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Development of Reading To Learn (R2L) Based E-Modules Assisted by Kvisoft Flipbook Maker to Improve Students' Hots-Literacy in Chemical Bonding Material

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Abstract: Development of Reading To Learn (R2L) Based E-Modules Assisted by Kvisoft Flipbook Maker to Improve Students' Hots-Literacy in Chemical Bonding Material. This study aims to (1) To determine the feasibility of e-modules based on Reading To Learn on chemical bond materials. (2) To determine the improvement of students' HOTS-Literacy skills on chemical bonds after using e-modules based on Reading To Learn. (3) To determine the effectiveness of e-modules based on Reading To Learn in improving students' HOTS-Literacy on chemical bonds. (4) To determine students' responses to the Reading To Learn-based e-module on chemical bonds. This research was conducted at MAN 1 Medan T.A 2024/2025 with all students of class XI SAINS as the population and class XI SAINS A-1 as the sample with sampling using purposive sampling technique. The type of research used is Research and Development (R&D) with the ADDIE development model (Analysis, Design, Develop, Implementation, and Evaluation). This research was conducted up to the implementation stage or the trial stage. The assessment to test the results of the feasibility of e-modules involved three validators as material experts and media experts, while the trial stage involved 32 student respondents in class XI SAIN A-1 MAN 1 Medan. The average results of the first validator gave a feasibility percentage value of 86.47% with the category "Very Feasible". And the assessment of the second validator gave a percentage of feasibility of 92.64% in the "Very Feasible" category. While the assessment of the third validator gives a percentage of feasibility of 90% in the "Very Feasible" category. The N-Gain score test results were 0.70 with a percentage of 70.03% with high criteria. The level of effectiveness of the e-module is seen from the posttest scores of students who are declared complete because the score of student learning outcomes reaches the KKM score of 32 students with a percentage of classical completeness of 100% so that it is included in the criteria very effective. So it can be concluded that the Reading to Learn-based E-Module teaching material is suitable for use because it can improve students' HOTS-Literacy skills on Chemical Bonding material.

Keywords: Development, E-Module, R2L, Chemical Bonding, Host-Literacy

Abstrak: Pengembangan E-Modul Berbasis Reading To Learn (R2L) Berbantuan Kvisoft Flipbook Maker Untuk Meningkatkan Hots-Literacy Siswa Pada Materi Ikatan Kimia. *Penelitian ini bertujuan untuk (1) Mengetahui kelayakan e-modul berbasis Reading To Learn pada materi ikatan kimia. (2) Mengetahui peningkatan kemampuan HOTS-Literacy siswa pada materi ikatan kimia setelah menggunakan e-modul berbasis Reading To Learn. (3) Mengetahui keefektifitasan e-modul berbasis Reading To Learn terhadap peningkatan HOTS-Literacy siswa pada materi ikatan kimia. (4) Mengetahui respon siswa terhadap e-modul berbasis Reading To Learn pada materi ikatan kimia. Penelitian ini dilaksanakan di MAN 1 Medan T.A 2024/2025*

dengan seluruh siswa kelas XI SAINS sebagai populasi dan kelas XI SAINS A-1 sebagai sampel dengan pengambilan sampel menggunakan teknik purposive sampling. Jenis penelitian yang digunakan adalah Research and Development (R&D) dengan model pengembangan ADDIE (Analysis, Design, Develop, Implementation, dan Evaluation). Penelitian ini dilakukan sampai tahap implementasi atau tahap uji coba. Penilaian untuk menguji hasil kelayakan e-modul melibatkan tiga validator sebagai ahli materi dan ahli media, sedangkan tahap uji coba melibatkan 32 responden siswa kelas XI SAINS A-1 MAN 1 Medan. Perolehan hasil rata-rata dari validator pertama memberikan skor persentase kelayakan 86,47% masuk kedalam kategori "Sangat Layak". Dan penilaian dari validator kedua memberikan persentase kelayakan 92,64% masuk kedalam kategori "Sangat Layak". Sedangkan penilaian dari validator ketiga memberikan persentase kelayakan sebesar 90% masuk kedalam kategori "Sangat Layak. Hasil uji N-Gain score sebesar 0,70 dengan persentasi 70,03% dengan kriteria tinggi. Tingkat keefektifitasan e-modul dilihat dari nilai posttest siswa yang dinyatakan tuntas karena skor hasil belajar siswa mencapai nilai KKM sebanyak 32 siswa dengan persentase ketuntutasan klasikal sebesar 100% sehingga termasuk kedalam kriteria sangat efektif. Sehingga dapat disimpulkan bahwa bahan ajar E-Modul berbasis Reading to Learn layak digunakan karena dapat meningkatkan kemampuan HOTS-Literacy siswa pada materi Ikatan Kimia.

Kata kunci: *Pengembangan, E-Modul, R2L, Ikatan Kimia, Host-Literacy*

• INTRODUCTION

Indonesian education has various educational problems that are the biggest challenges in realizing quality education. These problems are divided into two parts, namely problems in the macro scope and problems in the micro scope. Educational problems in the macro scope, namely confusing and overly complicated curriculum, uneven education, teacher placement problems, low teacher quality, and expensive education costs. While in the micro scope, namely monotonous learning methods, inadequate facilities and infrastructure, and low student achievement (Ginting et al., 2022).

Every individual student has basic skills since birth which consist of attitude, thinking, and understanding skills. Therefore, every student should be able to develop their talents and basic skills (Arsy & Octarya, 2022). In addition to skills, there are also several other challenges faced, one of which is literacy skills. Literacy is the ability to write and read. Literacy has an important role in an individual because it is related to a person's/individual's skills in communicating, thinking critically, creatively, being able to work together (collaboratively), and being innovative (Muliani et al., 2021). The important role of literacy is a support that every individual should have in facing and living a more complex life for the future (Berlian et al., 2021).

Based on the results of the 2018 PISA assessment, the average scores for reading literacy, mathematical literacy, and scientific literacy of Indonesian students were 371, 379, and 396, respectively. This places Indonesia in 70th place out of 78 participating countries. From these results, it can be said that the scientific literacy skills of Indonesian students are still below average, so that literacy is one of the programs promoted by the government in improving the quality of education in Indonesia (Aryani et al., 2022).

Scientific literacy can be defined as a person's ability to understand science, communicate science and apply scientific knowledge to solve problems, so as to improve attitudes and sensitivity towards the surrounding environment (Irsan, 2021). According to (Kurniyawan & Tanshzil, 2024) an individual who has reading/literacy skills will be

able to find ways to solve problems and will analyze the problems so that a critical character/personality will be formed. According to NSES (National Science Education Standard), a person with scientific literacy skills has six elements of scientific literacy, namely: (1) science as inquiry, (2) science content, (3) science and technology, (4) science from a personal and social perspective, (5) history and nature of science, (6) unifying concepts and processes. Thus, science literacy skills become one of the main needs of students in building quality education and being able to create quality Human Resources (HR) who are able to implement their abilities and knowledge to solve problems related to science. Science literacy generally focuses on four interrelated aspects, namely knowledge, context, competence and attitude (Fuadi et al., 2020).

High-level thinking skills (High Order Thinking Skills) can be interpreted as the ability to carry out complex thinking processes which include analyzing material, criticizing and creating solutions to problem solving and thinking processes which are not merely memorizing and relaying known information (Saraswati & Agustika, 2020). But the ability to connect, manipulate, and transform knowledge and experience that has been owned to think critically and creatively in an effort to determine decisions and solve problems in new situations. In general, there are several aspects that indicate the high-level thinking skills possessed by a person, namely the ability to think critically, think creatively, and solve problems (Sianturi, 2021).

The role and importance of High-Level and creative thinking skills are used in problem solving efforts. Problem solving is using (transferring) existing knowledge and skills to answer unanswered questions or difficult situations. High-level thinking skills, both critical thinking skills, creative thinking skills, and problem-solving skills that are possessed by a person cannot be possessed directly but are obtained through practice (Aningsih, 2018). High-level thinking is identical to questions that are at the cognitive level C4-C6 or analyzing, evaluating, and creating (Putri et al., 2018).

Based on this background, the researcher was motivated to conduct this research as an effort to improve literacy culture and high-level thinking skills, as well as an alternative that can be done when implementing chemistry learning in schools to choose effective and efficient learning media in building HOTS Literacy in the school environment.

▪ METHOD

This research was conducted at Madrasah Aliyah Negeri (MAN) 1 Medan located at Jalan William Iskandar No.7B, Bantan Tim, Medan Tembung, Medan City, North Sumatra. This research will be conducted in the odd semester of the 2024/2025 academic year. The population in this study were all students of class XI SAINS in the odd semester of the 2024/2025 academic year totaling 6 classes. The sampling technique used in this study was Purposive Sampling, namely directly selecting one class, namely XI SAINS A-1 with a total of 32 students. The type of research used is Research and Development. By applying the development design model, namely the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). Research & Development is a process of developing educational tools which is carried out through a series of research using various methods in a cycle which goes through various stages (Khairunisa et al., 2024). In this study, data collection techniques were carried out using e-module validation sheets, student response questionnaires, and test instruments. Data collection was carried out by providing e-module validation sheets to the validator. Then a pretest was conducted to students before entering the chemical bonding material, then the validated R2L-based e-module was given to students at each meeting as a substitute for

apperception. The posttest was given to students at the end of the learning as a final test. The final test (posttest) was adjusted to the Hots-Literacy indicator which contained Hots-Literacy-based questions on the chemical bonding material. Then a student response questionnaire was given to see students' responses to the developed e-module. Data analysis in this study used the validity test of material experts and media experts, the validity test of the student response questionnaire, effectiveness analysis, and the N-Gain test using Microsoft Excel.

Research Design

The type of research used is Research and Development (R&D). The design chosen is ADDIE (Analysis, Design, Devel opment, Implementation, and Evaluation).

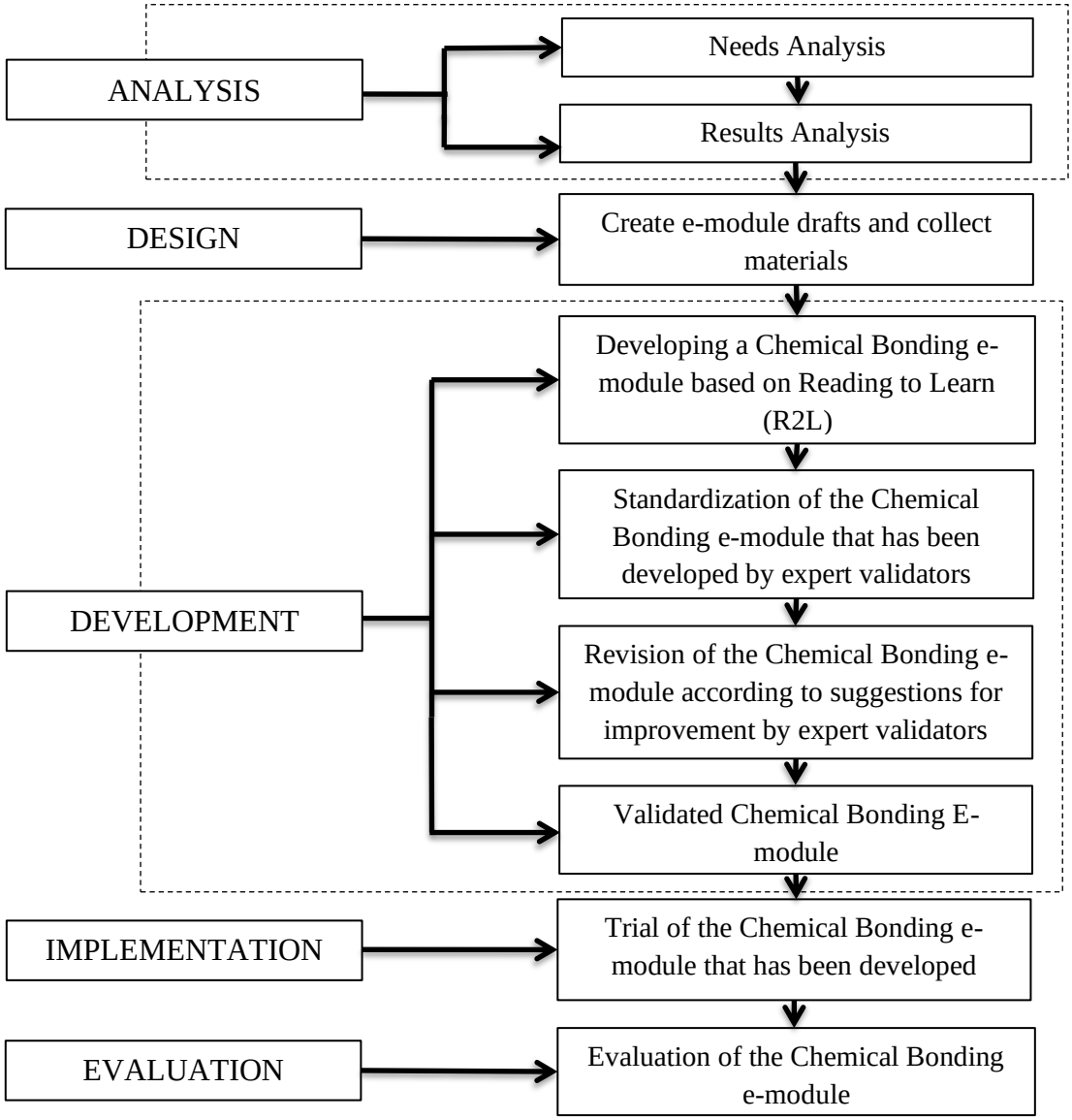

Figure 1. Procedure for Developing an E-Module on Chemical Bonding Based on R2L

1. Analysis

The initial step that must be taken in the ADDIE model is to analyze, in this stage it is necessary to conduct needs assessments, identify problems and analyze texts. Needs analysis is by looking at the gap that occurs between learning objectives in the reaction rate material, with the abilities that students already have at school. Analysis activities are carried out using observation, interview, and literature study methods.

2. Design

At the e-module design stage, there are several stages that need to be carried out, including the following: 1. Designing a specific formulation of learning objectives or learning indicators that students want to achieve. 2. Designing learning activities, which refer to the Reading To Learn approach strategy. 3. Designing the content that will be presented in the e-module. 4. Designing a test assessment strategy/assessment rubric that is in accordance with the objectives or indicators that have been formulated. 5. Designing an initial draft of the Reading To Learn-based e-module.

3. Development 3666

a. E-Module Development

At this development stage, the researcher will develop a learning media product in the form of an E-Module based on R2L which has been designed or called the initial product.

b. Expert Validation Test

In this step, the researcher submitted the initial e-module that the researcher had developed to material experts, media experts, and chemistry teachers to be tested for its feasibility using a questionnaire. The researcher conducted a validation test in November 2024. The expert team's validation test was seen from the aspects of content suitability, presentation suitability, language suitability, contextual assessment aspects, and graphic suitability. The validation test of the expert team was seen from the aspects of content suitability, presentation suitability, language suitability, contextual assessment aspects, and graphic suitability, the suitability of which was assessed using a questionnaire based on a Likert scale, as seen in table 1.

Table 1. Scoring on the Questionnaire Based on the Likert Scale

No.	Answer Options	Score
1.	Very Good (VG)	5
2.	Good (G)	4
3.	Pretty Good (PG)	3
4.	Not Enough (NE)	2
5.	Not Good (NG)	1

(Dwi Yani et al., 2023)

The score is analyzed using the following calculation formula :

$$Eligibility\ percentage = \frac{Total\ scores\ obtained}{Maximum\ score}\ x\ 100\%$$

As a provision in giving meaning and decision making, the calculation results above can be interpreted with a range as in table 2 below :

Table 2. Classification of Learning Media Assessment

Percentage	Criteria
80,1% – 100%	Very Worth It
60,1% – 80%	Worthy
40,1% – 60%	Quite Decent
20,1% – 40%	Less Worthy
0,0% – 20%	Very Less Worthy

(Lastri, 2023)

c. Revision

Revisions are made based on the results of validation from experts in the form of assessments, comments, and suggestions from experts and chemistry teachers. If the e-module is declared valid and suitable for use, there is no need to revise it.

4. Implementation

Activities carried out in the implementation stage are preparing classes, teachers and students. The sample used by researchers was 1 class as an experimental class. Before the trial use of the e-module, researchers conducted an initial identification of student abilities through pretest questions. Furthermore, the trial stage of the e-module that has been validated by an expert validator aims to collect data related to the assessment of improving students' critical thinking skills, and student responses to the use of e-modules based on R2L in the chemistry learning process on chemical bonding material. The research procedure for the distribution of the E-Module developed for further testing to the experimental class can be seen in the following picture :

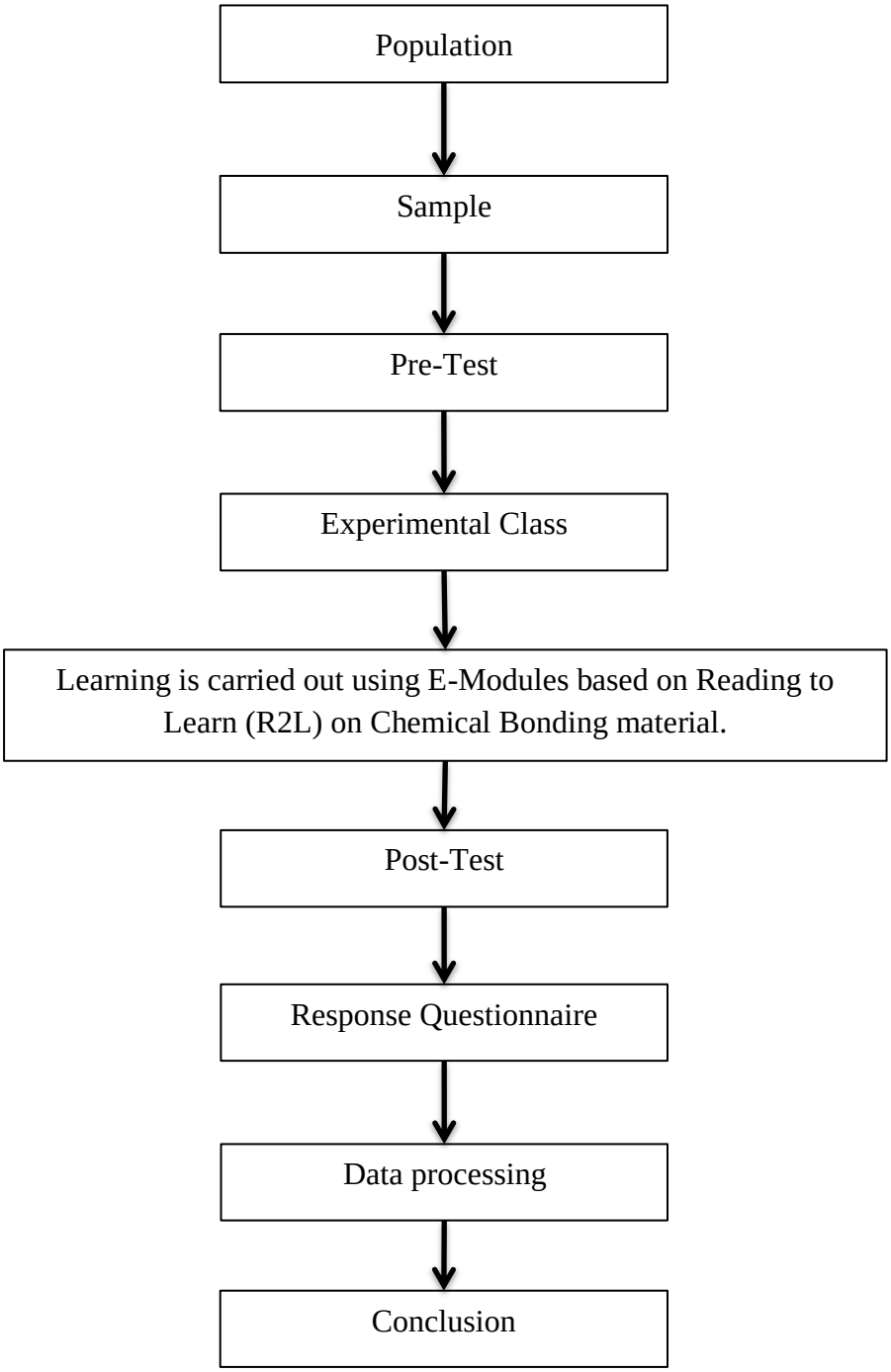

Figure 2. Procedure for Implementing the R2L Based E-Module on Chemical Bonding Material

5. Evaluation

At this stage, the teaching materials that have been created and tested for their feasibility will be applied to the target school. This product will be tested on 32 subjects of class XI SAINS A-1 MAN 1 Medan. The product that will be given is an E-Module containing the material "Chemical Bonds" in accordance with the curriculum and

Teaching Module that the researcher has developed. The teaching materials in this product are E-Modules based on R2L learning on the material of Chemical Bonds assisted by Kvisoft Flipbook Maker. Implementation is the stage of product testing after it has been developed.

To determine the increase in HOTS-Literacy skills experienced by students before and after the implementation of the developed e-module, data analysis will be used with the normalized N-Gain formula.

$$N - Gain\ (g) = \frac{posttest\ score - pretest\ score}{maximum\ score - pretest\ score}\ x\ 100\%$$

The effectiveness of learning after using the product can be seen from the results of the student learning completion test. Teaching materials are said to be effective for use in learning if at least 80% of students are able to achieve the KKM value that was previously applied. Determination of student learning completion is done by calculating each student's score and analyzing it based on the KKM achievement set by the school, which is 75. The percentage of student learning completion can be calculated using the formula :

$$PKK = \frac{T}{Tt} x\ 100\%$$

Description:
PKK : Percentage of classical completion
T : Number of students who have completed learning
Tt : Total students

To identify deficiencies in the developed e-module, namely with a student response questionnaire. To obtain valid data, the questionnaire processing was used with a Likert scale (scoring on the questionnaire based on the Likert scale can be seen in table 1), then the data was analyzed using the following percentage formula :

$$Score = \frac{Score\ obtained}{Maximum\ score}\ 100\%$$

Table 3. Student Response Assessment Classification

Percentage	Criteria
80,1% – 100%	Very good
60,1% – 80%	Good
40,1% – 60%	Pretty good
20,1% – 40%	A Little Bit Good
0,0% – 20%	Not Good

(Hamid, 2022)

▪ RESULT AND DISCUSSION

This study uses the research and development (R&D) method. The design used is ADDIE. The ADDIE development model is a learning device development model. This model was developed by Dicky and Carry in 1996 (Dalimunthe et al., 2021). he ADDIE development model consists of five stages, namely: Analysis, Design, Development, Implementation and Evaluation which aims to develop teaching materials in the form of E-Modules based on R2L on Chemical Bonding material for grade XI. This study aims to develop teaching materials that are in accordance with the criteria for content feasibility, presentation feasibility, language feasibility, contextual assessment aspects, and graphic feasibility in accordance with the National Education Standards Agency (BSNP).

The stages in this study began with analysis. Based on the results of the needs analysis, the researcher found problems in the learning process at MAN 1 Medan. The results of interviews with class XI chemistry teachers stated that there were no fun learning media that could help students improve their learning outcomes. During the learning process, teachers only taught using textbooks and several other printed media. Then, an analysis of students was carried out to determine the character of students so that it would be adjusted to the development of teaching materials that were suitable for students. The analysis carried out was the cognitive and social aspects of students. And to determine the development of student characteristics, data on the age of students was needed. Furthermore, an analysis of the material was carried out which was reviewed from the teaching module (RPP) and seven sub-material components were obtained in the Chemical Bonding material, namely the Basics of Chemical Bonding, Atomic Stability, Ionic Bonding, Covalent Bonding, Metal Bonding, Molecular Form and Intermolecular Bonding. And finally, an analysis of learning objectives was carried out which was reviewed from the basic competencies and indicators that were in accordance with the material for the teaching materials to be developed. The learning objectives based on the teaching materials that have been developed are: Students are expected to be able to understand the basics of the formation of chemical bonds as an effort for atoms to achieve stability through the octet or duplet rule, students are able to understand the concept, process, and characteristics of ionic, covalent, and metal bonds, as well as analyze their properties and applications in everyday life, and students are able to explain the basic concept of molecular shape based on VSEPR theory and are able to describe the types of intermolecular bonds, such as hydrogen bonds, Van der Waals forces, and dipoles.

The next stage is design, at this stage the researcher makes a draft or design of the module. This design is based on the results of the needs analysis and the results of the material analysis that have been carried out, so that the components of the material to be proposed are in accordance with the standards. The design that is made contains several sub-materials of Chemical Bonds contained in the teaching module (RPP). In the teaching materials based on R2L that are developed, there is material on Chemical Bonds with seven sub-topics, namely Basics of Chemical Bonds, Atomic Stability, Ionic Bonds, Covalent Bonds, Metal Bonds, Molecular Forms and Intermolecular Bonds. The teaching materials that are developed are also accompanied by various examples of questions and discussions, case studies in everyday life and are also accompanied by competency tests at the end of the material to train and measure understanding of chemical bonding material after using this R2L based teaching material. The presentation of chemical figures and chemical information aims to provide additional information for students and is equipped with enrichment for simple student assignments to make it easier for students to analyze

directly and stimulate students to think critically. In the teaching materials there are also learning video links to make it easier for students to understand material in the learning process.

Then the next stage is development. After the e-module design is completed, the next stage is to validate the Reading to Learn-based teaching materials by two Lecturers from the Chemistry Department of Medan State University and one Chemistry subject teacher from MAN 1 Medan. Validation is carried out using a modified BSNP questionnaire. In this questionnaire, there are five aspects that will be assessed including aspects of content feasibility, presentation feasibility, language feasibility, contextual assessment aspects, and graphic feasibility. The results of the validation of R2L-based teaching materials by Lecturers of the Chemistry Department of Medan State University and Chemistry Teachers at MAN 1 Medan can be seen in the table below :

Table 4. Results of Validation of Teaching Materials by Lecturers of the Chemistry Department, State University of Medan and Chemistry Teachers at MAN 1 Medan

No	Assessor	Assessment Components					Eligibility Percentage (%)	Criteria
		CF	PF	LF	CAA	GF		
1	First Lecturer	47	40	37	44	126	86,47	Very Worth Using
2	Second Lecturer	53	40	43	39	140	92,64	Very Worth Using
3	Chemistry Teacher	52	40	38	41	135	90	Very Worth Using

Based on the validation results, all respondents gave a good response to the R2L-based module on the Chemical Bonding material that had been developed. This can be seen from the percentage of the first Lecturer's eligibility of 86.47% with very feasible criteria, the second Lecturer 92.64% very feasible, and the Chemistry subject teacher 90% very feasible.

The next stage is implementation. After the Reading to Learn-based teaching materials have been declared valid or feasible, they will be given to students to see the responses to the Reading to Learn-based teaching materials that have been developed by providing a questionnaire covering aspects of interest in E-Modules, ease of presentation of materials and benefits of learning E-modules based on R2L. The results of the percentage of student responses to teaching materials based on R2L can be seen in the following table:

Table 5. Percentage of Student Responses to R2L Based Modules

No	Assessment Aspects	Percentage of Student Responses (%)
1	Aspects Of Interest In E-Modules	91,04
2	Ease Of Presentation Of Materials	91,04
3	Benefits Of Learning E-Modules Based On Reading To Learn (R2L)	90,93
Average		**91,00**

Based on the results of the student response questionnaire to the R2L based E-Module on the Chemical Bonding material, the average percentage was 91.00%. With the

description of the average percentage of the E-Module interest aspect of 91.04%, the material presentation aspect of 91.04%, and the learning benefits aspect of the R2L based E-Module of 90.93%. Based on the criteria for the level of student response to the E-Module, students gave a very good response where students felt interested in using the R2L based E-Module to study the Chemical Bonding material.

The last stage is evaluation. After carrying out the implementation stage, the researcher will then evaluate the students to determine the extent of their knowledge of learning the Chemical Bonding material after using the Reading to Learn-based E-Module. At this stage, the researcher measures the effectiveness of learning using the Reading to Learn-based E-Module from the results of the student learning completion test, at least 80% of students are able to achieve the KKM. Based on the trial of the application of the Reading to Learn-based E-Module to Class XI SAINS A-1 MAN 1 Medan students, the results of the posttest scores of students who were declared complete because the student learning outcome scores reached the KKM value of 32 students with a classical completeness percentage of 100% so that it can be concluded that the Reading to Learn-based E-Module is very effective for use in chemistry learning, especially in the Chemical Bonding material. Meanwhile, to improve students' HOTS-Literacy abilities based on the trial of the application of E-Modules based on Reading to Learn in Class XI SAINS A-1 MAN 1 Medan students, the results of the average value before (pretest) and after (posttest) using learning media in the form of E-Modules based on Reading to Learn increased from 40.46 to 82.18 and the N-Gain Score value of 0.70 with a percentage of 70.03% with high criteria. So based on the increase in the average value and the N-Gain Score value, it can be concluded that there is an increase in students' HOTS-Literacy abilities from before (pretest) to after (posttest) learning.

The development of an E-Module based on Reading to Learn (R2L) assisted by Kvisoft Flipbook Maker aims to improve students' HOTS-Literacy in the Chemical Bonding material. The R2L approach was chosen because it is able to guide students in understanding scientific texts systematically, starting from the preparation stage, modeling, to text transformation. By using Kvisoft Flipbook Maker, this E-Module presents material in an interactive digital format that combines text, images, audio, and video, so that learning becomes more interesting and effective. The main advantage of this E-Module is its ability to improve students' critical and analytical thinking skills through a deep understanding of the concept of chemical bonds. In addition, this module also supports independent learning, allowing students to learn at their own pace according to their individual needs and learning styles. The implementation results show that the use of R2L-based E-Module improves students' understanding of scientific texts and encourages them to be more active in developing solutions based on chemical concepts. This is in accordance with research conducted (Mufida et all, 2022) it is proven that the development of E-Modules for chemistry learning can improve student learning outcomes and is proven by the high response given by students.

There are two important factors that determine the success of a learning process, namely the model and learning media (teaching materials). These two factors are interrelated and cannot be separated. This is related to research conducted by (Magdalena et all, 2020), the use of teaching materials such as modules has benefits obtained by teachers, namely teaching materials in accordance with curriculum guidelines, not dependent on textbooks and government assistance textbooks. While the benefits obtained by students are, creating interesting learning, fostering motivation, reducing dependency and getting ease in learning each indicator contained in the learning device.

In addition, the learning model also affects the success of a learning process. Therefore, innovation in learning models is needed that involve students through group collaboration. One model that can increase the success of a learning process is the R2L based model. The Reading to Learn based learning model is one of the learning models that encourages students to read and understand the contents of the reading. Based on research conducted by (Putra et all., 2024), it states that learning using the Reading to Learn model can enable students to link one science concept with another concept, process and apply information, search for information from different reference angles, use information to solve problems, and analyze information critically.

Based on the facts in the field, it shows that the problem that causes low learning outcomes and learning responses is the absence of the use of learning resources that can activate students to be motivated to learn. Efforts to overcome the problem of the absence of learning resources in learning are by using modules.

One of the efforts that can be made by teachers to reduce learning boredom in students is to develop teaching materials into various forms of teaching materials. To develop teaching materials, teachers are required to continuously improve their abilities. If teachers do not have the ability to develop varied teaching materials, teachers will be trapped in a monotonous learning situation and tend to be boring for students (Herianingtyas, 2022).

R2L is a learning model that involves students in reading and understanding the contents of the reading. So that students are expected to have skills in scientific literacy. In developing this Reading to Learn-based E-Model, researchers emphasize reading activities and understanding reading texts. So that in the R2L e-module developed by researchers, many interactive video features, game-based questions and case studies in daily activities are included. It is hoped that students will increase their literacy.

So based on the results of the research that has been carried out, it can be concluded that the R2L-based E-Module on the Chemical Bonding material is valid and feasible to use and the high student response shows that students like and are interested in the electronic module. In addition, the R2L-based E-Module has a high level of effectiveness and can improve students' HOTS-Literacy abilities. This shows that the use of Reading to Learn-based E-Modules is very effective in learning and can improve students' HOTS-Literacy abilities in the Chemical Bonding material.

▪ CONCLUSION

The conclusions that can be drawn from the results of the research and discussion are as follows: (1) The level of eligibility of the E-Module teaching material based on R2L on the Chemical Bonding material is determined by the assessment of the validator or material expert and media expert. In this study, two Lecturers from the Chemistry Department of Medan State University and one Chemistry Teacher at MAN 1 Medan were used as Validators. The assessment of the first validator (First Lecturer) gave a percentage score of eligibility of 86.47%, falling into the category of "Very Eligible". And the assessment of the second validator (Second Lecturer) gave a percentage of eligibility of 92.64%, falling into the category of "Very Eligible". While the assessment of the third validator (Chemistry Teacher) gave a percentage of eligibility of 90% falling into the category of "Very Eligible. (2) The level of increase in students' HOTS-Literacy abilities on the Chemical Bonding material after using the E-Module based on R2L is determined by the results of the average pretest and posttest scores. The average value of students before (pretest) and after (posttest) using E-Module teaching materials based on

R2L increased from 40.46 to 82.18. The results of the N-Gain Score test were 0.70 with a percentage of 70.03% with high criteria. Which means that the use of E-Module teaching materials based on R2L can improve students' HOTS-Literacy abilities in the Chemical Bonding material. (3) The level of effectiveness of the E-Module based on R2L on improving students' HOTS-Literacy in the Chemical Bonding material is determined by the results of the student learning completion test (posttest) if at least 80% of students are able to achieve the KKM value set by the school, which is 75. The results of the posttest scores of students who were declared complete because the student's learning outcome scores reached the KKM value were 32 students with a classical completeness percentage of 100% so that it is included in the very effective criteria. Which means the use of E-Module teaching materials based on Reading to Learn can increase the effectiveness of learning outcomes. (4) The level of student response to the e-module based on R2L on chemical bond material is determined by students of class XI SAINS A-1 MAN 1 Medan. The assessment by students of class XI SAINS A-1 MAN 1 Medan gave an average score of 91.00%. With the percentage of the aspect of interest in the E-Module 91.04%, ease of presentation of material 91.04% and the benefits of learning E-Module based on R2L 90.93%. Based on the criteria for the level of student response to the E-Module, students gave a "Very Good" response where students felt interested in using the E-Module based on R2L, to study the Chemical Bond material.

▪ REFERENCES

Aningsih, A. (2018). Kemampuan Berpikir Tingkat Tinggi. *Journal Reseapedia*, *1*(1), 5–24.

Arsy, Y. N., & Octarya, Z. (2022). Efektivitas Strategi Pembelajaran Eksperimen Berbasis Metode Process Oriented Guided Inquiry Learning (Pogil). *Journal of Natural Science Learning*, *01*(01), 68–74.

Aryani, S. A., Susilowati, E., & Utami, B. (2022). Analisis Kemampuan Literasi Kimia dan Higher Order Thinking Skills (HOTS) Siswa MIPA pada Materi Asam Basa Di SMA Batik 1 Surakarta. *Jurnal Pendidikan Kimia*, *11*(1), 60–67. https://jurnal.uns.ac.id/JPKim/article/view/49995

Berlian, M., Mujtahid, I. M., Vebrianto, R., & Thahir, M. (2021). Profil Literasi Sains dalam Pembelajaran IPA di Era Covid-19: Studi Kasus di Universitas Terbuka. *Journal of Natural Science and Integration*, *4*(1), 77. https://doi.org/10.24014/jnsi.v4i1.11662

Dalimunthe, A., Affandi, M., & Suryanto, E. D. (2021). Pengembangan Modul Praktikum Teknik Digital Model Addie. *Jurnal Teknologi Informasi & Komunikasi Dalam Pendidikan*, *8*(1), 17. https://doi.org/10.24114/jtikp.v8i1.26777

Dwi Yani, Nibras Alhama Najwa, Almanik Dyan Permatasari, Dinenggi Wulanoventi, Herawati Susilo, & Aynin Mashfufah. (2023). Pengembangan Bahan Ajar Berbasis Potensi Daerah Sebagai Pendukung Pembelajaran Tematik. *Journal Innovation In Education*, *1*(4), 235–246. https://doi.org/10.59841/inoved.v1i4.712

Fuadi, H., Robbia, A. Z., Jamaluddin, J., & Jufri, A. W. (2020). Analisis Faktor Penyebab Rendahnya Kemampuan Literasi Sains Peserta Didik. *Jurnal Ilmiah Profesi Pendidikan*, *5*(2), 108–116. https://doi.org/10.29303/jipp.v5i2.122

Ginting, E. V., Ginting, R. R., Hasibuan, R. J., & Perangin-angin, L. M. (2022). Diterima : 12-04-2022. *Analisis Faktor Tidak Meratanya Pendidikan Di Sdn0704 Sungai Korang*, *3*(4), 407–416.

Hamid, N. (2022). Cooperative Learning Type Number Head Together: A Literature Review Perspective. *Social Sciences And Humanity Studies*, *1*(1), 25–32.

Herianingtyas, N. L. R. (2022). Penguatan literasi sains siswa mi/sd melalui pengembangan e-modul dengan instrumen asesmen berbasis higher order thingking skills. *Elementar: Jurnal Pendidikan Dasar*, *2*(1), 15-26.

Irsan, I. (2021). Implemensi Literasi Sains dalam Pembelajaran IPA di Sekolah Dasar. *Jurnal Basicedu*, *5*(6), 5631–5639. https://doi.org/10.31004/basicedu.v5i6.1682

Jahro, A. T. W. dan L. S. (2023). Pengaruh Metode Reading To Learn Dan Rangkuman Terhadap Hots-Literacy Sains Siswa Pada Materi Laju Reaksi. *Pediaqu: Jurnal Pendidikan Sosial Dan Humaniora*, *2*(1), 1–23.

Khairunisa, D., Juwita, I., Putra, A. S., Egya, J. M., Bangun, K. W. B., & Muchtar, Z. (2024). Development of Interactive LKPD Based on Augmented Reality Media on Chemical Equilibrium Material. *Jurnal Pendidikan dan Pembelajaran Kimia*, *13*(3), 61-71.

Kurniyawan, H., & Tanshzil, S. W. (2024). Peran dan strategi guru pendidikan pancasila dan kewarganegaraan dalam membangun kemampuan literasi warga negara. *Integralistik*, *35*(1), 33–47.

Lastri, Y. (2023). Pengembangan Dan Pemanfaatan Bahan Ajar E-Modul Dalam Proses Pembelajaran. *Jurnal Citra Pendidikan*, *3*(3), 1139–1146. https://doi.org/10.38048/jcp.v3i3.1914

Magdalena, I., Prabandani, R. O., Rini, E. S., Fitriani, M. A., & Putri, A. A. (2020). Analisis pengembangan bahan ajar. *Nusantara*, *2*(2), 180-187.

Mufida, L., Subandowo, M. S., & Gunawan, W. (2022). Pengembangan e-modul kimia pada materi struktur atom untuk meningkatkan hasil belajar. *JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)*, *7*(1), 138-146.

Muliani, A., Karimah, F. M., Liana, M. A., Pramudita, S. A. E., Riza, M. K., & Indramayu, A. (2021). Pentingnya Peran Literasi Digital bagi Mahasiswa di Era Revolusi Industri 4.0 untuk Kemajuan Indonesia. *Journal of Education and Technology*, *1*(2), 87–92.

Putra, A. S., Siahaan, S. Y., Aulia, S., Khairunisa, D., Juwita, I., Batubara, D. A. A., & Zubir, M. (2024). The Effect of Reading to Learn (R2L) Based Modules on Increasing Stedents HOTs-Literacy In Chemical Bonding Materials. *Jurnal Pendidikan dan Pembelajaran Kimia*, *13*(3), 52-60.

Putri, R. R., Ahda, Y., & D, R. (2018). Aspect Analysis in Higher Order Thinking Skills on the Evaluation Instrument of Protist Topic for the Grade 10 Senior Highschool Students. *Biodik*, *4*(1), 8–17. https://doi.org/10.22437/bio.v4i1.5504

Saraswati, P. M. S., & Agustika, G. N. S. (2020). Kemampuan Berpikir Tingkat Tinggi Dalam Menyelesaikan Soal HOTS Mata Pelajaran Matematika. *Jurnal Ilmiah Sekolah Dasar*, *4*(2), 257. https://doi.org/10.23887/jisd.v4i2.25336

Sianturi, P. (2021). Analisis Kesulitan Guru Bahasa Indonesia Dalam Penerapan Pembelajaran Higher Order Thinking Skills (Hots) Di Smk Swasta Pariwisata Prima Sidikalang. *Bahastra: Jurnal Pendidikan Bahasa Dan Sastra Indonesia*, *5*(2), 34–37. https://doi.org/10.30743/bahastra.v5i2.3676