of students responds shown that the average score percentage is 95.33% that means the students responds in interactive E-LKPD based on Reading to Learn (R2L) on chemical equilibrium material obtained "very interesting".



Gambar 2. Graph of Students Responses Result

Information:
1. Display of Interactive E-LKPD Based on R2L
2. Presentation of Interactive E-LKPD Based on R2L
3. Components Interactive E-LKPD Based on R2L in Improving Students' HOTS Science Literacy Skills

Dessiminate Stage

After design the interactive E-LKPD Interactive E-LKPD based on Reading to Learn (R2L) was distributed on the chemical equilibrium material, before distributed the research must be calculate the research instrument data analysis to check the level of students' literacy abilities.

Research Instrument Data Analysis

In this stage, before distributing to students, a trial of the questions must be carried out first to check the validity, reliability, discrimination power and level of difficulty of the questions.

Validity test is conducted to check the accuracy of the instrument, the validity test in this study using SPSS version 23. The questions tested were 22 items. The question items are said to be valid if $r_{count} > r_{table}$. By using a significance level of 0.05, $r_{table} = 0.3388$ was obtained.

The test items are said to be good if they are not too difficult and not too easy. From the validity data shown that from 13 questions were valid, states 11 questions in the difficult category and 2 questions in easy category.

Discriminatory power, namely if $D \leq 0.00$ is not good, $D \leq 0.20$ is not good, $D \leq 0.4$ is sufficient, $D \leq 0.7$ is good, and $D \leq$ is very good. The results of the discriminatory power test, shown that from 13 questions were valid there are 4 questions with very good criteria, 7 questions with good criteria also there are 2 questions with category enough.

In calculating test reliability, use the KR-20 formula. A question item is said to be reliable if $r_{count} > r_{table}$ and a significance level of 0.05, it states r_{count} is 0.737 with $r_{table} = 0.3388$ so that means the reliability in category high.

Pre-test Result

The students got the lowest score, which was 0, and the highest score was 50. In this case, it can be seen that the students only answered the questions by guessing the answers. For students who got a score of 40 and 50, it was because the students guessed the answers and also the students had studied in advance with courses outside of school.

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Interactive E-LKPD Based on R2L Data Processing

The Interactive E-LKPD based on R2L, an assessment is carried out to obtain each student's score. Below the three meetings result accumulation Interactive E-LKPD based on R2L in the table 6.

Tabel 6. Interactive E-LKPD Based on R2L Accumulation

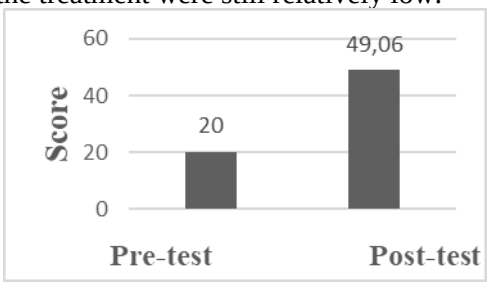
	Meeting 1	Meeting 2	Meeting 3
Average	77.28	82.13	85.69

The outcomes of the Interactive E-LKPD based on R2L sheet assessment show that in three meetings. The average value increase from the first meeting is 77.28, the second meeting obtained average value is 82.13 and in third meeting obtained average value is 85.69. Based the data obtained the total average of three meetings is 82.

Post-test Result

The post-test results after implementing interactive E-LKPD based on R2L on chemical equilibrium matter obtained the lowest score is 20 and the highest of 80.

The results of measuring students' HOTS Literacy Science abilities before the treatment were still relatively low.



Gambar 3. Graph of Students Responses Result

Hypothesis Testing

The prerequisite testing by homogeneity and normalcy tests are conducted which was tested using SPSS version 23.0.

Normality Test

Tabel 7. Normality Test Result

	Sig.	Description
Pre-test	0.362	Homogenous

According sig. (2-tailed) value of 0.101 which means it is greater than α which is 0.05, is stated to be normally distributed.

Homogenity Test

Tabel 8. Homogeneity Test Result

	Sig.	Description
Pre-test	0.51	Normal
Post-test	0.101	Normal

Based on the data in table 8 shows that the homogeneity pre-test and post-test has a sig value of 0.362, which means the sig value is greater than α (0.05). Therefore, it may be said that the pre-test and post-test findings show a homogeneous distribution of data.

One Sampel T-Test

Tabel 9. T-Test Result

	Sig.	Description
Pre-test & Post-test	0.009	Presence of influence

Based on table 9, it is found that by checking using SPSS version 23.0 with a significance level of 0.05, it shows the Sig. value for the pre-test and the Sig. value for the post-test, which is at the level of 0.009. This means that in test with the One Sample T-Test, Sig <0.05, therefore Ha is accepted and H0 is rejected. There is an interactive influence of E-LKPD based on Reading to Learn (R2L) on chemical equilibrium material on student learning outcomes and shows a significant increase in students' HOTS Science Literacy abilities. Therefore, the hypothesis is accepted.

N-Gain Test

Tabel 10. N-Gain Test Result

Average		
Pre-test	Post-test	N-Gain Score
20	49.06	0.36

From the table 11, shown that the average pre-test score is 20, the average post-test score is 49.06. So, the N-Gain score is 0.36, so the category of N-Gain score is medium category.

CONCLUSION

Based on the data analysis that has been carried out in this research, the following conclusions can be drawn:

1. Interactive E-LKPD based on Reading to Learn (R2L) can be developed as a learning support.
2. It was found that very feasible to used and from data students responds get data the using interactive E-LKPD based on Reading to Learn (R2L) on chemical equilibrium very interesting to used.
3. Based on the results obtained, there is influence of learning outcomes when applied the interactive E-LKPD based on Reading to Learn (R2L) on chemical equilibrium.
4. Based on the result of effectiveness of interactive E-LKPD based on Reading to Learn (R2L) interpreted in medium category and suitable to used.

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