

The Development of Mathematics E-Module By Using Flip PDF Professional Software On Algebraic Form Material.

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Abstract

The development The purpose of this research is to develop and produce Mathematics E-Modules by Using Flip PDF Professional Software on Algebraic Forms material. Research and Development model used ADDIE (Analysis, Design, Development, Implementation, Evaluation). The research subjects were class VII students, instrument validators, educational technology media validators and mathematics learning materials (lecturers and teachers). The object of research is the E-Module of Mathematics using Flip PDF Professional Software on Algebraic Forms material. The data collection instrument was in the form of a questionnaire, with qualitative and quantitative data analysis techniques. Based on the validity test, the E-Module Mathematics using Flip PDF Professional Software was declared very valid with a percentage level of validity of 87.65%, and the small group practicality test with a number of respondents of 10 students found that it was very practical with a practicality level percentage of 86.35%. The results of the study indicate that the e-module developed is suitable for use in the mathematics learning process in schools that have online facilities.

Keywords: *E-Module, Flip PDF Professional, Algebraic Fom.*

Introduction

Along with the times, the world of education is currently also growing. Various ways are carried out to improve the quality of education. For this reason, various innovations are needed both in curriculum development, learning innovation, and fulfilling educational facilities and infrastructure. technology changes the learning orientation from conventional learning to digital learning. The challenges of the 21st century encourage various parties, not only students but also teachers to have the ability and skills in the field of technology in the learning process. 21st century skills help both teachers and students think critically, collaborate, and adapt to the development of learning in Indonesia. Changing the model into a digital learning model indirectly changes student learning orientation from teacher-centred learning (Teacher Centered Learning) to student-centered learning.

In the world of education, mathematics is one of the compulsory subjects that must be studied. Mathematics has a very important role in the development of science, information technology and industry. This can be seen from the existence of mathematics subjects at all levels of education ranging from elementary school to university level. In addition, mathematics lessons at school also have more learning hours than other subjects.

Based on the results of an interview with a mathematics teacher at MTs N 3 Rokan Hulu, the researchers obtained information that currently learning is being conducted online due to the COVID-19 pandemic. During online learning, students' interest in learning decreases and students' mathematics learning outcomes are still low. One of the contributing factors is that they are influenced by gadgets, students are more interested in playing

gadgets than learning, mathematics is considered a difficult and boring subject, teaching materials provided by teachers are still in the form of print media and have not utilized existing technology. Likewise, mathematics learning in Indonesia has not provided maximum results. According to Tri Hidayati, problems that often occur in learning mathematics include low mastery of mathematics, low curiosity, and limited appropriate mathematics modules (Tri Hidayati, 2018).

The teacher is the most important component in a learning. To improve the quality of learning, teachers are required to make learning more innovative so that it can encourage students to learn optimally. In a mathematics lesson, teachers need to motivate students and teachers must also provide guidance to students both orally and in writing, but written assistance in teaching materials is much more effective, because it can be read repeatedly and studied independently by students. . In general, teachers provide teaching materials that are still in the form of printed modules. However, this printed module still has drawbacks, including not durable (rotten), inflexibility (requires space to store, heavy) and high cost.

In accordance with the times, teaching materials are not only in the form of books but can also be taken from the internet or from other sources in the form of journals, articles, electronic books (e-books), and electronic modules (e-modules), making it easier for students to access various materials that are available. will be studied (Reza Ardiansyah and et al, 2016). Interesting and innovative teaching materials are very important and contribute greatly to the learning process carried out (Andi Prastowo, 2011).

Teaching materials are very important for students, especially in this day and age when technology is growing, this can be used to solve problems for students. One source of independent learning that adapts to the development of science and technology is learning using e-modules. The presentation of teaching materials in electronic form will certainly become more attractive and provide convenience which in the end can support and complement the teacher's role as a source of information for students (Najuah et al, 2020). In addition, a module that is inserted with multimedia features can also enrich the reading experience, let alone used it properly. Teaching materials that are adaptive to technological developments allow learning to be effective and efficient because they are fun for students. Effective learning is learning that is able to actively involve all students (Zubaidah Amir & Risnawati, 2015). Moreover, learning is currently done online or online learning. Online learning was implemented due to the COVID-19 pandemic. So that the e-module is considered very suitable for use during online learning. The use of e-modules is very effective in eliminating student boredom or boredom during online learning.

E-modules are one of the appropriate learning alternatives for students because e-modules help students to add information about the concepts studied through systematic learning activities. E-module is a form of media presentation of self-study teaching materials that are arranged systematically and presented electronically. The advantages of e-modules compared to print modules are that they are more flexible and can be equipped with interactive media such as video, audio, animation and other interactive features in their presentation so that students will be more interested in using them. E-modules are considered innovative because they can display complete, interesting, interactive teaching materials and carry out good cognitive functions.

In making an e-module requires assistance from a particular software or software. One of the software used in developing mathematics e-modules in this research is Flip PDF Professional. Flip PDF Professional is an application for creating e-books, e-modules, e-papers and e-magazines.

The advantage of this software is that Interactive Publishing is not only in the form of text but can insert images, videos, music/sounds, hyperlinks and others so as to make the e-

module interactive with users. With this e-module, students can have a variety of learning experiences, and can eliminate student boredom because the media used is more varied. So that the e-module using Flip PDF Professional software is very well used to improve students' understanding in the learning process. The following is a display of the Flip PDF Professional software.

Based on the results of research conducted by Iqbal Maulana, it shows that e-modules using Flip Pdf Professional software are suitable for use in learning mathematics. The results of his research obtained that the developed mathematics e-module product was valid and suitable for use in the learning process in the classroom. So that this learning media can be used as an alternative mathematics learning media (Iqbal Maulana, 2020).

One of the subjects in mathematics is Algebraic Forms, which is taught to seventh grade students in SMP/MTs. The material of Algebraic Forms is very closely related to everyday life. Many students have difficulty in completing algebraic form material, including difficulty understanding algebraic concepts, understanding algebraic rules and properties and difficulty in calculating algebraic form operations. The concept of Algebra is a basic mathematical material that is widely used as a prerequisite material for studying other mathematics subjects. Given the importance of studying this Algebraic Form material as the basis for the next learning process, it is necessary to conduct research on teaching materials that can actively involve students in building their knowledge and finding their own meaning from what they learn during the learning process. So that it can improve understanding of the material.

Based on the description of the problem, the researcher is interested in conducting research with the title "Development of Mathematics E-Modules by Using Flip PDF Professional Software on Algebraic Forms of Material".

Method

This research is a development research because it produces a product. Research and development (research and development) is a research method used to produce certain products and test the effectiveness of these products (Sugiyono, 2016). The research design used the ADDIE research model. The ADDIE model is suitable for the development of teaching materials as follows, which is the ADDIE research model cycle.

The subjects in this study were seventh grade students of SMP/MTs, educational technology experts and learning materials experts from mathematics lecturers and teachers. The object of this research is the development of a mathematics e-module using Flip PDF Professional software on Algebraic Forms.

The data collection technique used in this research is a questionnaire technique. The questionnaire technique was used to collect data regarding the assessment of various aspects of the validation of the module and the practicality of the module. The data collection instruments were in the form of a validation questionnaire sheet and a practicality questionnaire sheet. Before being tested, the e-module was validated by 4 validators consisting of 2 validators of learning material experts, 2 validators of technology experts. The data analysis technique used is a qualitative descriptive analysis technique and a quantitative descriptive analysis technique. This qualitative descriptive analysis technique was used to analyze the results of the review of learning material experts, educational technology experts and material experts in the form of suggestions and comments regarding the improvement of mathematics e-modules on algebraic forms of material. Quantitative descriptive analysis is done by analyzing quantitative data in the form of numbers obtained from questionnaires.

After obtaining the results of the validity of the validator and the practicality of the students, the percentage level can be adjusted according to the table of validity criteria according to (Riduwan, 2011) as follows:

Table 1. E-Module Validity Data Interpretation Math by Using Professional PDF Flip Software On the Material of Algebraic Forms

No	Interval	Criteria
1	$0\% \leq V \leq 20\%$	Invalid
2	$20\% < V \leq 40\%$	Less Valid
3	$40\% < V \leq 60\%$	Quite Valid
4	$60\% < V \leq 80\%$	Valid
5	$80\% < V \leq 100\%$	Very Valid

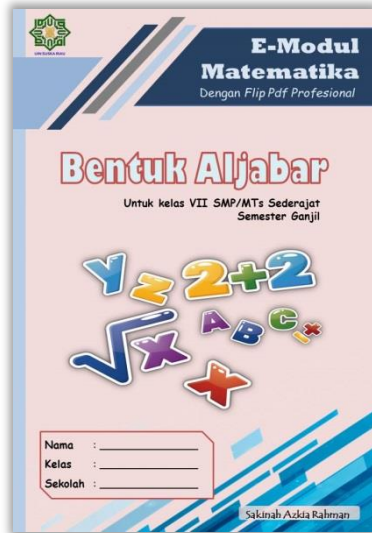
Result and Discussion

Result

The results of this study are described in accordance with the development model used by researchers, namely the ADDIE model which consists of five stages, that is:

Analysis (Analysis) The analysis step consists of two stages, namely performance analysis or performance analysis and needs analysis or need analysis. Performance analysis is carried out to find out and clarify whether the performance problems faced require solutions in the form of program implementation or management improvements. The problem faced in this study is that some teachers do not use communication technology in the learning process, the teaching materials provided still tend to be monotonous, namely in the form of print media, and the available teaching materials are still limited. Needs analysis is a necessary step to determine the abilities or competencies that students need to learn. The needs analysis stage is the stage needed to determine the abilities or competencies that students need to learn to improve learning performance or achievement. The results of observations in the field indicate that there are no electronic teaching materials in the form of e-modules used in learning so that students are bored and bored using printed teaching materials in general.

Design is the stage used to carry out the design, so that the product specifications are clear and the product prototypes to be made. At this design stage, the researcher collects books related to the teaching materials to be developed, chooses the right design, chooses an attractive layout according to the characteristics of the students and prepares the materials as an evaluation of the teaching materials to be developed. The steps that the researchers took at the design or design stage were as follows: 1) Determine the title to be compiled, 2) Prepare source books and other reference books, 3) Identify the learning material, and design the form of learning activities. appropriate, 4) Identify indicators of competency achievement and design the type of assessment that will be presented, 5) Design module writing formats, 6) Draft e-modules. The following is a display of some of the e-module components that have been designed:



Picture 1.
Front Cover Design



Picture 2.
Back Cover Design



Picture 3.
Main Menu Design



Picture 4.
Study Activity Design

Development is carried out after completing the e-module design, at the development stage validation is carried out by validators of educational technology experts and material experts using a questionnaire. Before the e-module is validated by the validator of educational technology experts and learning materials experts, the questionnaire used is first validated by the instrument expert validator. The instrument is validated based on the grid that has been made before designing the instrument. The stages are as follows:

1. Research Instrument

Validation Based on the results of instrument validation, the instrument expert validator gave a score of "B" which means "can be used with minor revisions". Thus, the researcher made improvements that were suggested by the validator until it was valid, then the questionnaire was used to validate the developed e-module.

2. E-Module Validation

In the e-module validation process, the validity of educational technology experts was tested and the validity of learning material experts was tested using a questionnaire. The validation of the developed e-module aims to determine whether the developed e-module is feasible or not to be tested. The technology validity test was conducted to determine the level of validity of the e-module based on the technical requirements. From the results of e-module validation by an educational technology expert validator, there are suggestions for improving e-modules so that researchers make improvements first before being tested. The material validity test was conducted to determine the level of validity of the e-module based on didactic and construction requirements. From the results of e-module validation by expert validators of learning materials, there are suggestions for improving e-modules so that researchers make improvements first before being tested.

Implementation (Implementation). E-modules that have been developed and declared valid are then tested in small groups by giving e-modules to students. Researchers conducted a small group trial with 10 students as respondents. The e-module was tested with the aim of getting suggestions from students in order to improve the e-module. After the students read and studied the e-module, then the researcher gave a practicality test questionnaire. This questionnaire aims to determine whether the developed e-module is practical or there are still errors. From the practical results of this small group, there are no suggestions or comments from students.

Evaluation (Evaluation). Evaluation can be defined as a process carried out to provide value to a learning program.

1. Evaluation At The Development Stage

The results of validation by validators of educational technology experts as a whole can be seen in Table 2. below:

Table 2. Validity Results of Educational Technology Experts

No	Aspect	Indicator	Validity Value	Criteria
1.	Technical Terms	Use of letters and writing	81,25%	Very Valid
		E-Module Design	87,5%	Very Valid
		Image Usage	85%	Very Valid
		Attractive Appearance E-Module	80%	Valid
Overall Ideal Percentage			83%	Very Valid

The results of the validation by learning material experts as a whole can be seen in Table 3. Below:

Table 3. Learning Material Expert Validity Results

No	Aspect	Indicator	Validity Value	Criteria
1.	Active Terms	The suitability of the material with the curriculum in supporting the achievement of competencies and learning indicators	92,5%	Very Valid
		The module emphasizes the	90%	Very Valid

		concept discovery process		
		Practice questions can measure the achievement of competence	93,3%	Very Valid
		Using language according to the developmental level of students	86,67%	Very Valid
2.	Constructive Terms	The material is presented simply and clearly.	95%	Very Valid
		Provide sufficient space for writing or drawing	95%	Very Valid
		Completeness of the content of the module	90%	Very Valid
		Have clear learning goals	90%	Very Valid
3.	<i>Flip PDF Profesional Software</i>	Use of Professional Flip PDF Software on e-modules.	96,67%	Very Valid
Overall Ideal Percentage			92,30%	Very Valid

The data from the overall validation results, namely the results of validation by educational technology experts and learning materials experts can be seen in the following table:

Table 4. Overall Validation Results

No.	Validator	Validity Value	Criteria
1	Educational Technology Expert	83%	Very Valid
2	Learning Material Expert	92,30%	Very Valid
Average		87,65%	Very Valid

2. Evaluation At The Implementation

Stage At the implementation stage of the e-module, the data obtained in the form of data from the practicality test. E-Modules that have been declared valid are tested on a small group with a total of 10 students as respondents. The results of the assessment in small group trials can be seen in the following table:

Table 5. Practical Results of Small Group Trials

No.	E-Module Practicality Variables	Nilai Praktikalitas	Kriteria
1	Student interest and display of E-modules	85,78%	Very Practical
2	Usage Process	87,11%	Very Practical
3	Time	86%	Very Practical
4	Evaluation	86%	Very Practical
Overall Ideal Percentage		86,35%	Very Practical

Based on the table that has shown the results of expert validation of learning materials on mathematics e-modules using Flip PDF Professional software on algebraic form material, it is found that 92.30% is categorized as very valid and the validation results of technology experts 83% are categorized as very valid. Overall, the e-mathematical module using the Flip PDF Professional software developed was declared very valid with an average validity

value of 87.65%. And the results of the practicality trial of e-modules in small groups are included in the very practical criteria with a percentage of 86.35%. So that the e-module developed is feasible to be tested on students. However, suggestions from experts are used as material for improvements to improve e-modules.

Discussion

E-Module Validity Analysis.

The results of the analysis show that the e-module for learning mathematics using Flip PDF Professional software that has been developed is included in the very valid criteria from a technical point of view with a percentage of 83%. The results of the validation carried out by educational technology experts on each statement were analyzed quantitatively. And the results of the analysis in terms of didactic, construction, and use of Flip PDF Professional software are included in the very valid criteria with a percentage of 92.30%. This means that the e-module is declared feasible to be used as teaching material.

E-Module Practical Analysis.

Practical analysis in small groups was conducted to determine the level of practicality of the developed e-module. The practicality test was carried out by giving practicality questionnaires after using the e-module to 10 seventh grade students. From the results of the small group practical analysis test, it can be stated that the e-module developed is included in the very practical criteria with a percentage of 86.35%.

Practical results in small groups per indicator analyzed quantitatively can be explained as follows: 1) Based on "Student interest and e-module display" it is stated that it is very practical with a percentage of 85.78%. This shows that the developed e-module attracts students' interest in its use. 2) Based on the "Usage Process" stated very practical with a percentage of 87.11%. This shows that the e-module that has been developed can be adapted to the speed of student learning, can increase student learning activities and help students understand the material. 3) Based on "Time" stated very practical with a percentage of 86%. This shows that the developed e-module can save time in its use. 4) Based on the "Evaluation" stated very practical with a percentage of 86%. This shows that the developed e-module provides practice questions that can help facilitate students' mathematical abilities and stimulate students' thinking power.

Based on the validity test by educational technology experts and learning materials experts along with small group practical tests, the e-module developed is included in the very valid and very practical criteria. This is supported by the results of research conducted by Elok Fa'iqotul Himmah with the title "Development of E-Modules with Professional Flip PDF on Temperature and Heat Materials" with the results of the research carried out included in the "very good" category (Elok Fa'iqotul Himmah, 2019). Likewise with the research conducted by Ririn Dwi Agustin and Shandi Pratama entitled "E-Module with a Scientific Approach Using Professional Flip PDF on Square and Rectangular Material". The results of the validity test of the developed module are included in the very valid validity criteria. And the results of module trials based on student opinion questionnaires as research targets obtained very effective criteria used in the mathematics learning process (Ririn Dwi Agustin and Shandi Pratama, 2019). Both of these relevant studies obtained good and effective results, as well as research conducted by researchers, this means that the development of mathematics e-modules using Flip PDF Professional software shows good results for use in the learning process.

Conclusion

Based on the research on the development of mathematics e-modules using Flip PDF Professional software in algebraic form that has been carried out, it can be concluded that the results of developing mathematics e-modules using Flip PDF Professional software in algebraic form are stated to be very valid with a percentage of 87.65%. This shows that the developed e-module has met the technical, didactic, construction, and appropriate aspects of using Flip PDF Professional software. Thus the developed e-module can be used in the learning process. The results of developing a mathematics e-module using Flip PDF Professional software in algebraic form are stated to be very practical with a percentage of 86.35% in small group trials, so it can be concluded that the developed e-module is suitable for use in the mathematics learning process in schools that have facilities online.

Reference

- Agustin, Ririn Dwi dan Shandi Pratama. 2018. *E-Modul dengan Pendekatan Saintifik Menggunakan Flip PDF Profesional Pada Materi Persegi dan Persegi Panjang*. Prosiding Seminar Nasional IKIP BUDI UTOMO (E-ISSN : 2774-163X)
- Amir, Zubaidah dan Risnawati. 2015. *Psikologi Pembelajaran Matematika*. Yogyakarta: Aswaja Pressindo
- Andi Prastowo. 2011. *Panduan Kreatif Membuat Bahan Ajar Inovatif (Menciptakan Metode Pembelajaran yang Menarik dan Menyenangkan)*. Yogyakarta: DIVA Press
- Daryanto dan Aris Dwicahyono. 2014. *Pengembangan Perangkat Pembelajaran*. Jogjakarta: GAVA MEDIA
- Hamdani. 2011. *Strategi Belajar Mengajar*. Bandung: Pustaka Setia
- Hartono. 2019. *Metodelogi Penelitian*. Pekanbaru : Zanafa Publishing.
- Hidayati, Tri. 2018. *Pengembangan Perangkat Pembelajaran Matematika dengan Suplemen History of Mathematics*. Purwokerto Selatan: CV Pena Persada
- Himmah, Elok Faiqotul. 2019. “*Pengembangan E-Modul dengan Flip PDF Profesional pada Materi Suhu dan Kalor*”. Skripsi. Bandar Lampung: UIN Raden Intan
- Kementerian Pendidikan dan Kebudayaan. 2017. *Panduan Praktis Penyusunan E-Modul*. Jakarta: Direktorat Pembinaan SMA
- Kusumaningtyas. Endang. 2018. *Menguak Mebel IT Matematika: Media Pembelajaran Berbasis Information Technology*. Kulon Gresik: Caremedia Communication
- Kurniawan, Citra dan Dedi Kuswandi. 2021. *Pengembangan E-modul Sebagai Media Literasi Digital Pada Pembelajaran abad 21*. Lamongan : Academia Publication.
- Majid, Abdul. 2006. *Perencanaan Pembelajaran Mengembangkan Standar Kompetensi Guru*. Bandung : PT Remaja Rosdakarya
- Maulana, Iqbal. 2020. “*Pengembangan E-Modul Flipbook Berbantuan Flip PDF Profesional dengan Pendekatan Situation Based Learning (SBL) Pada Pokok Bahasan Sistem Persamaan Linear Dua Variabel (SPLDV) Kelas VIII Di SMP Negeri 12 Bandar Lampung*”. Skripsi. Bandar Lampung: UIN Raden Intan
- Mudinillah, Adam. 2021. *Software Untuk Media Pembelajaran (Dilengkapi dengan Link Download Aplikasi)*. Yogyakarta : Bintang Pustaka Madani
- Mulyatiningsih, Endang. 2014. *Metode Penelitian Terapan Bidang Pendidikan*. Bandung: Alfabeta
- Najuah, Pristi Suhendro Lukitoyo dan Winna Wirianti. 2020. *Modul Elektronik: Prosedur Penyusunan dan Aplikasinya*. Medan: Yayasan Kita Penulis
- Prihatiningtyas, Suci dan Fatikhatun Nikmatu Sholihah. 2020. *Physics Learning E-Module*. Jombang : Fakultas Pertanian Universitas KH.A Wahab Hasballah

- Pohan, Albert Efendi. 2020. *Konsep Pembelajaran Daring Berbasis Pendekatan Ilmiah*. Grobogan: CV Sarnu Untung
- Riduwan. 2011. *Skala Pengukuran Variabel-variabel Penelitian*. Bandung: Alfabet
- Sanjaya, Wina. 2013. *Penelitian Pendidikan (Jenis, Metode dan Prosedur)*. Jakarta: Kencana Prenada Media Group
- Sugiyono. 2017. *Metode Penelitian Pendidikan*. Bandung: Alfabeta
- Trianto. 2011. *Pengantar Penelitian Pendidikan bagi Pengembangan Profesi dan Tenaga Kependidikan*. Jakarta: Kencana
- Zakiah, Hanna. 2019. *Pengembangan E-Modul dengan Pendekatan Konstektual pada Materi Bilangan Bulat SMP Kelas VII*. Dalam *Jurnal Matematika dan Pendidikan Matematika* Vol. 1, No. 9