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The Use of E-Modules to Improve Students' Understanding of Concepts and Independent Attitudes Through Google Classroom

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ABSTRACT
This study aims to determine the effect of using e-module hydrocarbon compounds through Google Classroom on students' understanding of concepts and independent attitudes. The research was conducted at SMKN 1 Seberida, Indragiri Hulu Regency, Riau in the even semester of the 2019/2020 school year. The research method used was pre-experimental with one group pretest-postest research design. Sampling was carried out on a nonprobability basis using purposive sampling technique. The sample in this study were students of class X Multimedia, totaling 32 people. Based on the calculation, the posttest mean score was 80.78% and the N-Gain value was 0.7488 with high criteria. Whereas for the independent attitude of students, it was obtained an average score of 87.50% and the N-Gain value of 0.5496 in the moderate category. It can be concluded that the use of hydrocarbon compound e-modules through Google Classroom can improve students' understanding of concepts and independent attitudes.

Keywords: *E-module, Concept understanding, Independent attitude, Google classroom.*

1. INTRODUCTION

Along with technological advances in education, Indonesia has also experienced changes in the field of education, one of which is a change in the education curriculum, which from KTSP (Education Unit Level Curriculum), now becomes the 2013 curriculum with revisions. There are several things that have been revised in the 2013 curriculum, including (1) there is no restriction on the thinking process of students at each level of education, for example in the curriculum before the revision, students for elementary school level are limited to understanding, then in the 2013 curriculum revision, elementary level students are not limited to the understanding stage but can also arrive at the creating stage according to their age, (2) using active learning methods. (3) Increasing the relationship between core competencies (KI) and basic competencies (KD) [1].

With the increase in the relationship between KI and KD, many textbooks (textbooks) in the 2013 curriculum before the revision had to be updated. According to the Head of the Book of the Center for Curriculum and Book of the Ministry of Education and Culture (Puskurbuk Kemendikbud), Supriyatno said that in content there is nothing wrong in the 2013 Curriculum book. Errors are only in the order, especially thematic books which are an integration of various subjects. In addition, the current Curriculum 2013 textbooks are adjusted to the basic competencies required to follow them so they must be revised. From this change, books that have been circulating in the community in terms of content can still be used, so what has changed from the 2013 Curriculum book is its presentation. The process of switching and changing KD of a subject certainly does not run smoothly, there are always problems even

though the curriculum has been announced and is determined to be running [2].

Based on the explanation above, the authors took the initiative to use teaching materials in accordance with the requirements of the 2013 revised KD curriculum, especially for learning chemistry at the SMK Agriculture unit level, especially on hydrocarbon compounds. Teaching materials for hydrocarbon compound materials currently available in the form of student textbooks are not in accordance with the demands of KD in the 2013 revised curriculum where in the textbooks students contain hydrocarbon compounds and petroleum while the demands of KD are hydrocarbon compounds and their derivatives as well as the use of hydrocarbon compounds and their derivatives. in food processing. The teaching material that the author wants to use is an ICT-based module, namely e-module.

E-module is a form of presenting independent learning materials arranged systematically into specific learning units, which are presented in an electronic format, where each learning activity is linked with a link as navigation which makes students more interactive with the program, In addition, e-modules are also equipped with videos or animations that can support the learning process and can also be equipped with audio to enrich the learning experience [3]. With the e-module, it is hoped that it can meet the needs of students for teaching materials that are still not fully in accordance with the demands of KD in the 2013 revised curriculum, both in the learning process and in content.

The results of observations made at SMKN 1 Seberida in several classes in class X (ten) at the time when chemistry learning was taking place it was concluded that students were still not independent in following the learning process. During the observation, learning is more focused on educators, while students are more passive. This can be seen when the learning process takes place in only one direction, educators are more active in explaining, while students are more inactive. Students are more waiting for explanations and directions from educators. The attitude of someone who always needs encouragement to act and has not been able to do something without the help of other people is still classified as not independent [4].

Then from the results of the evaluation given by the educator at the end of the lesson it showed that almost 90% of students could not answer correctly. This is an indication of the low level of understanding of students' concepts of the material that has been taught by educators. A student is said to have understood a concept if he has the ability to grasp the meaning of the information received in the form of: (1) interpreting a chart, diagram or graph, (2) translating a verbal statement into a mathematical formula, (3) predicting based on certain tendencies (interpolation and extrapolation), (4) Expressing a concept in one's own words [5]. Meanwhile, according to [6], Conceptual understanding is when a person shows the coherence of an error-free understanding of structures. In this contextual understanding is related to the quality of understanding the individual structure of students.

Furthermore, from the results of the questionnaire before the research was carried out on 35 respondents conducted at SMKN 1 Seberida, the results obtained include: that 97% of students have androids, 97% of students have worked on chemical tasks using android as much as 97% and students like to use android in chemistry learning as much as 89%.

It can be concluded that almost all students have an Android and they like to do assignments using Android. So that the authors think to take advantage of this situation to use teaching materials in the form of e-modules, where the existence of e-modules in chemistry learning is expected to foster an independent attitude of students because from the results of the questionnaire students generally like working on chemistry assignments using Android.

In order to make the use of e-modules more attractive and effective for learning, the author uses the Google Classroom application as a forum for implementing the e-module. Where Google Classroom is a service that uses the internet provided by the Google e-Learning system, a structured classroom application in the learning process that exists today. Google Classroom is a free online service for educational institutions, non-profits, and anyone with a Google Account. Google Classroom makes it easy for learners and teachers to stay connected, both inside and outside the classroom [7].

Google Classroom is an application that can be used for the learning process where Google Classroom is designed to be similar to real learning, namely there is a role for educators and students in it [8]. The use of Google Classroom can provide access to students in taking lessons online (online). Educators can provide learning even though they are not in the classroom. This is due to the existence of a series of advanced features which are ideal tools for use with students and educators even though educators and students are not in the same place.

The use of Google Classroom in learning can provide quite a number of benefits, including simplifying assignments to students, improving educator communication with students, being able to access the learning process from somewhere quickly, easily and save paper usage [9].

2. METHOD

This research was completely performed at Public Vocational School (SMK N 1) Siberida in the even semester of 2019/2020. The research form was pre-experimental with one group pretest-posttest design [10]. The test was involved one experimental class without a control class, this was due to the unavailability of other classes, where all students were not have learning facilities such as laptops and androids. This research was conducted at the time of the Covid-19 pandemic and learning was conveyed in online form. The learning process was carried out well and smoothly, so students must have a laptop or Android. Data on students' concept understanding and independent attitudes were taken twice by conducting prestest and posttest [10]. The deigned research is illustrated in Table 1.

Table 1. The research design carried out in the form of one group pretest-posttest

Subject	Pretest	Treatment	Posttest
One group	O_1	X	O_2

Noted; O_1 is the pretest value before treatment, X is the treatment and O_2 is the posttest value after treatment.

Meanwhile, the N-Gain formula was used to analyze students' understanding of concepts and independent attitudes. This value was taken before and after using the e-module. The formulation for determining the value of N-Gain is shown in equation 1 [11]

$$N-gain=\frac{S_{post}-S_{pre}}{S_{\max}-S_{pre}} \quad (1)$$

Where, S post is posttest value, Spre is pretest value and Smaks is maximum value. The normalized Gain is interpreted to express the increase in students' conceptual understanding of hydrocarbons compound. The N-Gain value categories are summarized in Table 2.

Table 2. The N-Gain value category used to measure students' understanding of concepts and independent attitudes (Heke, 1998).

Normalized Gain score	Interpretation
(<g>) > 0,7	High
0,3 < (<g>) ≤ 0,7	Moderate
(<g>) ≤ 0,3	Low

The indicators were used to measure concept understanding consist of seven indicators, namely: (1) restate a concept, (2) classifying the objects observed according to certain properties, (3) provide examples and nonexamples of a concept, (4) concepts presented in various forms of representation of the material(5) the development of necessary and sufficient conditions implanted in the concept, (6) using certain procedures or operations, and (7) application of concepts or algorithms in problem solving [12]. The test was used to see the understanding of the concept utilized 40 multiple choice questions.

Meanwhile, the indicators were used to measure learning independence consist of 4 items, namely; (1) have confidence, (2) have high motivation, (3) initiatives and (4) responsible [13]. Independent learning attitudes were analyzed using a questionnaire consisting of 20 statements. Be sure the symbols in your equation have been defined before the equation appears or immediately following. Please refer to “Equation (1),” not “Eq. (1)” or “equation (1).”

3. RESULT AND DISCUSSION

This research was conducted by pretest and posttest to determine the understanding of concepts and students' independent attitudes. The pretest was tested before starting the treatment to obtain the initial abilities of students. While the posttest was tested after the treatment to measure students' conceptual understanding. Meanwhile, the independent attitude questionnaire was given to students after the treatment. The aspect of e-module efficiency towards increasing understanding of the concept can be seen from the increase in the pretest and posttest scores. This effectiveness value is obtained from the conceptual understanding test on carbon compound material. This test is carried out before and after the implementation of the e-module developed. The results of data analysis are shown in Table 3.

The results of pretest and posttest analysis from the seven indicators of concept understanding can be demonstrated in Figure 1.

Based on the analysis, it known that the posttest average value was 80.78%, this value was higher than the pretest average score of 26.24%. This means that the understanding of the concepts of students who learn using e-modules was higher than the conceptual understanding of students who were not use e-modules. Thus it can be concluded that the use of e-modules in the learning process can improve students' understanding of concepts. To find out the increase in students' understanding of concepts after using the e-module is conducted, it can be seen through the N-Gain test.

Table 3. Data on concept understanding before and after applied e-modules.

No	Indicators	Percentage values (%)	
		Before using e-modules	After using e-modules
1	Restate a concept	26,95%	83,59%
2	Classifying the objects observed according to certain properties	25,00%	86,97%
3	Provide examples and non examples of a concept	30,72%	78,12%
4	Concepts presented in various forms of representation of the material.	21,87%	88,54%
5	The development of necessary and sufficient conditions implanted in the concept,	33,59%	69,53%
6	Using certain procedures or operations	23,04%	76,56%
7	Application of concepts or algorithms in problem solving	22,50%	80,62%
Average values		26,24%	80,78%

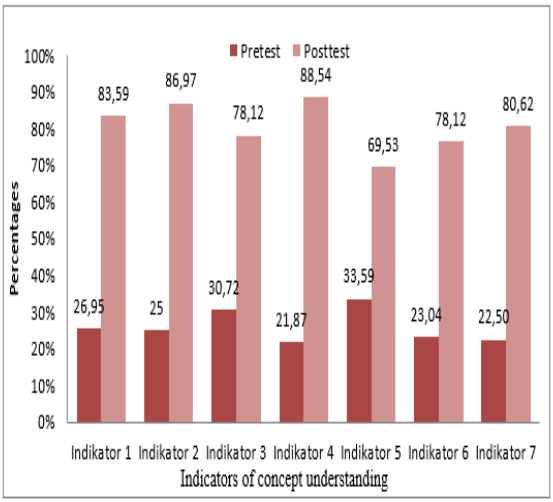

Figure 1. The average values of understanding concept obtained before and after using e-modules.

The value of students' concept understanding is known to be 0.7488. This means that there is an increase in students' conceptual understanding after using the e-module by 0.7488 with the high category. The increase in students 'conceptual understanding is due to the effectiveness of the e-module which is developed to improve students' conceptual understanding on subject of hydrocarbon compounds. This is contributed by the animated instructional videos that are specifically designed to help students understand the concept of abstract hydrocarbon material.

Furthermore, the pretest and posttest data from understanding the concept were tested for normality. This test was performed to determine the distribution data. The normality testing was carried out using the Shapiro-Wilk test with the help of SPSS 23. If the data is normally distributed and a significant value is obtained greater than 0.05. The results of the analysis found that the pretest data were normally distributed. Where a significant value was obtained of 0.231 (> 0.05). While the obtained posttest data were not normally distributed. Where a significant value was obtained at 0.02 (<0.05). The data for normalization of concept understanding can be seen in Table 4.

Based on the normality data, it concluded that the pretest data were normally distributed and the posttest results were not normally distributed. Then the next test was carried out using the Wilcoxon test, which was a non-parametric test to measure the significance of the difference between two groups of data with an ordinal or interval scale.

Table 4. Normality data on concept understanding obtained from the Kolmogorov-Smirnov and Shapiro-Wilk analysis.

	Group	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	Df	Sig.
Value	Pretest	0.153	32	0.056	0.957	32	0.231
	Posttest	0.185	32	0.007	0.882	32	0.002

Based on the results of the Wilcoxon test, the Z value was -4.495 with p value (asymp. Sig 2 tailed) of 0.000. The hypothesis decision was to accept Ha. There were significant differences in students' understanding of concepts before and after the use of e-modules on hydrocarbon compound material. Wilcoxon test data is shown in Table 5.

Table 5. The data derived from the results of the Wilcoxon test analysis

	posttest – pretest
Z	-4.945[b]
Asymp. Sig. (2-tailed)	0.000

Student learning independence in utilizing e-module was seen using a questionnaire which consists of 20 statements. This questionnaire was given to students before and after the research. The calculation of data analysis on students' independent attitudes is summarized in Table 6.

Table 6. The percentage of independent learning obtained before and after using the e-module.

No	Indicators	Percentage	
		Before using e-module	After using e-module
1	Confidence,	68,28%	89,53%
2	Motivation,	58,90%	86,40%
3	Initiative	57,34%	83,90%
4	Responsibility	67,81%	90,15%
Average values		63,08%	87,50%

As mentioned in Table 7, the values of student independence was found to be 63.08% before using e-module. After implementing the e-module, the student's independence score was processed to be 87.50%. The comparison of the learning independence values of students before and after using e-modules is shown in Figure 2.

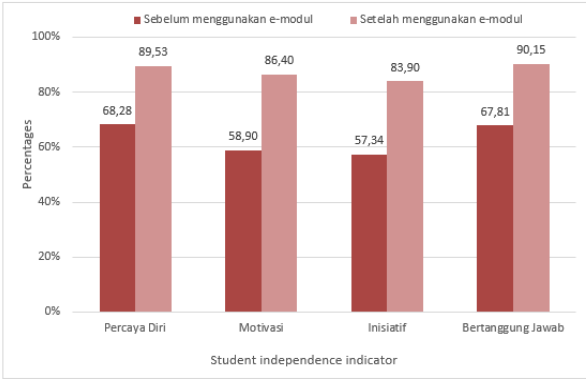

Figure 2. Comparison of the learning independence values found before and after using E-module

Based on Figure 2, the responsible indicator was obtained 90.15%. This shows that students could solve problems related to chemistry learning, which was by using e-modules properly on hydrocarbon material through the Google Classroom application. While the initiative indicator was obtained the lowest score of 83.90%. This shows that students in solving a problem was still need encouragement and support from teachers and others.

In general, students' learning independence increased after using the developed e-module, this was contributed by e-modules to train students' learning independence well. National Education (2004) explains that the modules were books written to create students to learn independently without teacher guidance or guidance. The combination of modules with electronics will be more interesting to be used as teaching materials, because in the e-module there are animated videos, pictures and writing that make students more active in learning. [14] also explained that e-modules as teaching materials have a function to train students to learn independently. Students can learn independently using e-modules without the help of teachers that are usually present in every lesson. This makes students have the skills to dig up information, develop themselves and do not depend on the teacher. In the implementation of the 2013 curriculum, e-modules are very much used in the learning process and in addition, the current situation of the Covid-19 pandemic occurred, all learning processes are carried out online. Through the e-module, the teacher can still deliver learning material to students without having to meet face to face and can also explain material through videos and animations to attract students' learning interest.

Furthermore, the increase in students' learning independence after using the e-module was carefully analyzed through the N-gain test.

The value of learning independence was obtained 0.5496, this means that the increase in student learning independence after using the e-module was found in the medium category. Furthermore, the questionnaire data explaining the independent attitudes of students before and after using the e-module were analyzed for normality test. The normality test was carried out to determine the distribution of normal or abnormal data. Normality testing was performed by using the Shapiro-Wilk test with the help of SPSS 23, if the data was normally distributed, a significance value was obtained greater than 0.05.

The data before using e-module was obtained a significance value of 0.708 (> 0.05), this means that the data was normally distributed. While the data after using e-module was obtained a significance value of 0.019 (<0.05). This indicates the data was not normally distributed. Details of normality data are summarized in Table 7.

Table 7. The results of the normality test for students' independent attitudes analyzed before and after using the e-module.

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group	Statistic	df	Sig.	Statistic	df	Sig.
Nilai	before using e-module	0.097	32	0.200*	0.977	32	0.708
	after using e-module	0.185	32	0.007	0.918	32	0.019

Based on the normality test, it was found that the data were normally distributed before using e-module and not normally distributed after using e-module. For this reason, testing the hypothesis of this study was continued with the Wilcoxon test, which was a non-parametric test to measure the significance of the difference between two groups of paired data on an ordinal scale. Wilcoxin testing was based on normality assumptions with the provision that Ha was accepted if the p value (asymp. Sig 2 tailed) <0.05 [15].

Table 8. Data on students' independent attitudes were tested with the Wilcoxon test.

Test Statistics[a]	
	Before and after using e-module
Z	-4.947[b]
Asymp. Sig. (2-tailed)	0.000

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

Based on the Wilcoxon test, it was obtained a Z value of -4.497 with a p value (asymp. Sig 2 tailed) of 0.000. The hypothesis decision was to accept Ha. There was a significant difference in the independence of students before and after the use of e-modules on the material of hydrocarbon compounds. The results of the student's independent attitude test analyzed by the Wilcoxon test are shown in Table 8.

As calculated in Table 10, it is explained that the use of hydrocarbon compound e-modules can improve students' understanding of concepts and independent attitudes. This was in accordance with [14] who states that the module was a teaching material to help students improve understanding of concepts. This caused the modules were arranged in a systematic manner, which was equipped with various pictures, instructions, concise and easy to understand. In addition, this hydrocarbon compound module was made in the form of an e-module and makes it easier for students to use it because it can be used anywhere and anytime. The flow of using hydrocarbon compound e-modules in learning is shown in Figure 3.

Research on the effectiveness of using e-modules on hydrocarbon materials has been conducted [16]. This study shows that the use of scientific literacy-oriented e-modules can improve students' critical thinking skills because the made e-modules are equipped with various features such as video animation, images, text, and audio. As a result, students were more active in asking questions and enthusiastic in learning the material. Another study was also conducted [17]. This study integrated several features such as text, images, animation, audio and video. The built features were to increase student motivation in learning. [18] has also explained about electronic-based learning media. This study found that learning using media such as animation and interesting videos would increase the motivation of students in the learning process. [19] also expressed the same opinion that media based on information and communication technology were effective and suitable for use in the learning process. In addition, [20] also found that e-module based learning media can improve

students' critical thinking skills and this research has been applied to high school in Kampar.

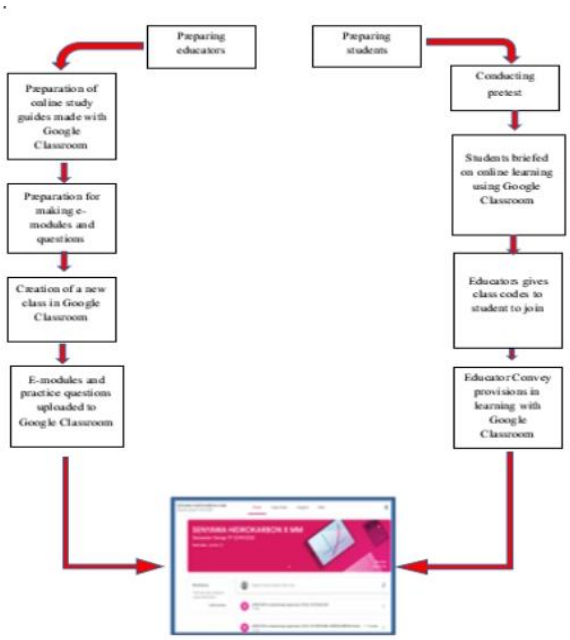

Figure 3. Schematic of using e-modules developed through Google Classroom

4. CONCLUSION

Based on the results of research and discussion, the following conclusions can be drawn: (1) the use of hydrocarbon compound e-module through Google Classroom for students of SMK Pertanian can improve concept understanding with an average score of 80.78% and an N-Gain value of 0 , 7488 with high criteria. (2) the use of hydrocarbon compound e-module through Google Classroom can also increase the learning independence of students where the average score is 87.50% and the N-Gain value is 0.5496 in the moderate category.

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