



## Developing Quran-Integrated E-Modules on Salt Hydrolysis: A Learning Cycle 8E Approach for 11<sup>th</sup> Grade of Senior High School Students

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### Abstract

The low learning outcomes of students are caused by limited teaching materials and educators who tend to use the lecture method during learning. This research aims to develop an E-Modules Based on Learning Cycle 8E Integrated with Al-Quran verses on Salt Hydrolysis Material for 11<sup>th</sup> Grade of Senior High School (SMA/MA) that are valid and practical. This research uses the Research and Development research type with the 4-D development model (define, design, develop, and disseminate). However, only the first three stages of the model were implemented in this research. The results showed that 1) e-modules based on Learning Cycle 8E integrated with Al-Quran verses on salt hydrolysis material 11<sup>th</sup> Grade SMA / MA met the criteria very valid with a percentage of the validity of e-modules based on Learning Cycle 8E is 89%, the validity of content feasibility on integration with Al-Qur'an verses obtained a percentage of 90.6%. 2) e-modules based on Learning Cycle 8E integrated with Al-Quran verses on salt hydrolysis material for 11<sup>th</sup> Grade SMA/MA have met the criteria of being very practical with the results of the student response questionnaire obtaining a percentage of 84% and educators obtaining a percentage of 93%.

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## INTRODUCTION

Study materials are a set of teaching materials based on the curriculum used to achieve predetermined competency standards and basic competencies (Herman, Mawarnis, et al., 2022). Teaching materials can be used as guidelines for teachers to direct all their activities in the learning process and can also be used as a guide for students to evaluate what they have learned. Teaching materials can be an alternative learning material in addition to textbooks which are sometimes difficult to obtain (Hulandari & Rahmi, 2022). Teaching materials have various forms, including printed materials (handouts, books, modules, LKS, brochures, and leaflets), non-printed teaching materials, audio (radio, cassette, audio CD), visual (photos or images), audio visual (such as; video, interactive e-modules) and multimedia (such as; interactive CD, computer based, internet) (Herman et al., 2024).

Many serious problems are often experienced by educators when teaching, one of which is the selection of appropriate teaching materials (Aisyah et al., 2020). In reality, the teaching materials used in schools are still conventional, namely printed teaching materials in the form of textbooks (Andani et al., 2023). In reality, not all schools are able to provide complete teaching materials for the teaching and learning process (Widiastuti, 2019). According to (Herawati & Muhtadi, 2020) in his research stated that the use of teaching materials used at school is still limited, especially in chemistry learning, where students only use textbooks in class. In addition, the limitations of teaching materials result in the learning process also

being less effective. This has an impact on many students who are not excited when taking chemistry lessons, so that the teaching and learning process that occurs in the classroom is not optimal. To address the shortcomings in the current teaching and learning process, it is crucial to develop innovative teaching materials.

The above problems are almost the same as the problems found by researchers when conducting observations and interviews with educators of 11th Grade chemistry subjects at SMAS Islam Boarding School Raudhatul Jannah Payakumbuh there are still many students who still do not reach the KKM (Minimum Mastery Criteria - the lowest score a student must achieve to pass a subject in the Indonesian education system) limit of around 60%. Based on the results of interviews and observations that researchers conducted with educators, it is known that the factors that influence the low learning outcomes of the first students are the limitations of teaching materials, the teaching materials used by educators are student worksheets and chemistry textbooks.

This textbook cannot be used as a source of learning for students independently because it requires guidance from educators, and there are limited time and learning resources for students. This limitation results in the implementation of the learning process being less effective, causing low student learning outcomes. Another teaching material used by educators is student worksheets, the existing student worksheets presents less interesting material and only black and white images because student worksheets is more focused on questions. Conditions like this affect the quality of the learning process and results which have an impact on learning outcomes. The second factor is related to learning models, educators rarely use learning models due to time constraints. So that educators are more dominant in delivering material using the lecture method.

Related to this problem, it is necessary to develop teaching materials that are in accordance with the needs of students, namely in the form of e-modules as one of the teaching materials. The reason researchers want to develop this e-module is that e-modules can be accessed easily and their use is flexible and can be used by students anytime and anywhere, e-modules are arranged systematically with language that can be adapted to the ability of students so that it is not confusing in understanding, then e-modules can also help students to measure and control their own abilities so that they can develop students' independence in learning (Mutmainnah et al., 2021). e-modules have the advantage of increasing the ability of students to be able to learn independently, because in e-modules, students can learn independently, 2021). e-modules have the advantage of increasing the ability of students to be able to learn independently, because the e-module already presents information that has supporting features such as images, sounds, moving images, and also videos that clarify the material in the e-module and can be used anywhere and anytime (Herman et al., 2024). The e-module that researchers will develop is based on Learning Cycle 8E. This is based on the fact that learning is still centered on educators so that students are less active, feel bored in class, and do not understand the material taught by educators which has an impact on the low learning outcomes of students.

According to (Mahardika et al., 2018) Learning Cycle 8E is a learning model based on a constructivism approach that aims to help students improve thinking skills and help students connect scientific concepts to everyday life. Learning Cycle 8E is the latest learning cycle which consists of eight stages namely Engage, Explore, E-Search, Elaborate, Exchange, Extend, Evaluate and Explain. Salt hydrolysis is one of the chemical materials that is suitable for the Learning Cycle 8E learning model, because it is a chemical material that is suitable for learning complex. In delivering salt hydrolysis material, learning media is needed that is supported by a variety of appropriate learning models so that students can understand learning concepts to be more meaningful. According to (Budiati, 2022) this model has advantages compared to other models, namely

prioritizing students to develop basic concepts independently armed with experiences in everyday life to be assembled as subject matter being studied.

Including science material in spiritual aspects will not reduce the scientific content of Islamic education itself (Rosita & Abzar, 2024). Research conducted by Mimi stated that integrating and interconnecting science with the Qur'an and Hadith can be done including chemistry (Herman, 2021). The characteristics of chemistry according to Kisworo, namely part of science where monitoring diverse environmental symptoms has been explained in the Qur'an (Kisworo & Azizah, 2018). Based on interviews with educators at SMAS Islam Boarding School Raudhatul Jannah Payakumbuh, it is known that chemistry learning has been integrated with verses of the Qur'an but the integration has not been stated in the teaching materials.

Despite the potential benefits of integrating science and the Quran in education, current teaching practices often overlook this connection. While materials that link scientific concepts to religious values can enhance student learning and appreciation for God, they remain relatively scarce. Salt hydrolysis, a complex topic in chemistry, exemplifies the need for innovative teaching approaches. To help students grasp this challenging concept, educators should explore a variety of learning media and models that make the subject more engaging and meaningful (Esaputri & Okmarisa, 2023). Based on the above problems, researchers are interested in conducting research entitled "Development of E-Modules Based on Learning Cycle 8E Integrated with Al-Quran Verses on Salt Hydrolysis Material for 11th Grade SMA / MA".

## METHOD

The type of research used is Research and Development (R&D). The model used in this research is the 4D model which consists of defining, designing, developing, and disseminating. However, the development carried out in this study is only limited to the third stage, namely development (develop) (Ramdhaniah et al., 2021). The Define stage is the initial stage carried out to determine the conditions and needs in learning and teaching materials which will be identified through (1) interviews with educators and students in 11th Grade Science Class (IPA) by asking questions related to chemistry learning at school, (2) syllabus analysis is carried out by looking at KI and KD on a learning material, (3) literature analysis is carried out by collecting information related to the product to be made, namely e-modules, (4) analysis of learning objectives. This research was conducted at SMAS Islam Boarding School Raudhatul Jannah Payakumbuh, using a sample of students enrolled in the eleventh grade STEAM program. The data collection tools used in this study consisted of a validity sheet evaluated by three validators and a practicality questionnaire filled out by 17 students and one chemistry educator.

At the Design stage, the E-module is designed using Canva and Heyzine flipbook to make it attractive and easy for students to understand. At the Develop stage, the components that have been designed are assembled and presented in the e-module, which is then carried out the validation and practicality stages. Data were collected through interview guidelines, validation sheets, and practicality questionnaires. Interview guidelines are used to collect information about problems in schools from both educators and students to determine the characteristics of teaching materials needed in the development of teaching materials.

The validation sheet is used to measure the validity of the teaching materials developed by evaluating aspects such as format, language, and questionnaire statements. The practicality response questionnaire was used to assess students' perceptions of the E-modules developed. The data analysis techniques used include validity and practicality analysis. Validity is

determined using a validation questionnaire which includes validation of the material substance of presentation feasibility, linguistic validation, and display feasibility (Ilahi et al., 2023). The percentage of validity and practicality was calculated using the formula and interpreted as shown in Table 1.

$$P = \frac{\Sigma \text{ skor per item}}{\text{skor maksimal}} \times 100\%$$

The results obtained can be interpreted using the following table.

Table 1. Validity Categories.

Interval	Category
0% - 20%	Invalid
21% - 40%	Less valid
41% - 60%	Valid enough
61% - 80%	Valid
81% - 100%	Very valid

## RESULTS AND DISCUSSION

### Define Stage

This stage includes a preliminary final analysis by conducting interviews with chemistry educators. This activity aims to find problems at SMAS Islam Boarding School Raudhatul Jannah Payakumbuh. The next activity analyzes students, the purpose of this analysis is to see the characteristics of students. The last activity in this final initial stage is analyzing the syllabus. This activity aims to see the core competencies and basic competencies in learning materials. The second analysis is analyzing the literature. This activity aims to understand the theoretical basis related to the product. The third analysis is the analysis of learning objectives, the goal is to see the learning objectives used, so that it is easier to develop a product (Ilmi et al., 2023). The results of interviews with chemistry educators at SMAS IBS RJ Payakumbuh found that classroom learning is still conventional and relies heavily on textbooks. This causes the involvement of students to be less so that it makes learning chemistry for students difficult. Therefore, the researcher designed an e-module based on learning cycle 8e integrated with Al-Qur'an verses. According to (Ilahi et al., 2023) E-modules are designed to increase learner involvement and encourage independent learning.

### Design Stage

The design stage involves creating e-modules in a format that is suitable for learners. The initial design of this e-module begins with analyzing the Syllabus, Core Competencies (KI) and Basic Competencies (KD), Competency Achievement Indicators (IPK) and aspects of learning materials. After analyzing is complete and collecting sources as a reference, then making e-modules in Microsoft Word 2010 in accordance with salt hydrolysis material and e-module writing format, the next step is to make the material into e-modules using the canva application and heyzine flipbook. E-modules are made using the canva and heyzine flipbook applications, which are equipped with various interesting and simple features. The resulting e-module can be used online through a link shared with students. Before e-modules can be used by students, e-modules must go through the validation stage first. This stage aims to determine the validity level of a product through a questionnaire. This validation stage was carried out by four validators, namely three chemistry lecturers and 1 chemistry educator. From the validator's suggestions, the product was improved so that it could be declared valid by the validator.

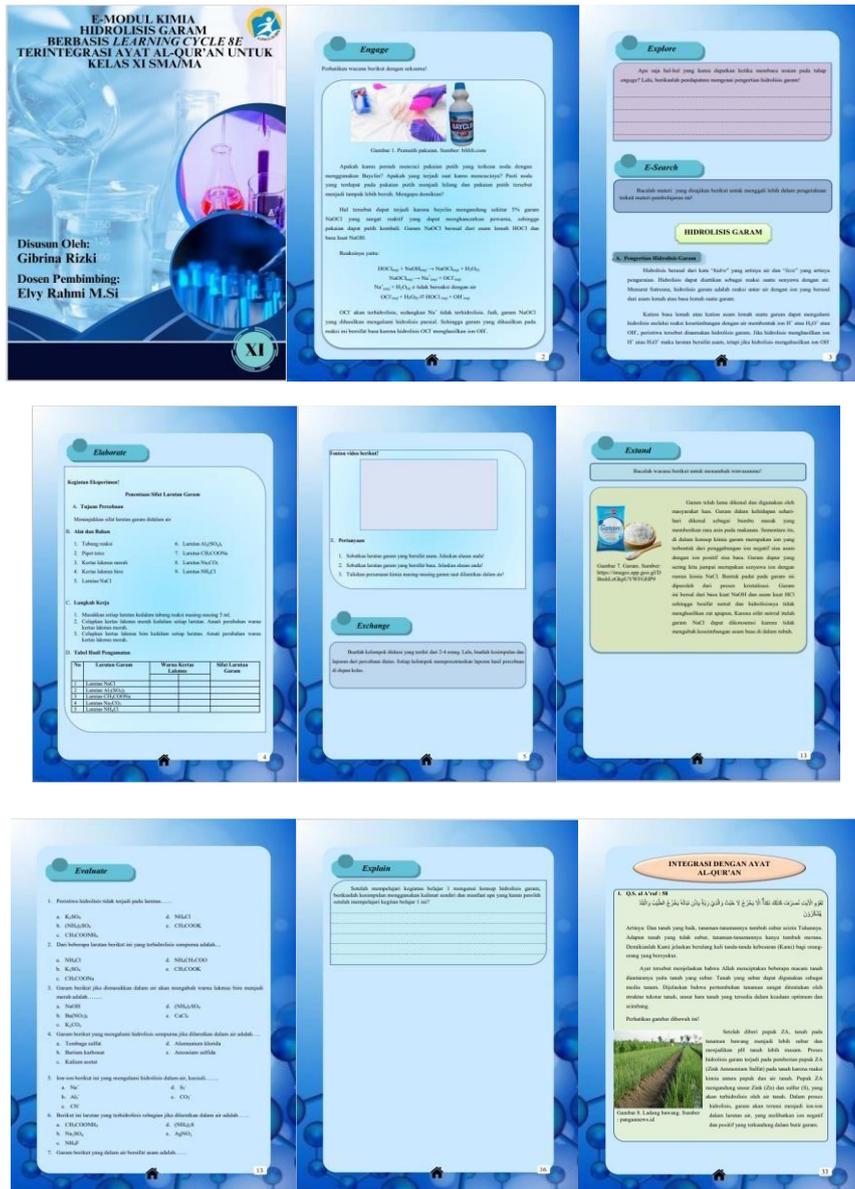


Figure 1. Display of E-Module Based on Learning Cycle 8E Integrated with Al-Qur'an Verses

**Develop Stage**

At this stage, the e-module is tested for validity and practicality. Analysis of the e-module validation results for the content eligibility aspect can be seen in the following table.

Table 2. Analysis of the Results of the E-Module Validation Sheet Based on LC-8E

No	Aspects validated	Validator			Sum	Max Skor	%	Desc
		1	2	3				
1	Content Feasibility	37	40	41	118	132	89%	Very valid
3	Feasibility Linguistics	22	19	22	63	72	88%	Very valid
4	Feasibility Graphics	24	25	26	75	84	76%	Very valid
	Amount	111	111	118	340	384	89%	Very valid

Based on Table 2, the content feasibility aspect reached an assessment percentage of 89% so that it was included in the very valid category. This is because the material coverage in the e-module is in accordance with the core competencies (KI), basic competencies (KD) and indicators of competency achievement (IPK). The material presented in the e-module includes chemical concepts, facts, and theories that are in accordance with the KD and IPK. The interpretation of the Al-Quran verses in the material is appropriate. The material presented in the e-module is scientifically correct and in accordance with the material and is associated with everyday life. This is in line with the results of research (Herman, Rahmi, et al., 2022) that a good e-module has material that refers to basic competencies and is accompanied by supporting material to increase students' knowledge.

The validity test results for the presentation feasibility aspect of this e-module reached a percentage of 88% from the validator so that it was included in the very valid category. This is because in the e-module there are components such as learning instructions, KI, KD, and GPA, image sources, tables and evaluation questions. This is in accordance with research conducted by (Sainita et al., 2023) that the presentation of elements such as learning instructions, sample questions and evaluations in e-modules can help students during learning.

The results of the language validity test from the validator obtained a percentage of 88% which was classified as very valid. This is due to the suitability of the language in the e-module with the development of students. According to (Samawati & Rahayu, 2021) the linguistic aspect is one of the constructive requirements and the main requirement in making teaching materials or e-modules based on the General Guidelines for Indonesian Spelling (PUEBI) and linguistic requirements that are easy to understand or in accordance with the level of thinking of students, namely communicative, effective, not double meaning. The appropriateness of language in e-modules is a key factor in successful learning. By using the right language, e-modules can be an effective tool to improve learners' understanding, motivation and learning skills.

The results of the graphical test from the validator obtained a percentage of 76% which means valid. This is because the cover and e-module are designed with attractive images and colors. According to (Roni et al., 2023) an e-module is said to be attractive if the images displayed are in good color. The concepts described in the material are also emphasized with tables or pictures. This is proven to be able to increase students' understanding of the concepts they learn. By using interesting and informative visual elements, it can change learning materials that are often considered boring to be more interesting and easy to understand such as the presence of video and image elements that help students to more easily understand learning materials. The results of the e-module Validation Sheet on the integrated part of the Al-Qur'an verse in the e-module can be seen in the following table.

Table 3. Analysis of the Results of the E-Module Validation Sheet on the Integrated Section of Al-Qur'an Verses in the E-Module

No	Aspects validated	Sum	Max score	%	Desc
1	The accuracy of the selection of Al-Qur'an to the material	7	8	87,5%	Very valid
2	Appropriateness of Al-Quran verses with the material	7	8	87,5%	Very valid
3	Accuracy of example from Islamic aspects with the concept of chemistry	7	8	87,5%	Very valid
4	Accuracy of interpretation of values the content of the verse	8	8	100%	Very valid
	Amount	29	32	91%	Very valid

Based on Table 3 above, the results of the validation test of the integration of salt hydrolysis material are very valid with a percentage of 91%. This means that the accuracy of the selection, the accuracy of giving examples and interpreting the Al-Quran verses in the material is appropriate. The existence of this suitability makes it easier for students to integrate it with the material and apply it in everyday life. According to (Herman, 2021) the purpose of integrating chemistry with verses from the Qur'an is to teach students that science comes from the Qur'an. Chemistry and the Qur'an never contradict each other, thus learning chemistry students can think about the power of Allah SWT so that it can foster faith and devotion to Allah SWT. After the e-module was validated and revised according to the validator's suggestions, a practicality test was carried out involving 17 students and 1 educator. Broadly speaking, the analysis of the results of the questionnaire sheet for the practicality of e-modules based on Learning Cycle 8E integrated with Al-Qur'an verses can be seen in the following table

Table 4. Analysis of the Results of the Learner Response Questionnaire Sheet

No	Practicality aspect	Sum	Max score	%	Desc
1	Ease of use	190	216	88%	Very valid
2	View	358	432	83%	Very valid
3	Subject matter	182	216	84%	Very valid
4	Language	119	144	83%	Very valid
5	Benefits	62	72	86%	Very valid
	Amount	911	1080	84%	Very valid

Based on table 4 above, it can be seen that the results of the practicality test with students on e-modules based on Learning Cycle 8E integrated with Al-Qur'an verses are overall very practical with a percentage of 84%.

Table 5. Analysis of Educator Response Questionnaire Results

No	Practicality aspect	Sum	Max score	%	Desc
1	Ease of use	11	12	92%	Very valid
2	View	22	24	92%	Very valid
3	Subject matter	11	12	92%	Very valid
4	Language	8	8	100%	Very valid
5	Benefits	4	4	100%	Very valid
	Amount	56	60	93%	Very valid

Based on table 5 above, it can be seen that the results of the practicality test with educators on e-modules based on Learning Cycle 8E integrated with Al-Qur'an verses are overall very practical with a percentage of 93%.

The results of the practicality test for the ease of use aspect were categorized as very practical by students with a percentage of 88% and educators 92%. This is because the learning material in the e-module is systematic and easy for students to understand. Learning materials related to everyday life, integrated with Al-Qur'an verses and also supported by instructions for using the e-module and e-modules can be studied in stages individually or in groups without time limitations and anywhere. According to (Martin, 2022) e-modules can support students to learn at their own pace. The use of e-modules during learning also supports the role of the educator as a facilitator, the educator does not have to repeat explaining the material, thus facilitating the work of the educator, and the educator can observe the activities of students more carefully individually or in groups without time limitations and anywhere. According to (Martin, 2022) e-modules can support students to learn at their own pace. The use of e-modules during learning

also supports the role of the educator as a facilitator, the educator does not have to repeat explaining the material, thus facilitating the work of the educator, and the educator can observe the activities of students more carefully. According to educators, the e-modules are easy to access, navigate and use in learning.

The results of the practicality test for the display aspect were categorized as very practical by students with a percentage of 83% and educators 92%, this is because the e-module has been designed as attractive as possible so that students are not bored or bored in using it. This is in accordance with research conducted by (Nora et al., 2022) which states that e-modules are said to be good if the module is attractive and the display design can encourage students to learn, the images included are clear with attractive color selection and can reinforce the material presented.

The results of the practicality test for aspects of learning materials were categorized as very practical by students with a percentage of 84% and educators 92%. This is because the learning material in the e-module is systematic, easy to understand. According to (Martin, 2022) Teaching materials that collect material that is systematically organized are in fact able to make students better understand the contents of teaching materials, besides that the learning material is related to everyday life and the application of religious values. Presentation of information related to the daily environment can encourage curiosity and provide challenges for students to learn more deeply.

The results of the practicality test for language aspects were categorized as very practical by students with a percentage of 83% and educators 100%, this is because the sentences in the e-module are easy to understand. Good language and easy-to-understand sentence structure are able to convey the concepts that researchers want to convey to readers well. In addition, the terms in the e-module are also easy to understand. The e-module presents a glossary that compiles a collection of terms related to the material, making it easier for students to understand the terms contained in the module (Martin, 2022).

The e-module based on the 8E Learning Cycle and integrated with Al-Quran verses received overwhelmingly positive feedback. Students rated it as 84% practical, while educators gave it a 93% approval rating. According to Ridwan, these scores suggest that the module is highly effective and applicable in real-world learning situations (Simangunsong & Pane, 2021). E-modules are packaged in the form of a link or URL that leads to the heyzine flipbook page which is opened by learners and educators via laptops / PCs, smartphones connected to the internet network.

## CONCLUSION

Based on the research results obtained, the Learning Cycle 8E-based e-module is very valid with a percentage of 89% and the validity of content feasibility on integration with Al-Qur'an verses obtained a percentage of 90.6%. E-modules integrated with Al-Qur'an verses are also very practical with the acquisition of percentages from the responses of students and educators respectively 84% and 93%.

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