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The Development of E-Module of Hydrocarbon Material Using *Lectora Inspire*

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ABSTRAK

Materi hidrokarbon merupakan salah satu materi dalam ilmu kimia yang menjadi masalah bagi mahasiswa pendidikan kimia, dalam rangka mengembangkan media belajar yang memudahkan mahasiswa memahami materi hidrokarbon, riset pengembangan e-modul dilakukan. Penelitian ini bertujuan menghasilkan e-modul materi hidrokarbon yang layak digunakan dan mendapatkan respon yang baik. Model ADDIE yang terdiri dari analisis, desain, dan development digunakan sebagai model penelitian dan pengembangan dalam penelitian ini. Responden adalah mahasiswa Program Studi Pendidikan Kimia FKIP Untan berjumlah 12 mahasiswa untuk uji coba awal dan 32 mahasiswa untuk uji utama. Teknik penelitian yang digunakan adalah teknik pengukuran dan teknik komunikasi tidak langsung. Alat pengumpulan data yang digunakan yaitu lembar penilaian kelayakan dan angket respon. Hasil yang diperoleh menunjukkan bahwa e-modul sangat layak dari aspek kelayakan materi sebesar 88%, aspek kelayakan kebahasaan sebesar 91%, dan aspek kelayakan kegrafikan sebesar 95%. Hasil perhitungan persentase angket respon mahasiswa pada uji coba awal sebesar 83% dan uji utama sebesar 84% yang dinyatakan sangat baik. Berdasarkan hasil penelitian yang telah dilakukan, e-modul materi hidrokarbon menggunakan *lectora inspire* dinyatakan sangat layak dan memdapatkan respon yang sangat baik, sehingga dapat dijadikan sebagai sumber belajar dalam pembelajaran materi hidrokarbon untuk meningkatkan pemahaman mahasiswa.

ABSTRACT

Hydrocarbon material is one of the materials in chemistry which is a problem for chemistry education students. In order to develop learning media that makes it easier for students to understand hydrocarbon, research to the development of e-modules is carried out. The goal of this research is to create an e-module of hydrocarbon material that is useful and receives positive feedback. ADDIE model consisted of analysis, design, and development was used as research and development model in this study. In total 12 students from the Chemistry Education Study Program FKIP Untan, and 32 students from the main test served as respondents. Measurement and indirect communication techniques are employed in the investigation. Feasibility evaluation sheets and response questionnaires are the instruments utilized for data collection. The results show that the e-module is highly viable, with a percentage of material feasibility 88%, linguistic feasibility 91%, technical feasibility 92%, and 95% graphic viability. In the initial experiment, the proportion of student questionnaire responses was calculated at 83%, and in the main test, it was calculated at 84%, which was deemed to be very good. E-module of hydrocarbon material using Lectora Inspire was pronounced to be extremely feasible and received a very good reaction based on the research findings, that it can be used as a learning resource in learning hydrocarbon material to improve students' understanding.

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1. INTRODUCTION

At the university, organic chemistry is a branch of chemistry. Many students believe that organic chemistry is a challenging subject. Because there is no mathematical calculation (algorithm) involved in solving problems, understanding abstract material is necessary, and there are many special terms in organic chemistry (Ellis 1994). Organic chemistry in universities is quite complex. There are many concepts that need to be understood and linked together. Therefore, students must have a solid understanding of and ability to reason about reactions and organic reaction mechanisms in order to succeed (Ira, 2020).

(Fakhrurrazi et al, 2017), Hydrocarbon material necessitates a thorough conceptual grasp of organic chemistry conceptual, factual, and procedural expertise (Aprilia, 2021). Studying the subject of hydrocarbon compounds can be challenging because 1) the facts and terms are numerous and diverse, making it difficult for students to understand them; 2) some terms are still unfamiliar and not used in daily life; and 3) the concepts are fairly broad (Andre,2021). Previous study showed that students struggled with hydrocarbon material, specifically with cyclic carbon chains (12.50%) and alicyclic carbon chains (20.83%), as well as with the IUPAC nomenclature of alkane compounds (54.17%), chemical reactions of alkane compounds (50.00%), and structural formula (25.00%) (Catur, 2013). Therefore, it is necessary to develop learning media that makes it easier for students to understand hydrocarbon material.

The students of Chemistry Education FKIP Untan likewise struggle with learning organic chemistry. According to preliminary questionnaire of the class of 2020 students in the Chemical Education Study Program FKIP Untan who have taken organic chemistry courses on monofunctional compounds, it was discovered that they have problems with hydrocarbon material, particularly with the nomenclature, structure, reaction mechanism, and production of hydrocarbon compounds. In light of this, educational tools are required to help students absorb hydrocarbon content more easily, but can be used anytime and anywhere (Nazali, 2016).

In an effort to improve students' comprehension of abstract hydrocarbon material, Nurmariza et al. (2017) argue that teaching materials that can portray real abstract concepts in order to make them more concrete are necessary. To enhance the calibre of continuing learning, one type of learning process activity is the creation of instructional materials (Nurbaeti 2019). All resources in the form of textbooks, modules, audio, handouts, interactive teaching materials, and the like are considered teaching materials if they are arranged to aid educators in achieving learning objectives (Prastowo, 2016).

The need for a teaching material that can visualize real abstract concepts in order to become more concrete is an effort to increase students' understanding of abstract hydrocarbon material, Nurmariza et al., (2017). The development of teaching materials is a form of learning process activities to improve the quality of ongoing learning (Nurbaeti 2019). Teaching materials are all materials in the form of textbooks, modules, audio, *handouts*, interaction teaching materials and the like which are arranged to help educators achieve learning goals (Prastowo, 2016).

Observation on learning process revealed that the learning resources used by students were in the form *handouts* from lecturers, chemistry textbooks, and *e-books* in foreign languages. Students said that lecturers had never used an e-module that combined text with video and animation in it. Students stated that the content was difficult to understand since it used foreign language. Seeing this, it is necessary to develop learning resources by utilizing *cellphones* or laptops, namely by making e-modules of hydrocarbon materials using *lectora inspire* and the content was delivered in Bahasa Indonesia. The electronic module is a renewal of learning media which was originally in the form of printed learning media or better known as modules (Winatha, 2018). E-modules are learning media that emerged along with the development of science and technology (Syidiq, 2020). The findings of previous research stated that the module could facilitate students in learning (Ariana, 2020). Other research findings also state that the module can motivate students in learning (Darmayasa et al, 2018). Therefore, the developed e-module can help students learn independently which can be operated using a laptop, *smartphone*, or web and can be accessed anytime without time restrictions. The benefit of learning to use e-modules is to develop students' skills in observing, classifying, communicating, measuring, and concluding in the learning process (Rosa, 2015).

Some of the main characteristics of e-modules are 1) Self-instruction, which enables students to study autonomously and without depending on outside parties, is one of the fundamental characteristics of e-modules and is crucial; 2) self-contained, meaning that the e-module contains all necessary learning resources. 3. Stand-alone is a feature of a module that does not rely on additional instructional resources or learning media. 4) adaptable, specifically e-modules that are flexible/flexible to be employed in different hardware (hardware) and are developed to adapt to the evolution of science and technology; In order for an e-module to be considered user-friendly or friendly to users, it must satisfy the following criteria: instructions and information must be clear, informative, and easy to understand for users, in responding and accessing as desired (Wulansari et al., 2018).

In Kartikasari's (2021) research that the e-module makes it easier for students to understand the concept of hydrocarbons where the e-module also guides students to learn independently, because the learning materials are designed systematically by displaying/containing images, audio, videos and animation and are equipped with tests/quizzes formative. A total of 95.67% average positive response value therefore the e-module can help students understand the concept of hydrocarbon compounds.

The Lectora Inspire application was chosen to overcome the shortage of teaching materials. The output produced from several development applications to create e-modules requires other applications such as flashplayer and supreader/readium. E-modules developed using the Lectora application can be run directly on computers or laptops without requiring additional applications. E-modules are made in the form of HTML when online and exe format for offline ones, which contain general module components, but are equipped with additional features such as navigation menus to make it easier for users to move between menus, multimedia, quizzes and a glossary to explain the definition of terms (Rukoyatun, 2018). Lectora Insire application can also be used to add videos, images, audio and insert evaluation sheets such as questions. Therefore, this application is very supportive for the creation of e-modules (Kiruna et al., 2020).

The results of previous studies in the use of Lectora Inspire in learning media received a very good response and were very feasible to use with a percentage of 82.91% assessed from three aspects, namely aspects of convenience, appearance, and application effectiveness (Rukoyatun, 2018). There is no research on hydrocarbon material e-modules using Lectora Inspire. The advantages of the teaching materials developed are that these teaching materials contain sample questions, quiz questions, videos and interesting pictures that can motivate students in learning.

Based on the description above, it is necessary to develop a hydrocarbon material e-module using Lectora Inspire. The advantage of Lectora Inspire is that it is easy to use in creating learning media, apart from that, Lectora was created for e-learning needs so it can be used for learning both online and offline. It is hoped that the development of a hydrocarbon material e-module using Lectora Inspire can help students access the material, there by creating enjoyable learning. This study aims to produce an e-module of hydrocarbon material that is suitable for use in the learning process. The developed e-module can explain the concept of hydrocarbons through text, videos and images that are in accordance with students' learning interests and have the advantage that the product developed can be used both online and offline. Furthermore, the purpose of this development is to determine the feasibility level of the hydrocarbon material e-module using Lectora Inspire and to determine the response of students of the Chemistry Education Study Program FKIP Untan to the hydrocarbon material e-module using Lectora Inspire.

2. METHOD

The research model used was research and development. The research process refers to the ADDIE development model, which consists of 5 stages, namely *Analysis*, *Design*, *Development*, *Implementation* and *Evaluation* (Sugiyono, 2016). However, this research was limited to the *development*. Simplification of the stages of this research, because this research is only to determine the level of feasibility & student response to the developed e-module.

For the first stage, problem and needs analysis were carried out. so that the facts and problems in the field were obtained. Then, *story board* e-module of hydrocarbon materials was made using *Lectora Inspire. The* second *design* is to design a product that will be made according to *the story board*. The third stage of *was* to develop prototype to produce the final product. At this stage the feasibility of this research and response test were carried out. The evaluation of the e-module feasibility test was assessed by three aspects of the assessment, namely the content, linguistic, and graphic aspects which are assessed by 3 experts in their respective fields. Respondents in this study were students of the Chemical Education study program, FKIP Untan, as many as 12 people for the initial trial and the main trial was carried out on 32 students. This study uses data collection techniques in the form of measurement techniques and indirect communication techniques. Meanwhile, the feasibility assessment sheet and response questionnaire were used as data collection tools that have been feasibility and declared valid for use. The data from the feasibility results were analyzed through stages, namely in each statement the score obtained was calculated, then the percentage was calculated for the total score for each statement after which the overall average percentage was calculated.

Student responses was attained from questionnaire that has been given to students. The response questionnaire included indicators, assessment items, and alternative choices using a *Likert* scale of four rating scales, namely SS (Strongly Agree), S (Agree), TS (Disagree), and STS (Strongly Disagree).

3. RESULT AND DISCUSSION

Result

The development of the hydrocarbon e-module using *Lectora Inspire* refers to the ADDIE development model. The 3 stages of ADDIE can be seen in Table 1.

Table 1. ADDIE model development steps

ADDIE Step	Results
Analysis	**Problem Analysis:** 1. Students has difficulties with hydrocarbon materials, especially in giving nomenclature of hydrocarbon compounds, reaction mechanisms and making the structure of hydrocarbon compounds and making hydrocarbon compounds. 2. The learning media used by students are in the form of printed books, electronic books in foreign languages, and *power point* from lecturers. **Needs Analysis:** It takes a teaching material in the form of an e-module of hydrocarbon material using *Lectora inspire* which can be used by students to support learning.
Design	**Product Design** E-modul in this study was designed based on graduate learning achievements, course learning outcomes, learning material used, applicable software used to support the development of e-modules and selecting formats. 1. The first step is to determine the implemented CPL and CPMK indicators of achievement that have been formulated based on the Semester Learning Plan (RPS). 2 The collection of learning materials based on the study of book literature for the University level. 3. The application used, namely *Lectora Inspire 8*. The *Lectora Inspire* was chosen because it has several characteristics that distinguish it from other media or applications. 4. E-module format has several parts, namely the initial section contains the front page which provides several menus to go to the e-module, *cover*, e-module identity, introduction, table of contents, technical use of e-modules, learning achievements, concept maps, and glossary. The content section contains learning materials, evaluation questions and supplement questions. The last part contains a bibliography, author bio and back cover. **Preparation of Instrumen** This instrument is in the form of expert validation sheets and student response questionnaire sheets made based on the National Education Standards Agency (BSNP).
Development	1. The e-module was created with the *Lectora Inspire 8*. The *cover* and content cover were made using *Photoshop CS6,* while the e-module content was made using *Lectora Inspire.* If the e-module has been created,then the e-module is *published* in *exe* format then the e-module can be shared in the form of a *link* so that it can be accessed by students using gadgets and laptops. 2. The results of the e-module feasibility assessment obtained a percentage of 91% based on3 aspects of the assessment. 3. The result of the initial trial obtained a percentage of 83% while the results of the main trial obtained a percentage of 84%.

Conducting a feasibility assessment aims to test the feasibility of the e-module created. Experts will assess the e-module in terms of content, language and graphics where aspect the research of feasibility test of the e-module of hydrocarbon material using lectora inspire. The percentage of feasibility assessment can be seen in Figure 1.

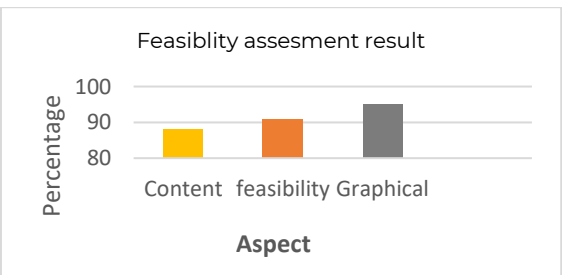


Figure 1. Percentage of feasibility assessment results

The total percentage of feasibility assessment based on 3 aspects is 91% with very feasible criteria.

Content Aspect

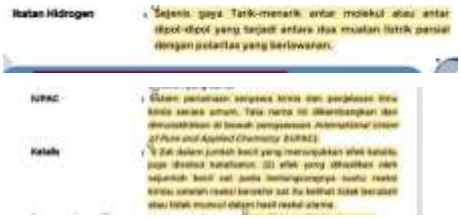
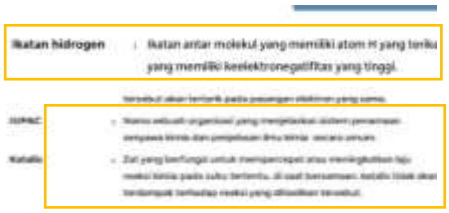
Assessment The results of the material feasibility assessment are presented in Table 2.

Table 2. Content aspect feasibility results

Indicators	Assessment Points	Percentage (%)	Criteria
The suitability of the material with Learning Outcomes (CPL)	Appropriateness of the material	91	Very feasible
	Breadth of the material	91	Very feasible
Accuracy of the material	Concept and definition accuracy	91	Very feasible
	Accuracy of drawings and illustrations	75	Feasible
Presentation technique	Continuity of concepts	83	Very feasible
Supporting presentation	Examples of questions in each learning activity	91	Very feasible
	Practice questions at the end of each learning activity	91	Very feasible
	Bibliography	75	Feasible
	Glossary	91	Very feasible
	Introduction	100	Very feasible
		88	**Very feasible**

Based on Table 3 the average percentage of the overall feasibility of the material is 88% with very feasible criteria. This shows that the indicators in the material aspect are stated to be very feasible. There were recommendation and suggestion given by experts to the e-module, namely to add instructions for working on the problem, correcting some incorrect terms in the e-module, correcting some pictures of compound structures in the sample questions presented, which are unclear and blurry and correcting some incorrect writing on the list references. The following before and after repairs are shown in Table 3.

Table 3. Results Before and After Improvement Content

No	Before Revision	After Revision
1.	Add question instructiom	
		
2.	Fixed some incorrect terms in e-modules contained in the glossary.	
		
3.	Improve some pictures of compound structures	

Based on Table 3 material experts provide suggestions, namely adding instructions for working on questions on each question, namely evaluation 1, evaluation 2, evaluation 3 and supplementary questions, fixed some incorrect terms in e-modules contained in the glossary and improve some pictures of compound structures in the examples of questions presented, which are less clear and blurry.

Language Aspect

Results of the language feasibility assessment can be seen in Table 4.

Table 4. Language aspect feasibility results

Indicator	Assessment Points	Percentage (%)	Criteria
Straightforward	Sentence structure accuracy.	83	Very feasible
	Sentence effectiveness	91	Very feasible
	Sentence standard	100	Very feasible
Communicative	Readability of messages or information	100	Very feasible
	Accuracy of using language rules	91	Very feasible
Spelling accuracy	Conformity with the intellectual development of students	100	Very feasible
Conformity with the rules	Spelling accuracy.	75	Feasible
Average % Score		**91**	**Very feasible**

The results of the linguistic feasibility assessment in terms of Table 4 obtained an overall average percentage of 91% with very feasible criteria. There is one assessment item that obtains proper criteria, namely spelling accuracy. The following before and after repairs are shown in Table 5.

Table 5. Results Before and After Improvement Language

Before Revision	After Revision
Correct the wrong word	
	

Based on Table 5 there are several suggestions for improvement in the language aspect by experts, namely correcting typo, and using good sentences in accordance with Indonesia rules on the front page.

Graphical Aspect

The results of the language feasibility assessment can be seen in Table 6.

Table 6. Graphical aspect feasibility results

Indicator	Assessment Points	Percentage (%)	Criteria
Size of e-module	Conformity of module size with ISO	100	Very feasible
	Size suitability with module content material.	91	Very feasible
E-module cover design (cover)	appearance of the layout elements on the front, back and back covers harmoniously	83	Very feasible

	has rhythm andunityand is consistent		
	The colors of the layout elements are harmonious and clarify the function	83	Very feasible
	The font used is Attractive and Easy to Read	91	Very feasible
	The complete e-module cover element	91	Very feasible
Content design	The placement of layout elements is consistent based on the pattern	91	Very feasible
	The appearance of the layout of the components in the e-module content gives the impression of harmony and a good impression of rhythm	91	Very feasible
	The separation between paragraphs is clear	91	Very feasible
	Simple e-module content typography	83	Very feasible
	Complete e-module content element layout	83	Very feasible
Design Lectora Inspire	Application Lectora can operate smoothly	91	Very feasible
		95	**Very feasible**

The results of the graphic feasibility assessment in terms of Table 6 as a whole are 95% with very feasible criteria. All assessment items were declared very feasible by the experts, this shows that the e-modules made are interesting and can motivate students in learning. The following is a graphic before and after the repair are shown in Table 7.

Table 7. Results Before and After Improvement Graphic

Before Revision	After Revision
Result on layout of the next, previous and home in the e-module.	
	

Based on Table 7 There are severel suggestions for improvement to the graphic aspect by experts result on layout of the next, previous and home in the e-module should be placed at the bottom, so that when reading the content on a page, users do not need scroll up to go to the next page.

Student Response

After conducting the e-module feasibility test by an expert and it was declared very feasible, then the student response test was carried out. This student response was carried out with initial trials and main trials. The following are the results of the student response assessment.

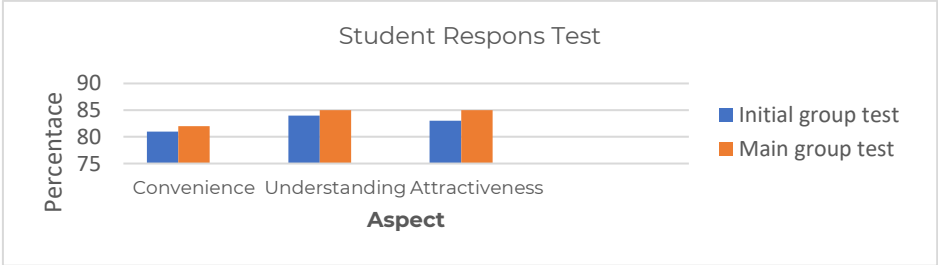


Figure 2. Percentage of student response test

The results of the assessment of student responses in the main trial can be seen in Table 8.

Table 8. Results of Assessment of Student Responses in the Initial Trial

Aspects	Statement Items	Percentage (%)	Criteria
Convenience	material presented in this e-module is easy for me to understand	83	Very good
	The material in this e-module is presented in sequence	83	Very good

	All questions on the e-module questions can be answered without looking at the answer key	73	Good
	this E-module did not help me to master monofunctional organic chemistry lessons, especially hydrocarbons.	87	Very good
Understanding	The sentences and grammar used in this e-module are in accordance with PUEBI (General Guidelines for Indonesian Spelling)	83	Very good
	The sentences used in this e-module have multiple meanings.	89	Very good
	The sentences and paragraphs used in this e-module are clear and easy to understand.	83	Very good
	The layout or arrangement of materials in this module makes it difficult for me to understand the material	83	Very good
Attractiveness	I think the appearance of the cover of the Lectora hydrocarbon materials is interesting	83	Very good
	I think the design view of the contents of the Lectora-based e-module is based on hydrocarbons Attractive	85	Very good
	The printed fonts used in this module are clearly legible	81	Very good
	Illustrations such as videos, pictures, and animations in this module can be seen clearly	83	Very good
	The colors used in this module are attractive	85	Very good
		83	**Very good**

Student responses to the hydrocarbon e-module using Lectora Inspire in the initial trial were stated to be very good with an average score of 83%. The scores on the aspects of convenience, understanding and attractiveness were 81%, 84% and 83%, respectively, with very good criteria.

The results of the assessment of student responses in the main trial can be seen in Table 9.

Table 9. Results of Assessment of Student Responses in the Main Trial

Aspects	**Statement Items**	**Percentage (%)**	**Criteria**
Convenience	material presented in this e-module is easy for me to understand	82	Very good
	The material in this e-module is presented in sequence	86	Very good
	All questions on the e-module questions can be answered without looking at the answer key	77	Good
	this E-module did not help me to master monofunctional organic chemistry lessons, especially hydrocarbons.	85	Very good
Understanding	The sentences and grammar used in this e-module are in accordance with PUEBI (General Guidelines for Indonesian Spelling)	86	Very good
	The sentences used in this e-module have multiple meanings.	88	Very good
	The sentences and paragraphs used in this e-module are clear and easy to understand.	82	Very good
	The layout or arrangement of materials in this module makes it difficult for me to understand the material	82	Very good
Attractiveness	I think the appearance of the cover of the Lectora hydrocarbon materials is interesting	82	Very good
	I think the design view of the contents of the Lectora-based e-module is based on hydrocarbons Attractive	86	Very good
	The printed fonts used in this module are clearly	84	Very good

legible		
Illustrations such as videos, pictures, and animations in this module can be seen clearly	87	Very good
The colors used in this module are attractive	86	Very good
	85	**Very good**

The results of student responses to the Lectora Inspire in the main trial were stated to be very good with an average score of 85%. The score on the aspects of convenience, understanding and attractiveness were 82%, 85% and 85%, respectively, with very good criteria

Discussion

Development of *Lectora Inspire*-based e-module on hydrocarbon materials refered to the ADDIE development model. The three stages of ADDIE were as follows: *Analysis*, *Design*, and *Development* . In this study, the e-module was reviewed for it feasibility and student response. The feasibility assessment in this study was to measure the feasibility level of the developed e-module which was assessed based on three aspects, namely material, language and graphics, which were assessed by 3 experts in their respective fields.

The results of the assessment the material aspect were declared very feasible with a percentage gain of 88%, the linguistic aspect 91% and the graphic aspect 95% declared very feasible. The three aspects of the assessment obtained an average percentage of 91%. This showed that from the three aspects of the assessment carried out it is said to be very feasible for initial trials or main trials. This is reinforced by the results of Mufidah's research, (2014) saying that the module is declared worthy as a learning resource to get a percentage of the overall aspect of 87.33%. According to Sawitri et al., (2014) a quality learning module is appropriate to use if it meets the standards of validity assessed by experts and experts.

The results of the material assessment by experts presented in Table 3 obtained a percentage of 88% with very decent criteria. There are two statements that get a value of 75%, namely the accuracy of the image (illustration) and the bibliography. The accuracy of the image (illustration) in question is that there are images that are not clear and do not include references. This is in line with the results research of Siti (2019), showing adding analogies with image visualization in products is very necessary in the learning process, especially for chemistry abstract. The bibliography in question is that there are some inaccurate writings and some books that have been used for more than 10 years.

Based on the suitability of the e-module material developed in accordance with graduate learning outcomes (CPL) with indicators that have been formulated. In line with research Sartono (2016), which states that educators can upload all information related to the learning material being taught by adding multimedia (images, animations, sound effects, etc.) so that students are more interested in learning it. In terms of the accuracy of the material, the e-module developed according to the definitions and concepts presented does not lead to many interpretations, in accordance with the concepts and definitions that apply in the field of science. In terms of the technique of presenting the e-module in accordance with the concepts presented in sequence, namely from easy to difficult. The e-module developed is in accordance with the characteristics of students and is neatly arranged so that it can make it easier for students to learn (Suryanda et al, 2016). teaching materials guide development for Depdiknas (2008), states the development of teaching materials should pay attention to the following principles of teaching materials: 1) starting from the easy to understand the difficult, from the concrete to understanding the abstract; 2) in order to strengthen understanding, repetition is needed; 3) provide reinforcement to students' understanding of the need for positive feedback; 4) high motivation is one of the determinants of learning success; 5) achieve the goal. In addition, the developed e-module contains supporting presentations such as a glossary, sample questions and additional videos to strengthen understanding. The activities presented in the module must be able to support the reader in understanding a concept. Understanding a concept, can not only be presented in the material. Several concepts are needed activities that can support the reader in understanding the concept, one of which is the existence of practice questions. Arikunto (2003) states that an activity to measure the success of students in learning is an evaluation question.

Based on Table 5, the results of the linguistic assessment by linguists stated that it was very feasible with an average percentage of 91%. There is 1 assessment item getting a percentage of 75%, namely spelling accuracy. This indicates that the language used in the e-module is clear, communicative, the sentences used are easy to understand which are in accordance with the cognitive development of students and the sentences used are in accordance with the general Indonesian spelling guidelines (PUEBI). Asfiah et al., (2013) say that the language used in the module must be adapted to the language of the students, not ambiguous, the sentences are effective, simple and interesting so that the information conveyed in the e-module is easily understood by students. This is in line with the opinion of Kurniasari et al., (2018) that spelling is not only a matter of symbolizing phonemes and letters, but also regulates how to write the words you want to write, write a sentence and have punctuation marks.

The result of the graphic assessment by the graphic expert, the percentage obtained is 95% with very feasible criteria (Table 6). All assessment items scored very well. Based on this, it shows that the e-module is made according to the ISO standard size, color display and graphic composition that supports the content presented. This is also supported research by Bagus (2020) that an attractive product display also remains a consideration, such as determining *icons* that have visualizations that are in line with the contents of the e-module, to help educate students' memory in remembering. The layout of the elements is complete and does not make users confused and the *Lectora Inspire* that is used can be operated properly such as adding video and navigation buttons in the e-module can be operated properly. Motivating students to read the material in learning, the e-module is made as attractive as possible (Lestari, 2013).

The results of the initial trial of student responses the percentage obtained was 83% with very good criteria. The initial trial was carried out in a small group test, namely the students of the Chemical Education Study Program FKIP Untan, batch of 2021, totaling 12 people who were randomly selected on condition that they had passed the organic chemistry course on monofunctional compounds. The e-modules tested in this small group are e-modules that have been improved based on the experts responses to the feasibility test.

The results of the main test of student responses the percentage obtained is 84% with verygood criteria. The main trial was carried out in a large group trial, namely the students of the Chemistry Education Study Program, FKIP Untan, class of 2020, totaling 32 people who were randomly selected on the condition that they had taken monofunctional organic chemistry courses trials the initial.

Based on the results presented, it shows that the developed e-module is very well used as teaching material in organic chemistry courses on monofunctional hydrocarbons (alkanes and cycloalkanes)This is supported by research by Amanullah (2020), which states that the development of teaching materials such as e-modules can maximize learning activities and help students in ongoing learning. A similar study was conducted by Umiatsih (2017) with the results of his research, namely e-modules using *spreadsheet software* have features that can be operated properly so that they are in accordance with school needs and can be used as teaching materials in the learning process. E-modules are assessed based on three aspects, namely aspects convenience, understanding and attractiveness. In the trials the aspect, was stated to be very good by obtaining a percentage of 81%, while for the main trials presented in Table 8 the percentage was stated to be very good. This is in line with research Athiyah (2018), that in the aspect of ease of obtaining the percentage of 87.3% is stated to be very good so that the product made is suitable for use. In line with the opinion of Ejin (2016), that the modules used for learning must be easy to understand and should not be confusing.

Aspects of understanding are presented in Table 7 for the initial trial obtained a percentage of 84% with very good criteria, while the main trial obtained a percentage of 85% (Table 8) with very good criteria. This shows that the e-module developed has been well used as teaching material and is easy to understand. In line with Sorrya (2014), good teaching materials are teaching materials that use good language and are easy to understand.

The attractiveness aspect is presented in Table 7 for the initial trial, obtained a percentage of 83% with the criteria very good, while in thema intrial was obtained a percentage of 85% with very good criteria (Table 8). This shows that in terms of appearance, writing, and color, it attracts and motivates students in the learning process. Motivation is a sense of interest, activeness and enthusiasm due to the emergence of a power within a person (Afandi, 2015). Other research findings also state that interesting teaching materials accompanied by examples and pictures and combined with several media such as audio, video, text and graphics will make it easier for students and can motivate students in learning (Niluh, 2021).

The use of Lectora Inspire based e-module is part of e-learning which can adapt to students interests, intelligence and learning styles. With the lectora inspire e-module, students are given the freedom to search for sources of information or problem solving materials related to the material. It is hoped that the use of this e-module can familiarize students with maximizing internet technology in learning.

4. CONCLUSION

The development of e-modules using the ADDIE development model is declared feasible to use, in terms of the results of the feasibility level assessed from three aspects, namely material aspects, language aspects and graphic aspects with very feasible criteria. The hydrocarbon material e-module using Lectora Inspire received a very good response in terms of three aspects, namely the aspect of convenience, understanding and attractiveness. Thus it can be concluded that the developed e-module can be used in learning on hydrocarbon material to support student understanding and can be developed further to the next stage.

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