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EFFECTIVENESS OF E-MODULE LITERACY MOVEMENT LEARNING DEVICES TO INCREASING MATHEMATICAL CONCEPT UNDERSTANDING ABILITY

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ABSTRACT

This study aims to determine the effectiveness of the assisted e-module literacy movement learning device *software Flipbook Maker* html5 type in improving students understanding of mathematical concepts. The background of this research is the low interest in reading, the ability to read and interpret reading and learning in the classroom is more *teacher center* so that literacy and the ability to understand concepts are rarely trained. This research is a research and development (R&D) method using the ADDIE model (*Analyze*, *Design*, *Development*, *Implementation*, and *Evaluation*). This research was conducted at Karya Nasional Sindangwangi Vocational School with research subjects namely class XII students of Motorcycle Engineering Skills Competency. The effectiveness test phase was carried out by students of class XII TSM 2 with a total of 34 students. Data collection techniques using test instruments in the form of questions *pretest* and *posttest* then analyzed using descriptive statistics. The results showed that the average value average yield *pretest* namely 53,82 and the average value of the results *posttest* ie 82,35. The results of the effectiveness test reached moderate criteria, with a percentage of 62,0483% so that the e-module that had been developed could be said to be "effective enough" to improve students ability to understand mathematical concepts.

Keywords: Literacy, E-Module, Understanding Mathematical Concepts

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PRELIMINARY

The Ministry of Education and Culture (Kemendikbud) has initiated the School Literacy Movement in 2015, as one of the efforts to improve the quality of education. This increase in literacy is aimed at all subjects (Kemendikbud, 2016) where mathematics is a compulsory subject (Permendikbud No.21 of 2016). In mathematical literacy, students must be able to formulate, apply, and interpret mathematics (Mawardhiyah & Manoy, 2018).

The School Literacy Movement strengthens the character development movement as outlined in the Minister of Education and Culture Regulation Number 23 of 2015. One

of the activities in the movement is the 15-minute activity of reading non-learning books before class starts. This activity is carried out to foster students' interest in reading and improve reading skills so that knowledge can be mastered better (Sari, 2018).

The learning process in the School Literacy Movement certainly requires a carrying capacity, one of which is learning tools. Learning devices are tools or equipment to carry out processes that enable educators and students to carry out learning activities (Zuhdan, 2011).

It started when the minister of Education and Culture (Kemendikbud) issued a circular letter Number: 36962/MPK.A/HK/2020 dated 17 March 2020 online learning (*learning from home*) and working from home (*work from home*) in order to containment of the spread of the Corona Virus Disease (Covid-19). As a result, all schools temporarily suspended the face-to-face teaching and learning process. This aims to prevent the spread of Covid-19 transmission (Chandra et al., 2021). The world of education must continue, the teaching and learning process cannot stop and must continue even though conditions change. Educators and students no longer meet in person (learning from home). Educators are required to be able to innovate and utilize the media *online* by designing online learning media. Innovation and use of online media is contained in Circular No. 4 of 2020 concerning Implementation of Education Policy in the Emergency Period of the Spread of Coronavirus Disease (covid-19) and a variety of teaching media that can be used to support online teaching and learning activities (Marlina & Bashori, 2021). The innovation contained in Circular Letter No. 4 of 2020 is certainly a good activity that must be continued after this pandemic.

The researcher conducted field observations and interviews with one of the mathematics teachers at Karya Nasional Sindangwangi Vocational School, especially in the Motorcycle Engineering Skills Competency. Then the learning done in class is more centered on the teacher so understanding the concept is rarely trained. The process of learning mathematics has not been widely supported by learning resources that can help students to learn independently in reviewing the material that has been received in the learning process, and also the lack of interest of students in understanding the material because the media used by educators is less attractive. This also affects the low ability of understanding students mathematical concepts. There are several factors that influence the low ability to understand students mathematical concepts, namely low motivation, interest and talent, readiness, and educators attention to students (Manurung, 2017). The results of observations and interviews conducted by researchers can be concluded that the level of

literacy and understanding of mathematical concepts of students at Karya Nasional Sindangwangi Vocational School, especially in the Motorcycle Engineering Competency is still low.

In general, the national average reading literacy activity index is in the low category. However, of the four dimensions that contribute to the index, there is one dimension that is quite prominent, namely the skills dimension which shows that efforts to equalize education are quite good. Another dimension that is quite positive is also seen in the alternative dimension, where people in general are starting to make use of information technology devices, although access to computers and the internet still needs to be improved to encourage equity. The low index numbers on the access dimension and the cultural dimension indicate the need for increased attention to these two dimensions (Kemendikbud, 2019).

Mathematical literacy is very important and is a fundamental skill that is just as important as literacy. One of the main goals of learning planning in schools is mathematical literacy. Teaching mathematics in schools aims to enable students to develop mathematical literacy, or their capacity to utilize and apply their mathematical knowledge in situations that arise outside the classroom (Taqiya & Juandi, 2023).

The factor of the low ability to understand concepts found by researchers regarding the learning methods used during the learning process is also in line with the results of research conducted by Junitasari entitled "Analysis of the Ability to Understand Mathematical Concepts of Junior High School Students on Cubes and Blocks Material " with the results of research on the ability to understand students mathematical concepts showed 82,9%. From the results of this study it can provide information to teachers about the ability to understand students mathematical concepts so that teachers are expected to be able to design learning activities that can improve students mathematical understanding abilities in indicators of giving examples and non-examples of concepts and indicators using, utilizing, and choosing certain procedures.

The Ministry of National Education states that understanding mathematical concepts is one of the skills or proficiency in mathematics that is expected to be achieved in learning mathematics, namely by demonstrating an understanding of the mathematical concepts they are studying, explaining the interrelationships between concepts and applying concepts or algorithms in a flexible, accurate, efficient and precise manner in solving problems (Mutohar, 2016). Conceptual knowledge is an implicit or explicit understanding of the principles that govern the domain and the interrelationships between

units of knowledge within the adomain. This knowledge is flexible and not tied to any particular problem (Rittle-Johnson et al., 2001).

One of the processes of following up on Circular Letter No.4 of 2020 regarding innovation and the use of online media in the learning process and the problems found during observations and interviews, researchers offer a solution, namely by having learning devices in literacy movements in the form of interactive e-modules that can be used by teachers, namely e-modules with assistance *software Flipbook Maker* html5 type. Electronic modules or e-modules are modules that are transformed into digital devices or electronic media that are designed to be more attractive so that students can learn independently and achieve the expected learning objectives. Developing modules that are packaged electronically can make it easier for students to study independently compared to printed modules. In addition, electronic modules can also be used anywhere, making them more practical, because they are an amalgamation of print media and computers, so electronic modules can present information in a structured, interesting and high-level interactivity (Ratriana et al., 2021).

Flipbook Maker html5 type is one *software* which can create e-modules, where each page becomes a book. *Flipbook Maker* The Html5 type can make files in pdf format and images into a book when opened per page (Firman, 2022). With help *software Flipbook Maker* html5 type can be added multimedia in the form of animation, moving pictures, video and audio and others. In addition, this electronic module can also be used anywhere, making it more practical, because it is an amalgamation of print media and computers, the electronic module can present information in a structured, interesting and high-level interactivity.

The several advantages of the solutions offered by researchers are that they can help the learning process be more interesting because images and videos can be inserted in it (Puspitasari et al., 2020). This e-module is also presented with a very attractive appearance, namely a full color display, easy-to-read type of writing, pictures that are appropriate to everyday life which make the e-module not boring to read (Fadilah et al., 2021).

Based on the description above, the researcher is interested in identifying to know more about the effectiveness of literacy movement learning tools in the form of assisted e-modules *software Flipbook Maker* html5 type in improving students understanding of mathematical concepts.

METHODS

This research uses the method *Research and Development* or (R&D) with the ADDIE model (*Analiyze, Design, Development, Implementation, Evaluation*). True to its name *Research and Development* or (R&D) is understood as a research activity whose process begins with *research* and continue *development*. Activity *research* conducted to obtain information about user needs (*needs assessment*), where as *development* generated for learning devices (Wibowo, 2018). The ADDIE development model developed by Branch (2009) is a product-based development model with a development step consisting of five steps: *analyze, design, develop, implement, dan evaluate* (Sari et al., 2017).

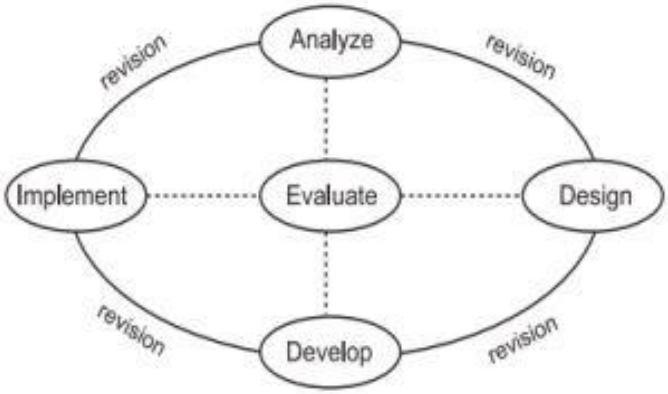


Figure 1. ADDIE Development Model Flow

Source: Branch (2009)

The research process was carried out at Karya Nasional Sindangwangi Vocational School, which is located on Jl. Rajagaluh-Sumber Buahkapas Village, Sindangwangi District, Majalengka Regency 45474. This research was conducted from March 2022 to August 2022. The participants in this study were students, educators and researchers. The participation of students here as a research subject is class XII students of the Motorcycle Engineering Skills Competency of Karya Nasional Sindangwangi Vocational School. In this study, the researcher acts as a planning leader. The researcher makes a product development plan that will be carried out systematically, then conducts trials by providing action on the subjects under study. The researcher chose 34 students of class XII TSM 2 Motorcycle Engineering Skills Competency as subjects because they received advice from one of the mathematics subject teachers in the class and also students in the class had motivation in learning mathematics if given interesting learning media and pleasant.

This research and development uses the ADDIE model stages (*analyze, design, development, implementation, evaluation*). Level *analyze* has main activities namely analyzing the need for developing teaching materials in learning objectives, some of the

analyzes carried out are performance analysis, student analysis, analysis of facts, concepts, principles and procedures of learning materials as well as analysis of learning objectives.

Level *design* includes several product development plans. The planning includes several activities, namely designing e-module components, designing materials/contents, designing *design* e-module and instrument planning.

Level *development* this is developed assisted e-module *software Flipbook Maker* html5 type. The contents of the material and questions have been synchronized between the mathematics subject and the productive subject of Motorcycle Engineering. One important step in the development stage is testing before implementation. Once developed, it will be validated by material experts and media experts. E-modules sent to students and validators.

Level *Implementation* in this research is the stage for implementing or testing the design of teaching materials that have been developed in real situations in class. Product trials were conducted to determine effectiveness. The effectiveness test was carried out on 34 students of class XII TSM 2 Motorcycle Engineering Skills Competency, the effectiveness test aims to find out how effective learning is using teaching materials that have been developed. The results of this trial can also be used as material for consideration to improve the teaching materials being developed.

The last stage is *evaluation* where this stage is carried out in all previous stages. *Evaluation* carried out at each stage in order to find out errors and justifications at each stage. As is *evaluation* at each stage, the e-module math literacy movement was assisted *software Flipbook Maker* type Html5 to increase students understanding of mathematical concepts that are produced to be feasible for use in the learning process.

This study will use a research instrument in the form of a test instrument on basic statistics material. In the test instrument there are two tests namely *pretest* and *posttest* with the same question. The questions that are made refer to indicators of understanding mathematical concepts (including: verbally restating the concepts that have been learned, classifying objects based on whether or not the requirements are fulfilled to form these concepts, applying concepts algorithmically, presenting concepts in various forms of mathematical representations , linking various concepts either internal or external to mathematics). This test is to find out the comparison between the results *pretest* and *posttest* is there an increase in the ability to understand students mathematical concepts.

The data analysis technique used by the researcher is descriptive quantitative. The researcher will collect the data by using *pretest* and *posttest* after students finish using the

assisted e-module *software Flipbook Maker* html5 type that has been extended. Data analysis assessment of the data *pretest* and *posttest* assessed using hypothesis testing *Wilcoxon* two samples that are correlated with each other are not distributed normal and test *N-Gain* to find out the increase in value *pretest* and *posttest* ability to understand students mathematical concepts.

The normality test is a test carried out with the aim of assessing the distribution of data in a group of data or variables, whether the data distribution is normally distributed or not (Fahmeyzan et al., 2018). In this normality test using *Test Shapiro Wilk* because the number of samples that are under 50 samples were carried out using *software* SPSS version 21. This normality test was developed by Samuel Shapiro and Martin Wilk in 1965. At this time, the test *Shapiro-Wilk* is the preferred normality test because it has better test power than alternative tests from various ranges (Karomah, S., Nugroho, S., & Faisal, 2019). The results of this normality test are data *pretest* and *posttest* not normally distributed so the next analysis step is the test *Wilcoxon*. Same is the case with the paired sample t-test, test *Wilcoxon* also used to determine whether there is a difference in the mean of two paired samples. Test *Wilcoxon* is part of the non-parametric statistical methods. Because it is part of non-parametric statistics, it is in the test *Wilcoxon* no research data is needed that is normally distributed (Septian & Rahayu, 2021).

The level of effectiveness is obtained from the results *pretest* and *posttest* on student learning outcomes. Calculation *N-Gain* used to determine the increase in value *pretest* and *posttest* ability to understand students mathematical concepts with the formula:

$$\textit{Index N gain (g)} = \frac{\textit{posttest score} - \textit{pretest score}}{\textit{ideal maximum score} - \textit{pretest score}}$$

The level of effectiveness is based on the average value *N-Gain* can be seen in Table 1.

Table 1. The Average Value of N-gain and Its Classification (Modified)

N-Gain rate	The classification	Effectiveness Level
(g) ≥ 0,70	Height	Very effective
0,30 ≤ (g) < 0,70	Currently	Effective enough
(g) < 0,30	Low	Less effective

Source: (Wahyuni et al., 2020) modified

RESULT AND DISCUSSION

The literacy movement device in this study is an assisted mathematics learning e-module *software Flipbook Maker* html5 type with a contextual approach with the target user being 34 students of class XII TSM 2 Motorcycle Engineering Skills Competency, Karya Nasional Sindangwangi Vocational School. At this time the researcher used a web-based application, namely *Flipbook Maker* type html5, type html5 is a markup language for structuring and displaying content from *World Wide Web*, a core technology of the Internet. html5 is the fifth revision of html which was first created in 1990. The main goal of html5 development is to improve HTML technology to support the latest multimedia technologies, easy for humans to read and also easy for machines to understand. The content of statistics material in this e-module uses a contextual approach in which examples of questions and exercises are integrated with everyday life in the learning process of TSM productive subjects.

This development aims to find out how effective the assisted e-module is *software Flipbook Maker* html5 type. Furthermore, the ADDIE model is used as a reference in this development research, including analysis, planning, development, implementation, and evaluation.

Results *Analyze* at the work analysis stage it is known that in the process of learning mathematics students are not yet supported by many learning resources that can help students to learn independently in reviewing the material that has been received in the learning process, and also the lack of interest of students in understanding the material due to the media used by unattractive teacher. Based on this analysis, it can be said that what students need in the learning process is an interesting and effective learning resource. At the analysis stage of students there is low ability to read and interpret reading and learning in the class is more teacher-centered so that literacy and the ability to understand concepts are rarely trained. Based on this analysis, it can be said that what students need in the learning process is not only interesting and effective learning resources, but also literacy learning resources that are needed so that they can increase students understanding of mathematical concepts.

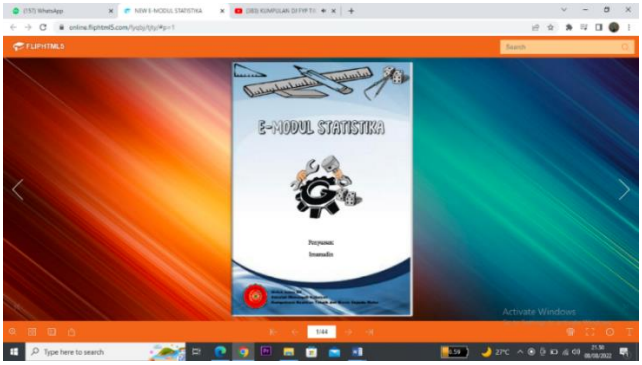
The results of the analysis of facts, concepts, principles and procedures of learning materials are 3 learning activities, namely learning activity 1 is the basic understanding of statistics, which includes: understanding datum, data and statistics, understanding population and sample. Learning activity 2 is the presentation of data, which includes: tables, various diagrams (bars, circles, lines), histograms, frequency polygons and ogives.

Learning activity 3 is a measure of data concentration, which includes: the mean of single data and group data, the median of single data and group data, the mode of single data and group data.

The results of the analysis of learning objectives are after studying the learning activities in the assisted e-module *software Flipbook Maker* The html5 type that is developed is expected that students can 1) State the meaning of statistics and statistics. 2) State the meaning of population and sample. 3) Mention the kinds of data. 4) Create a table from a group of data. 5) Make appropriate diagrams (bars, circles, lines) from a group of data. 6) Create histograms, frequency polygons and ogives of a group of data. 7) Finding the mean, median, and mode of a single data group. 8) Finding the mean, median, and mode of group data.

Results *Design* or product design is carried out in several processes, namely 1) Designing the components of the e-module, the components contained in the module include *cover* e-module, preface, table of contents, instructions for using the e-module, competency standards and basic competencies, learning objectives, materials, sample questions and practice questions, summary, key answers to practice questions and bibliography. 2) Material/content design, the material used by the researcher is statistics with a discussion of the basic understanding of statistics, data presentation, and data concentration measures. 3) Design e-module, several levels of planning *design*, color selection and *design background* for e-module material/content, selection *cover* and selection of models and forms of e-module writing. 4) The design of the instrument, the instrument used is a questionnaire and questions for *posttest* and *pretest*.

Results *Development* produced a draft e-module that combines all *design* results from the planning stage, *draft* e-module according to the data obtained based on the results of the learning analysis. This e-module is adapted to the characteristics of learning mathematics so that it can be used independently for students, some of the designs can be seen as follows:



English Version:

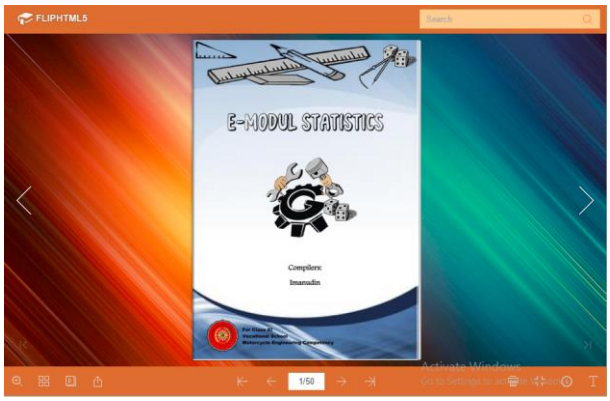


Figure 2. Form of Cover on E-Module

English Version:

Figure 3. Learning Materials in the E-Module

Assisted e-module *software Flipbook Maker* html5 type with this contextual approach contains statistical material made using *microsoft word* then converted in pdf format and then converted to *software Flipbook Maker* Type html5.

Results *implementation* intended to determine the effectiveness of the e-module which is carried out by testing namely *pretest* and *posttest* towards students. This study involved one mathematics educator and 34 students of class XII TSM 2 Motorcycle

Engineering Skills Competency where all of them had *smartphone Android*. This test is to find out the comparison between the results *pretest* and *posttest* is there an increase in students understanding of mathematical concepts.

Table 2. Result Data *Pretest* and *Posttest*

	Pretest	Posttest
Average Yield	53,82	82,35

The normality test is used to determine whether the data used is normally distributed or not. In testing a data is said to be normally distributed if:

If sig > 0,05 then the data is normally distributed

If sig < 0,05 then the data is not normally distributed

From the normality test data using SPSS can be seen in the following table.

Table 3. Data from Normality Analysis

Test Type	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Pretest	,167	34	,017	,911	34	,009
Posttest	,218	34	,000	,884	34	,002

From the table above it is known that the value of Asymp. Sig. *Pretest* 0,009 less than the real level value or 0,009 < 0,05, the data is not normally distributed. Asymp value. Sig. *Posttest* 0,002 less than the real level value or 0,002 < 0,05, the data is not normally distributed. So, both data are data *pretest* and *posttest*not normally distributed.

The results of the normality test above are data *pretest* and *posttest* not normally distributed so the next step is to test *Wilcoxon.* Test *wilcoxon* is a nonparametric test used to measure the differences between two groups of paired data on an ordinal or interval scale but the data is not normally distributed. This test is also known as the test *match pair test*.

Hypothesis:

Ho: there is no difference in the average value before the assisted e-module *software Flipbook Maker* html5 type with after the assisted e-module *software Flipbook Maker* type html5.

Ha: there is a difference in the average value before the assisted e-module *software Flipbook Maker* html5 type with after the assisted e-module *software Flipbook Maker* type html5.

Basic decision making in the test*Wilcoxon* are as follows:

If the probability value of Asym.sig 2 failed > 0,05 then Ho is accepted.

If the probability value of Asym.sig 2 failed < 0,05 then Ho is rejected.

From test data *wilcoxon signed test* using SPSS can be seen in the following table.

Table 4. Data from Test Analysis Results *Wilcoxon*

Value Type	Pretest-Posttest
Z	-5,119[b]
Asym. Sig. (2-Tailed)	,000

From the test results *wilcoxon signed test* obtained a Z value of -5,119 and an Asymp sig value. (2-tailed) which is 0,000 which means it is smaller than the 5% alpha level (0,05) so that Ho is rejected, it can be concluded that there is a difference in the average value before the e assisted module *software Flipbook Maker* html5 type with after the assisted e-module *software Flipbook Maker* type html5.

The normalized gain test is used to determine the level of effectiveness obtained from the results *pretest* and *posttest* ability to understand mathematical concepts with calculations *N-Gain*. The following table presents the results of the calculation analysis *N-Gain:*

Table 5. Data from Calculation Analysis Results *N-Gain*

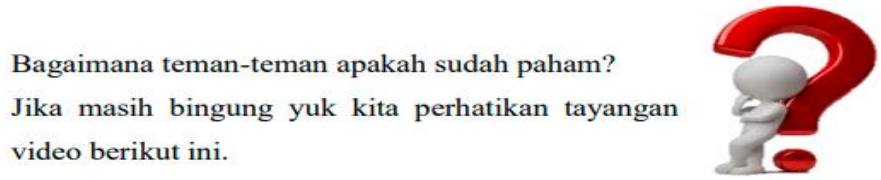
Value Type	N	Minimum	Maximum	Mean	Std. Deviation
Nilai N-Gain	34	,20	1,00	,6205	,24002
Average N-Gain Value	34	20,00	100,00	62,0483	24,00200

Based on the results of the analysis in the table it can be seen that the average value *N-Gain* namely 0,6205 in the medium category. And the average percentage is 62,0483% with quite effective category. So, it can be concluded that e-module development is assisted *software Flipbook Maker* html5 type is effective enough to improve students ability to understand mathematical concepts.

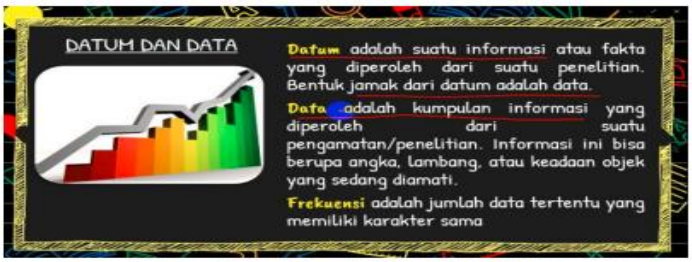
The results of the effectiveness of the evaluation of the treatment given to students in assisted e-module development *software Flipbook Maker* html5 type at Karya Nasional Sindangwangi Vocational School is quite effective in increasing students understanding of mathematical concepts. Test the effectiveness of assisted e-module development *software Flipbook Maker* html5 type is in the form of *pretest* and *posttest*. Result s*pretest* and *posttest* then analyzed using test *N-Gain* which is used to determine whether there is an increase in students understanding of mathematical concepts. Based on the average value table *N-Gain* and the classification of test results *N-Gain* obtained the average value *N-Gain* namely 0,6205 in the medium category. And the average percentage is 62,0483% with quite effective category.

Like other teaching materials, this e-module is an interactive teaching material that can be used in the mathematics learning process and provides many benefits to the world of education. That is because this e-module teaching material has several advantages, namely:

1) This E-module can be used in all types *smartphone*.
2) Spread is easy, can use other social media applications such as *WhatsApp*, telegrams and e-mails.
3) There are learning videos that can help students to better understand the subject matter.



Video pengertian dasar statistika



https://youtu.be/XKXZH_1eVeo

English Version:

How do friends already understand?
If you are still confused, let's pay attention to the following video.

Video basic understanding of statistics

https://youtu.be/XKXZH_1eVeo

Figure 4. Example of learning videos in e-modules

4) It can eliminate student boredom because this e-module is supported by various features and an attractive appearance, one of which is a link where this link will be connected to the Google form for*ice breaking* guess the picture.

English Version:

Figure 5. Options for Ice Breaking in the E-Module

The development of e-module teaching materials also has several drawbacks, namely: 1) This E-module must use an internet connection to access it. 2) Unable to mark pages as read.

The results of this study are in line with research conducted by Anggraini et al regarding "Development of E-Modules for Mathematics Learning using the Flipbook Maker Application". The results of the effectiveness test were obtained from students completing the questions given by the researcher with the results of the N-Gain test where

the percentage of students showed an increase in learning outcomes of 79% belonging to the "Effective" category and there was an increase in students understanding of mathematical concepts after using the e-module for learning mathematics online (Anggraini, R. S., Sustipa, W., & Erita, S., 2022).

This research also has limitations including: 1) There is no follow-up on the development of this e-module after implementation is carried out. 2) Learning materials in this e-module are limited. It only presents material about statistics, namely basic statistics, data presentation and data concentration measures. 3) Limited time during the research so that at the implementation stage the treatment was given to students who had previously received statistics material.

CONCLUSION

Based on the results and discussion that have been described above, it can be concluded that the results of the assessment of the effectiveness of assisted e-modules *software Flipbook Maker* This html5 type has an effectiveness level with an average N-Gain value of 0,6205 with medium category. And the average percentage results are 62,0483% with a fairly effective category, then the assisted e-module *software Flipbook Maker* html5 type is effective enough to improve students ability to understand mathematical concepts.

Some suggestions for researchers that can be given with research are that the e-module only presents statistical material so that it is hoped that other materials can be developed. Researchers hope to continue or apply the developed e-module to different subjects or samples to correct deficiencies to make it more attractive and effective. In the future, development is needed to measure the affective domain.

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