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Implementation of E-Module Stoiciometry Based on Kvisoft Flipbook Maker for Increasing Understanding Study Learning Concepts of Class X Senior High School

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A B S T R A C T

Referring to the current era of globalization, which refers the era of revolution 4.0, the use of today's technology in the learning process can be utilized. One of them is in applying ordinary modules into e-modules. The purpose of this study is the use of e-module stoichiometry based on Kvisoft flipbook maker to see the magnitude of the increase in students' understanding of the concept of stoichiometry. The research design used was a pre-experiment with a pretest-posttest design using one class as an experimental class. The sample in this study were students of the Madrasah Aliyah Negeri (MAN) 2 Pekanbaru class X KI 2. The results obtained were an increase in students' understanding of the concept from before using the e-module based on the koftoft flipbook maker with an average value of 40.2. After using Kvisoft flipbook maker based e-module the average value increased to 92.48. Large increase obtained by 0.83 with the category of moderate increase.

1. Introduction

Education is a conscious and planned effort to create an atmosphere of learning and learning process for students to actively develop their potential to have spiritual spiritual strength, self-control, personality, intelligence, noble character, and the skills needed by the community, nation and state (UU No 20, 2003). The learning process in the world of education involves educators and students.

The learning process in which there are interaction activities between educators and students as well as reciprocal communication that takes place in a learning situation to achieve learning objectives (Rustaman et.al., 2007). In the learning process so that learning takes place effectively and efficiently an educator must be

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good at determining teaching materials in accordance with the demands and developments of the times. As now the era of globalization has referred to the industrial era 4.0. One of the principles of the industrial era 4.0 is the integration of machines, workflows and systems, by implementing intelligent networks along the chain and the production process to control each other independently (Lifter et.al., 2013), so we need a suitable teaching material with the industrial era 4.0. Therefore, teaching materials must be made interesting and can be applied into technology to fit the industrial era 4.0, and students interested in reading by reading readily learners can understand the concepts being learned. For that we need an innovative teaching material in accordance with the industrial era 4.0 such as an electronic module (E-module).

E-module is a technology-based teaching material, seeing the current era of globalization, there are no students who do not have a gadget. E-modules can be applied into gadgets so that e-modules are innovative teaching materials that teachers can use in the learning process and can be used by students outside of learning. The advantage of e-modules compared to print modules is that they are interactive, which makes it easy to navigate, allows displaying or loading images, audio, video and animation and are equipped with formative tests or quizzes that allow automatic feedback immediately. In addition e-modules are in accordance with the demands of the times and are environmentally friendly (Suarsana et. al., 2013). This research is an application of a k-based e-module flipbook maker that has been developed.

Kvisoft Flipbook Maker Pro 3.6.10 application is an application for making e-books, e-modules, e-paper and e-magazines. Not only in the form of text, with Kvisoft Flipbook Maker can insert pictures, graphics, sound, links and videos on worksheets. Characteristics of Kvisoft Flipbook Maker is that this multimedia device besides being able to insert files in the form of pdfs, images, videos and animations Kvisoft Flipbook Maker also has a template design and features such as background, control buttons, navigation bar, hyperlink and back sound. So that the flip book maker is made more interesting. (Hidayatullah et.al., 2016).

The material on the e-module based on the Kvisoft flipbook maker that has been developed is stoichiometry. Calculations on stoichiometry are related to chemical reactions. In everyday life, many well-known various types of substances used. For example, sugar uses a unit of mass (kg), and oil is the unit in liters (L). Likewise, the substances involved in chemical reactions use units of moles to make it easier to determine the number of particles. This must be understood by students, that in learning stoichiometry not only memorizing formulas, but students must know the meaning of what they are learning, therefore teachers can use teaching materials in the form of e-modules so that students can understand the concept of subject matter. Understanding concepts is the competence shown by students in understanding concepts and in performing procedures (algorithms) that are flexible, accurate, efficient and precise.

Understanding the concept is a very important aspect in learning, because by understanding the concept of students can develop their abilities in each subject matter. In addition, understanding the concept is necessary for students so that in learning chemical materials they do not experience misconceptions. Because chemical materials are abstract so most students do not understand the concept. The indicators of concept understanding include the following indicators of students who understand a concept according to the National Education Standards Agency (Depdiknas, 2006) in the classroom assessment model, restate a concept, classify objects according to certain properties according to the concept, give examples and non-examples of the concept, presents concepts in various forms of mathematical representation, develops the necessary or sufficient conditions of a concept, uses, utilizes, and selects certain procedures and applies the concept or algorithm of problem solving.

The results of research by Haris et. al. (2016), the development of chemical e-modules on electrolyte and non-electrolyte material are (1) E-modules of development results are declared to be very feasible to use based on the results of validation. (2). The use of e-modules can improve students' critical thinking skills. (3) Based on a limited trial of the results of the questionnaire responses of teachers and students the e-module developed received positive responses. Furthermore, the results of Dwi et al. (2014) showed that the application of the module-assisted inquiry model proved to be effective in enhancing students' understanding of concepts and generic science skills. Therefore, researchers are interested in using e-modules based on Kvisoft Flipbook Maker on stoichiometry material that is expected to improve students' understanding of concepts.

Based on the results of researchers 'interviews with MAN 2 Pekanbaru teachers, the understanding of students' concepts is still lacking, especially on stoichiometry material. The teacher also states that in the learning process the teacher only uses printed books as teaching materials. Then based on students' statements when the teacher learning process only uses printed books as teaching material in the learning process. In addition to the results of the distribution of questionnaires to students, there are 60% of students answering that stoichiometric material is difficult to understand. This is because students do not understand the concept.

In accordance with research conducted by Miftahul et al. (2019), Muhammad et al. (2018), and Yenita et al. (2017), regarding the development of ICT-based media obtained by valid media so that it can be effective and appropriate for use in the learning process. Therefore, researchers use the e-module based on Kvisoft flipbook maker on stoichiometry material that has been valid and can be used for the learning process that is expected to be able to support increased understanding of students' concepts. Based on the description the researcher is interested in implementing the e-module that has been developed in the kostoft flipbook maker stoichiomery material to be able to give an increase in understanding the concept of students.

2. Methodology

This research used a quantitative approach with pre-post experimental design. This design used one experimental class. The research design can be seen in table 1 (Sugiyono, 2011). This research was conducted in December to mid-May 2019. The research site was conducted in MAN 2 MODEL Pekanbaru.

Table 1. Research Design

Sampel	Treatment	Posttest
1 Class	X	O

The subjects of this study were students of class X MAN 2 Pekanbaru in the academic year 2018/2019. The research sample was class X KI, while the object in this study was the understanding of students' concepts in chemistry subject matter stoichiometry.

Samples were taken by purposive sample technique. Data collection was taken by the method of documentation, interviews, teacher response questionnaires, student questionnaire responses and test questions for understanding concepts. The data analysis technique was performed data analysis of the results of the pretest-posttest. Before the pretest-posttest test instrument, the concept understanding questions are validated first. Validation about understanding concepts is done in content with expert lecturers, as validators. Criteria for evaluating categories of questions about understanding concepts that are valid or invalid can be seen in Table 2 (Asep et.al., 2011).

Table 2. Valid Categories of Understanding Concepts

Presentase	Category
90 – 100	Very Good
70 – 89	Good
50 – 69	Enough
30 – 49	Less
10 – 29	Very Less

The next technique is the analysis of normality from the results of the pretest-posttest using the Kolmogorov Smirnov Test normality test using SPSS 16. Then the t-test hypothesis test analysis is performed using SPSS 16 paired sample t test. With the hypothesis in this study are:

Ho: There is no increase in students' understanding of the concept after using the e-module based on the Kvisoft flipbook maker. Ha: There is an increase in students' understanding of the concept after the use of the e-module based on the koftoft flipbook maker.

Decision making of the t test is by the right party test, that is if t arithmetic is greater than t table then the hypothesis H0 is rejected and Ha is accepted. To find out the magnitude of the increase obtained N-Gain is used with the formula:

$$NGain = \frac{Skor\ postest - Skor\ Pretest}{Skor\ maksimum - skor\ pretes}$$

The upgrade categories can be seen in Table 3 (Hake, 1999).

Table 3. N-Gain Category

Nilai N-Gain	Category
N-Gain > 7	High
0,3 < N-Gain > 0,7	Mid
N-Gain < 0,3	Low

3. Results and Discussion

Before implementing e-modules, researchers have developed a k-based e-module flipbook maker on stoichiometry material. The results obtained from the development of the e-module based on Kvisoft flipbook maker are e-modules that are valid and suitable for use in the learning process. The initial look / e-module cover of a valid Kvisoft flipbook maker can be seen in Figure 1.

Figure 1. Initial Appearance of the Kvisoft Flipbook Maker-Based E-Module on Stoichiometry Material

Furthermore, researchers conducted large-scale trials of e-modules that have been developed to test the practicality and attractiveness of e-modules that have been developed. Large-scale tests conducted at MAN 2 Pekanbaru. For practicality e-module tests using teacher response questionnaires and for attractiveness tests use student response questionnaires. The results obtained are that the e-module based on Kvisoft flipbook maker on stoichiometry material that is developed is practical and interesting. This is in accordance with the statement of Tuyuzsuz (2010), regarding the learning process using ICT-based media that in the media can contain interesting animations that will facilitate students in the learning process. The e-module development matrix with concept understanding indicators can be seen in Table 4.

Table 4. Matrix between e-modules and Concept Understanding Learners

No	Indicator	Learning Activities (Page)					
		1	**2**	**3**	**4**	**5**	**6**
1	Restate a concept	3, 4	16		31	34	38, 39
2	Give examples and non-examples of a concept	1, 3, 4, 8	15	22			
3	Present concepts in various mathematical representative forms		19	23 24			40
4	Apply the concept to problem solving		21				40
5	Developing the necessary conditions and requirements is quite a concept	8	17, 18				38 39
6	Classify objects according to certain properties		17, 18	22			
7	Using utilizing and selecting specific procedures or operations			26			

The implementation of indicators 1, 2 and 3 in the e-module can be seen in every question of the exercises at the end of the learning activity. Where there are some questions that ask students to restate a concept that has been learned. As well as each exercise the questions and sample questions used in the e-module are adjusted to the concept understanding indicator.

The implementation of indicators 4,5,6 and 7 in the e-module can be seen in several questions' activities 3, 4, and 5 which can be seen in table 4, where some of the questions available are questions with a level of complexity between mathematical concepts and formulas contained in stoichiometry. Thus, students can implement their understanding by being able to show the workmanship procedures. Ministry of National Education, explains that ICT-based teaching materials must pay attention to the level of interaction of instructional materials that are prepared. Organizing teaching materials must reflect aspects seen from:

a) Complexity, the material must be developed from simple to complex both in developing concepts and supporting examples.

b) Urgency, core material must be developed first than development material.
c) Material wrangling must provide a coherent understanding of the concept understanding. Preparation of material does not make it difficult for students to understand the relationship between concepts and difficult to map in mind.

The data obtained at the time of implementing e-module based on Kvisoft flipbook maker in this study were validity data about understanding concepts and hypothesis testing data. The results of the validity data about understanding the concept can be seen in Table 5.

Table 5. Results of Validation Questions About Understanding Concepts

Indicator		**Question No**	**Average**	**Information**
Concept Understanding	**Question**			
Restate a concept.	1	1,2	87,25	Good
	2	3,4,5	81,25	Good
Give examples and non-examples of a concept.	3	6	81,25	Good
Present concepts in various mathematical representative forms.	4	7	87,25	Good
Apply the concept to problem solving.	5	8	85,93	Good
Developing the	6	9	80,46	Good
necessary	7	10	80,46	Good
conditions and requirements is quite a concept.	8	11	80,46	Good
Classify objects according to certain properties.	9	12	89,58	Good
Using utilizing	10	13	85,95	Good
and selecting specific procedures or operations.	11	14	85,95	Good

Before the concept understanding questions are validated, the number of questions is 18, after validating valid questions and can be used as many as 14 questions. This is in accordance with the suggestions given by the validator, so that the questions used for the pretest-posttest are 14 questions. Four invalid questions were deemed incompatible with indicators of concept understanding, so researchers only used 14 valid questions according to indicators of concept understanding.

Concept understanding data obtained in this study are in the form of pretest, posttest and student worksheet (LKPD) results in one experimental class, the implementation stage took place six times. Pretest is done at the beginning of the meeting before students use the e-module as teaching material. Furthermore, the final data is the posttest data given to students at the end of the lesson after following the learning process using e-modules for 6 meetings. Pretest and posttest results of students can be seen in Tables 2 and 3. While the average results of student workload LKPD each meeting can be seen in Figure 2.

Table 6. List of Pretest Value Understanding Concepts

Interval Class	(F)	Middle value (X)	FX
34– 36	6	35	210
37– 39	3	38	114
40 – 42	6	41	246
43 – 45	7	42	294
46 – 48	3	47	141
49	0	0	0
	N=25		40,2

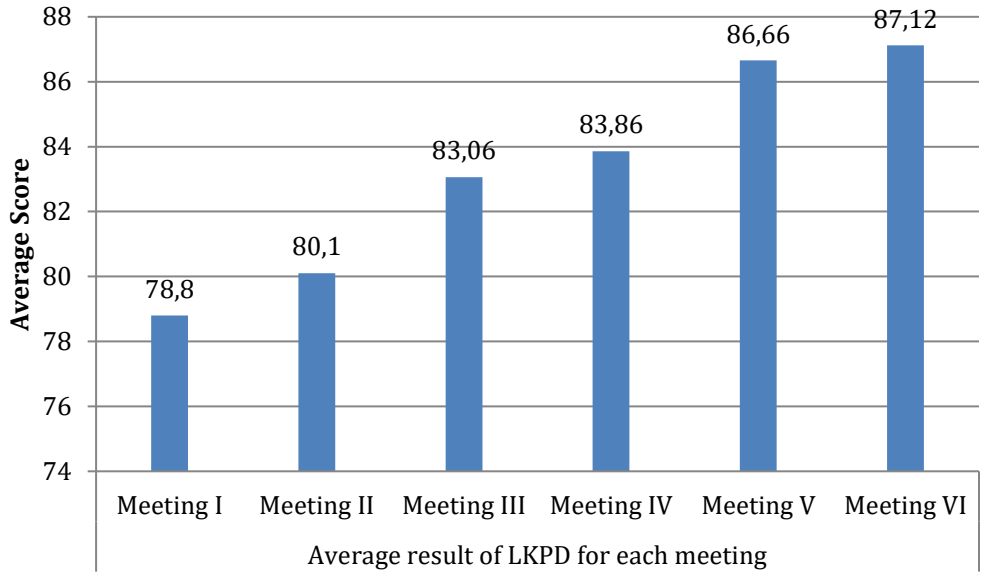

Figure 2. Graph of Average Student Learners

Table 7. List of Postest Understanding Value Concepts

Interval Class	Frequency(F)	Middle value (X)	FX
78 – 80	1	79	79
81 – 83	1	82	82
84 – 86	3	85	255
87 – 89	11	88	968
90 – 92	4	91	364
93 – 95	6	94	564
			92,48

Table 7 shows the average pretest results obtained that the students' concept understanding ability is still very low. It can be seen that from 25 students who have very low concept comprehension abilities, there are 9 students and 11 students included in the category of low concept comprehension abilities. Therefore, the use of e-module based Kvisoft flipbook maker is expected to provide increased understanding of the concept to students. This can be seen when giving LKPD, from the average value of LKPD learners, it can be seen that each meeting the average LKPD value of students has increased and not decreased or remained. This shows that there has been an increase in students' understanding of the concept after using the e-module based on the flipbook maker website on stoichiometry material. Furthermore, the latest data obtained is the posttest data which shows an average figure of 92.48, this shows the average value above the threshold value (KKM). With the high average of students, it can be said that students have a high understanding of concepts. Seen in table 7 of 25 students in which only one student falls into the category of understanding enough concepts meaning that only 4% of students have sufficient ability to understand concepts, the rest belong to the category of high concept understanding. This means that there is an increase in students' understanding of the concept after the use of e-modules based on Kvisoft flipbook maker pad stoichiometric material.

This is reinforced by the hypothesis test conducted by researchers. Pretest and posttest data obtained were tested hypotheses using SPSS. Before the pretest data and the hypothesis test are tested, the prerequisite test is done, namely the normality test. The normality test results on the pretest-posttest data can be seen in table 8:

Table 8. One-Sample Normality Test Results Kolmogorov-Smirnov Test

		Before Using the E-Module	After Using the E-Module
N		25	25
Normal Parameters[a]	Mean	40.67	89.97
	Std. Deviation	4.073	4.170
Most Extreme Differences	Absolute	0.143	0.193
	Positive	0.143	0.097
	Negative	-0.123	-0.193
Kolmogorov-Smirnov Z		0.716	0.963
Asymp. Sig. (2-tailed)		0.685	0.311
Test distribution is Normal.			

The information that can be obtained from Table 8 is data before and after using the e-module, data obtained are normally distributed at a significant level of 0.05. The sigCalculate values are 0.685 and 0.311, respectively. This means that both data have $sig_{cal} > \acute{\alpha}$. So, the data is normally distributed. So that the parametric statistical hypothesis test can be performed, namely paired sample t test. Hypothesis test results obtained can be seen in Table 9.

Table 9. T Test Results for Students' Understanding of Concepts Before and After the Use of E-Modules

	Paired Differences							
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	T	Df	Sig.(2 tailed)
Pretest-postest	-49.295	6.314	1.263	-51.904	-46.1689	-39.03	24	0.000

The information obtained in table 9 is the sig (2 tailed) value of 0,000 <0.05 meaning H0 is rejected. This is reinforced by the value of t arithmetic> t table that is 39,038> 2,064, which means that H0 is rejected with the Ha hypothesis accepted. The amount of improvement obtained is seen by using the N-Gain test which is equal to 0.83 meaning an increase in the medium category.

This is because e-modules developed by researchers are designed according to the mindset of students, not monotonous which only contains discourses that can cause boredom when read but which are developed concise dense and clear directly to the core subject, besides that e-modules are interactive multimedia that has been equipped with animated videos that help students in understanding the sabistak material psychoometrics can be animated and explained through videos that are stored on the e-module based on the koftoft flipbook maker, so as to make a major contribution to facilitate students in understanding concepts in stoichiometry material. Similar to Pamungkas et. al. (2016), which reports that the use of interactive multimedia can improve understanding of the concepts of the properties of space. In addition, the research conducted by Ardiyana et al, (2018), reports that the use of e-modules can provide an improvement in understanding students' concepts.

4. Conclusion

Based on the results of the study it can be concluded that the implementation of the e-module based on Kvisoft flipbook maker on stoichiometric material class X Madrasa Aliyah Negeri 2 Pekanbaru in the academic year 2018/2019 was carried out according to the purpose of the study. This can be seen from the achievement of learning targets, namely the implementation of a good e-module based on the koftoft flipbook maker based on stoichiometry material. There is an effective interaction between teachers and students through the use of a Kvisoft flipbook maker-based e-module in the learning process, which causes the implementation of learning time using a Kvisoft flipbook maker e-module based on stoichiometry material takes place according to the specified target. The existence of the syntax of learning that encourages students to develop the ability to understand concepts during the learning process takes place, so that students have a high ability to

understand concepts after the learning process using e-modules based on the Kvisoft flipbook maker on stoichiometry material. This is seen from the achievement of learning targets of students that have a high concept comprehension ability after learning to use e-modules based on the Kvisoft flipbook maker.

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