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DEVELOPMENT OF INTERACTIVE E-MODULES USING FLIP PDF PROFESSIONAL BASED ON A CONTEXTUAL APPROACH TO BUILDING FLAT SIDE SPACE MATERIALS

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Abstract

The development of this learning media is carried out to produce contextual-based interactive e-modules with the help of a professional flip pdf application that meets the valid, practical, and effective categories. So that it is useful for students in improving understanding of the flat-sided geometry material, especially the cube and beam submaterial. The research instruments used were lesson plans, material validation sheets and e-module media, pretest and posttest, as well as student and teacher response questionnaires. After all instruments, lesson plans, and e-modules are in the valid category, then they are tested in small groups and in the field. The results showed that: (1) the E-Module was in the valid category in terms of material and media, namely (92.70% and 90.97%) with a very feasible category; (2) the E-Module has met the practical value of the responses of students and teachers, namely (87.05% and 87.5%) in the very practical category; (3) The E-Modul meets the criteria of being effective with the completeness of student learning outcomes reaching 90% of students who get a score of 75 and the achievement of each indicator/learning objective that exceeds 75% of the total students. Based on the analysis of the research results, the N-Gain was 0.72, so it was included in the high category providing the effectiveness of student learning outcomes.

Keywords: *interactive e-module flip PDF professional contextual approach build flat side space*

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INTRODUCTION

According to the Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education system, Chapter II Article 3, explains that National Education has the function of developing capabilities and forming dignified characters in the context of educating the nation's life, aiming at developing the potential of students who believe and fear God Almighty. Almighty, noble, knowledgeable, healthy, capable, creative, independent, and formed to become a democratic and responsible citizen. Likewise, some of the functions of National Education must be applied to mathematics lessons, because mathematics is one of the most important subjects, because studying mathematics is not only to understand the concepts or procedures, but there are still many things that can be found from the results of the mathematics learning process (Siagian, 2016). Awareness of what is being done is a sign of the meaning of learning, as well as what is understood and not understood by students regarding facts, concepts, relations, and mathematical procedures that are very closely related to the daily lives of students (Mawaddah & Anisah, 2015).

Mathematics is very closely related to everyday life. So that in mathematics, a person is trained to find solutions to problems faced in life and in the scope of education. This is in line with the statement of (Ruseffendi, 2010) who argues that "mathematics*is the queen of the sciences*". On the other hand, mathematics also contributes greatly to the development of technology. The world of mathematics that involves calculations, measurements, data processing, and other parts plays a major role in the discovery of new things in the form of new science, problem solving, development and technology (Faridah & Aeni, 2016). Mathematics is always taught from elementary, junior high, and high school levels with the aim that students are expected to have the ability to think logically, analytically, systematically, critically, and creatively. To achieve some of these goals, learning techniques should continue to be improved until they reach a better quality level (Mufidah, Effendi, & Purwanti, 2013).

In fact, the world of mathematics education is often considered a difficult subject to master. Besides that, some students think that mathematics is a boring subject and often causes problems in learning (Siregar, 2017). Such conditions, increasingly resulted in the subject of mathematics is not liked, ignored and even ignored. Even though mathematics has an important role in everyday life, such as increasing reasoning power, thinking logically, creatively, and systematically, but on the other hand there are still many students who do not like mathematics subjects (Siagian, 2016). Included in the material for building a flat side that really requires real reasoning in everyday life.

The same thing was also expressed through the results of interviews and questionnaires by Mr. Azka Hidayat S.Pd I as a mathematics teacher at SMP Gajah Mada Medan that the use of learning media such as printed books, and cardboard/paper props has not fully attracted the attention of students to study mathematics, especially building materials. flat side space. This is evident from the learning outcomes of students which show that there are still some students whose scores do not meet the minimum completeness criteria (KKM) that have been set, which is 75. During the mid-semester test (UTS) and the end-semester test, it was recorded that from 20 students it was known that 70 % or 14 students meet the minimum completeness criteria, but 30% or 6 students have not met the minimum completeness criteria.

The low learning outcomes and student interest when learning mathematics mostly occurs because of the application of teaching techniques and the use of monotonous teaching media, causing student saturation (Silviana, Mikrayanti, Jauhari, & Furqan, 2021). In addition, the current world conditions and including the country of Indonesia are being hit by the Covid-19 pandemic. The COVID-19 *(Corona virus disease 2019)* first appeared at the end of 2019, precisely in Wuhan, China. COVID-19 is a virus that transmits very quickly and it is difficult to know the characteristics of people who have contracted the virus because it is a disease that cannot be seen with the naked eye. Almost all countries are experiencing the impact of the current pandemic, so many countries have set a *lockdown* and other anticipations to break the chain of spreading COVID-19 (Putria, Maula, & Uswatun, 2020). The impact has also penetrated the world of Indonesian education. As a result, schools were closed with the aim of preventing the spread of COVID-19. This of course worsens the motivation and absorption of students towards learning mathematics which cannot be carried out directly in the classroom.

To increase the interest and motivation of students in learning, it is necessary to develop a teaching material that can overcome problems in the learning process. The success of an educational goal depends on how the teaching and learning process is experienced by students. An educator in addition to being required to be careful in choosing and applying teaching methods that are in accordance with the goals to be achieved, is also able to choose media that is appropriate to the material to facilitate the delivery of material (Satriawati, 2015). So we need a learning media such as a module. The use of the module as a learning support is considered very necessary, because its characteristics that can be used independently can be an alternative or solution to learning problems from home due to *COVID-19* so as to help improve the mastery of material for both educators and students (Marisa, Yulianti, & Hakim, 2020).

In the current era of technological development, modules are often combined with technology to produce a product called *e-module*. *E-Modul* is an electronic version of a print module that can be read on a computer and designed with *software* supporting *E-modules* basically contain material, limitations, methods, ways of evaluating which are arranged regularly and attractively to achieve the desired competence according to the level of complexity electronically (Maryam, 2019). In the *e-module* , various features such as *video*, *audio*, and links can be added that make students more interactive with the program with the aim of enriching the student learning experience. The development of *e-module* also has a positive impact on students to use computer labs and projectors that were rarely used before. However, in making *e-module* , it needs to be designed using *software* with adequate features (Laili, 2019).

For this reason, one of the software that can be used is Flip PDF Professional software. Flip PDF Professional software is software that supports the creation of e-modules that can be converted into (.exe), (.app), (.fbr), and (.html) formats. With the help of a professional flip pdf, it is very practical to use in the learning process, it can also be used to make teaching materials, and the operation is very simple so that it can be used by anyone regardless of how proficient they are at using computers (Nisa, Mujib, & Putra, 2020). Flip PDF Professional can produce modules that have the advantage of being easily accessible and content that is integrated by video, audio, and images that support the learning process. Therefore Flip PDF Professional Software can help students in learning because it has interesting features that can create a more cheerful and meaningful learning atmosphere (Aulia, Patmantara, & Handayani, 2016).

In addition to e-modules that have been packaged in an attractive manner, the learning approach used by educators is also very much needed to determine the effectiveness of learning (Agung, Suyanto, & Aminatun, 2020). Based on the results of interviews by researchers with several students of SMP Gajah Mada (2021) that learning in class or online is delivered using lecture methods and group discussions. The presentation of the material is applied with the help of printed books and an explanation of the outline formulas of the material being studied. Teachers still use old methods such as giving students memorized formulas and are more likely not to relate lessons to life or contextual problems faced by students. As a result, students become bored and often ignore learning mathematics in class or in online learning models without following it properly.

One of the learning models that can facilitate students is a contextual approach. The contextual approach is a learning concept that can help teachers relate the material they teach to students' real-world situations and encourage students to make connections between their knowledge and its application in their lives as family and community members (Agung et al., 2020). Contextual learning as a learning model that provides facilities for student learning activities to seek, process, and find learning experiences that are more concrete (related to real life) through the involvement of students' activities in trying, doing and experiencing themselves (Zakiyah, Purnomo, & Sugiyanti, 2019).

Therefore, it is necessary to create and develop a teaching material in the form of an *e-module* using *Flip PDF Professional* based on a Contextual approach. With this development, students will be more interested in studying the subject matter of the material Build a flat side space. Because of the above background, the researcher wants to do a study with the title "Development *E-Modules* Using *Flip PDF Professional* Based on Contextual Approaches on Flat Side Space Building Materials".

METHOD

This research uses research and development (R&D) using software Flip PDF ProfessionalResearch and Development (R&D) is a research method used for research to produce a new product and then test the effectiveness of the product (Sugiyono, 2012).

The subjects in this study were students of class VIII SMP Gajah Mada Medan in the 2021/2022 academic year. The trial class in this study was class VIII-B, totaling 20 people. Meanwhile, the object in this research is an interactive e-module which was developed using a professional flip pdf based on a contextual approach to the material for building flat sides. The teaching material development model used in this research is the ADDIE model.

The ADDIE development model has 5 stages: Analysis, Design, Development, Implementation and Evaluation. At the development stage, it requires several tests by a team of experts, individual research subjects, on a limited scale and on a wide scale (in the field) as well as revisions to improve the final product so that even though it includes the testing process and product revision, the developed product has met the criteria for a good product, it is empirically tested. and there are no errors. The stage of the ADDIE model development model can be seen in the following figure Branch in (Hidayatullah, 2019).

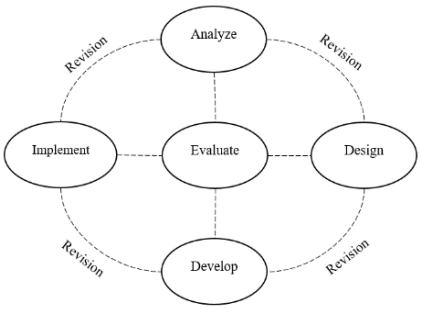

Figure 1. ADDIE Development Model Stage

The development procedure carried out by researchers in developing the e-module follows the stages of the ADDIE development model which are described as follows:

Analysis stage. According to Branch in Ratumanan and Rosmiati (2018: 70), the purpose of the analysis phase is to identify possible causes of performance gaps. The activities carried out at the analysis stage are as follows: (1) Validation of work gaps carried out to produce a statement of objectives based on the specified performance gap. This analysis was carried out by observing the teaching and learning process and by interviewing mathematics teachers at SMP Gajah Mada. (2) Establish instructional goals aimed at achieving goals that address performance gaps that lead to the causes of poor knowledge and skills. The priority of action set by the researcher is to develop teaching materials in the form of contextual-based e-module development on the material Build flat side space with the help of Flip PDF Professional software. (3) Audience confirmation (student analysis) is carried out with the aim of knowing the abilities and uniqueness of students personally. Considerations in analyzing the characteristics of students such as study habits, access to technology and information, and economic conditions. This stage of analysis is carried out by direct interviews with students. (4) Identify the resources needed to define all types of resources that will enhance the ADDIE process. The resources needed for this research are: materials (covering the 2013 revised 2017 curriculum book and material sources from other books), the technology used at Gajah Mada Junior High School, learning facilities (such as the availability of a computer laboratory and the zoom application when using online learning at the time of implementation). research), human resources (including researchers, teachers of mathematics subjects for class VIII of Gajah Mada Junior High School, material and design experts who will validate the e-modules that have been developed, and students of class VIII B of Gajah Mada Junior High School being studied). (5) The potential delivery system aims to determine the potential delivery system and estimate costs. The introductory system in this study uses a combination of face-to-face meetings and internet-based learning.

Design Stage. Aims to guide the expected performance as well as the appropriate test method. The stages of contextual-based e-module development related to the design phase are described as follows: (1) The design of the module framework includes the preparation of the initial module design and material preparation. The flat side chamber construction was used during product development. (2) Determining the design of the e-module display in accordance with the contextual approach which includes: constructivism (constructivism), finding (inquiry), asking (questioning), modeling (modeling), actual assessment (authentic assessment), and reflection (reflection). has been explained in the previous chapter. (3) A collection of references for the material developed in the module. (4) Prepare assessment instruments for use in research. And arrange a pretest and posttest which consists of 6 questions on cubes and blocks.

Development Stage. To build and validate learning resources. The general procedure associated with the development phase is described as follows: (1) Preparing materials based on a contextual approach; (2) Selecting and developing supporting media, the aim is to select or develop adequate media to support the learning process; (3) Developing e-modules for students. In making

e-modules, researchers did several things, namely: typing material and practice questions, making animations or videos related to the material, selecting audio, making navigation buttons, and unifying all components with the main application; (4) Conduct expert trials and revisit formative tests, the aim is to revise the initial design of the product and learning process to be implemented. The lesson plans, pretest & posttest questions will be assessed by material experts, while e-modules will be validated by media and material experts. It is intended to receive suggestions and then be revised. Revisions were carried out many times until the lesson plans, pretest & posttest questions, and digital books were obtained with good criteria to be implemented.

Implementation stage. Aims to prepare a learning environment and involve students. In this study, the implementation stage was carried out, where at this stage the e-module was tested on 20 class VIII students of SMP Gajah Mada in learning mathematics for cube and block sub-materials. The test plan used in this research is One-Group Pretest-Posttest Design. In terms of objectives, the results of the implementation can be known more precisely, because it can be compared with the situation before the implementation. This concept can be formulated as follows:

O_1 X O_2

Figure 2. *One-Group Pretest-Posttest Design* (Sugiyono, 2017:303)

Keterangan:

O_1	:	Uji awal *(pretest)* dilakukan sebelum diberi *e-modul*
X	:	Perlakuan melalui pembelajaran dengan menggunakan *e-modul* berbasis pendekatan kontekstual
O_2	:	Uji akhir *(posttest)* dilakukan setelah treatment. Pelaksanaan uji coba pembelajaran dilakukan oleh peneliti

The implementation is carried out directly by the researcher. In every implementation of learning, observations are made to the teacher (researcher) and the class will always be controlled by an observer (teacher).

Evaluation Stage. Aims to see the quality of the process and learning outcomes before and after implementation. At each stage of development with the ADDIE model an assessment is carried out to produce educational materials in the form of good electronic modules. The assessment carried out is formative assessment and summative assessment. Formative assessment in the form of assessments obtained from the product validation team and examiners of educational materials in the form of electronic modules. While the summative assessment is done by collecting the evaluation of each student in the form of a questionnaire on student perceptions of teaching materials.

In this study used data collection methods in the form of observation, interviews, distributing questionnaires and the last is a test. The data used in this research and development are quantitative data (obtained from the assessments of validators, teachers, and students who act as respondents to *e-module*) and qualitative (in the form of suggestions, criticisms, suggestions and responses from design experts and material experts used). to improve *e-module*) which is then analyzed descriptively and concluded statistically as input for improving or revising the products that have been developed.

Based on the research objectives, a tool is developed and compiled and evaluated in terms of feasibility, practicality and effectiveness. The data collection instruments used in this research and development are presented in table 1.

Table 1. Data Collection Instruments

Valuation Criteria	**Assessment Instruments**
Valid	a. Learning Implementation Plan (RPP) b. Learning Media validation sheet for Media Experts c. Learning Media validation sheet for
Practical	a. practicality sheet *E-module* (teacher's response questionnaire to interactive e-module) b. practicality sheet *E-module* (student response questionnaire to *e-module* interactive
Effective	a. Student learning outcomes assessment sheet

Data Analysis Techniques

Data analysis techniques are a method of processing data into information in a research process. Data analysis in this study aims to determine the validity, practicality and effectiveness *e-module*. Data analysis in this study includes qualitative data analysis and qualitative data analysis.

1. Validity The

Data analysis technique was carried out according to the data collection device.material validation questionnaire *e-module* uses an evaluation scale as a verification tool to evaluate the feasibility of the product being tested, and for product improvements there are comments and suggestions. In the technique of filling out the questionnaire, the researcher modified it by using four categories as shown in table 2.

Table 2. Category Assessment Sheet Validation

Score Assessment	Category
4	Very Good
3	Good
2	Poor
1	Not Good

The data were then analyzed descriptively and quantitatively. That is, we calculate the percentage material the developeddata were analyzed using the formula level of validity.

From the results of calculations using the above formula, a number is produced in the form of a percent. The score classification is then interpreted with qualitative sentences listed in table 3.

Table 3. Eligibility Criteria for Learning Devices

Validity Criteria Validity	Level
85.01% - 100.00%	Very valid, can be applied without improvement
70.01% - 85.00 %	Sufficiently valid, can be used with a slight revision
50.01% - 70.00%	Less valid, it is recommended not to use it because it must be revised first
01.00% - 50.00%	Invalid, or cannot be applied

1. Practicality

The interactive electronic module is considered practical using the analysis of student and teacher responses to a questionnaire, the questionnaire can be used to see student and teacher responses to a e-module. A e-module considered practical if the results of the analysis of the responses given to teachers and students, in the e-module can be used with little or no modification. In the method of filling out the feasibility questionnaire, there are practicality assessment categories, as shown in Table 4.

Table 4. Rules for Scoring Teacher and Student Response Questionnaires

Rating Score	Category
4	Very good, very interesting, very easy to understand, very easy to find, very interested
3	Good, interesting, easy to understand, easy to find, interested
2	Not good , less interesting, less easy to understand, less easy to find, less interested
1	good, not interesting, not easy to understand, not easy to find,

Not notinterested)

The data obtained from the teacher's response questionnaire and the remainder will be calculated on average and then converted according to practicality criteria. The analysis of the practicality of the product in the questionnaire can be calculated by the following formula:

: Percentage of practicality
: Total empirical score (validation result from validator)
: Total maximum expected score

The practicality criteria according to Akbar (2013: 155) can be seen from Table 5.

Table 5. Practical

Criteria Practicality	Level
85.01% - 100.00%	Very practical, or can be used without revision

70.01% - 85.00%	Quite practical, or can be used but needs minor revision
50.01% - 70.00%	Not practical, it is recommended not to use it because it needs revision
01.00% - 50.00%	Not practical, or should not be used

1. Effectiveness

The results of the effectiveness of interactive e-modules based on a contextual approach using Flip PDF Professional can be seen from three aspects, namely pretestscores posttest, and N-Gain Data from these three aspects were obtained at the implementation stage by conducting a trial using the pre-experimental One Group Pretest-Posttest Design method because it only used one class group, namely class VIII-B without a comparison class group.

The increase in student learning outcomes, namely the increase in students' knowledge and understanding of the cube and block submaterials can be seen from the pretest and posttest obtained by students. Student learning test results are assessed based on scoring guidelines. The maximum score for this test is 100. The formula for calculating student scores is.

Then look for the percentage of students who complete. The minimum completeness criteria for mathematics subjects in class VIII-B Gajah Mada is 75.

In addition, the effectiveness e-module is also assessed based on the analysis of achievement indicators or completeness of learning objectives. To find the category of indicator achievement or completeness of learning objectives, the total score of each indicator in the question is used. Here are the steps.

1. Determine the score of each indicator on each item with reference to the predetermined scoring guidelines
2. Summing up the scores of each indicator for each item
3. Calculate the percentage of question scores from each indicator by:

Determine the percentage of students who complete (achieve a minimum percentage of 75%) for each indicator.

Seeing the achievement of learning indicators with indicators of completeness, there is a minimum of 65% of students who are able to achieve a minimum of 75% of the formulated learning objectives (Leung & Hasratuddin, 2018).

Meanwhile, the effectiveness of learning using e-modules based on a contextual approach to improving student learning outcomes can be seen from the normalized gain value (N-gain). For data analysis on the effectiveness e-modules based on a contextual approach using Flip PDF Professional , use the normalized gain equation mentioned in the formula Hakke in (Febrianti, 2021)

Description:
g = Gain normalized
f= Average posttest score

Si = Average pretest score
100 = Ideal score
calculation results S gain is then converted into a normalized gain with the following criteria:

Table 6. Normalized Gain Classification

Criteria	Conclusion
0.7	High
0.3 < 0.7	Medium
< 0.3	Low

Module based on a contextual approach using Flip PDF Professional is considered effective if the results of the normalized gain are in the medium and high categories.

RESULT AND DISCUSSION

This research is a research and development (research and development) that produces a product that is valid, practical, and effective. The product is a contextual-based interactive e-module on the material for Constructing Flat Sided Space, especially the Cube and Block sub-materials in class VIII SMP.

The development of contextual-based interactive e-modules in class VIII of this junior high school uses the ADDIE development model. This model consists of 5 stages, where the first stage is analysis, the second stage is design, the third stage is development, the fourth stage is implementation, and the last stage is evaluation. The results of the contextual-based interactive e-module development based on the five stages are described as follows:

1. Analysis Results

Analyze (analysis) stage consists of job gap validation analysis, instructional objective analysis, audience confirmation (student analysis), identifying the required resources , and potential delivery systems.

Based on observations, learning mathematics at SMP Gajah Mada is expository. The boring lecture method results in a loss of motivation to learn which makes mathematics a difficult subject. The right solution was carried out by researchers by developing contextual-based interactive e-modules so that students were more motivated in learning mathematics. This is supported by the availability of technological tools such as mathematics laboratories and infocus which are rarely used and can later be used as introductory media.

2. Design Results

Then the design stage was carried out, namely making lesson plans, making e-module designs, making student ability tests, making validation instruments and response questionnaires that were in accordance with the state of Gajah Mada Junior High School which were obtained from the data from the previous analysis.

The design of the mathematical e-module using a professional flip pdf based on a contextual approach to the flat-sided spatial structure based on the structure of the e-module is as follows: cover/title page, preface, table of contents, concept map, KI page, KD, and Achievement Indicators, page of contextual-based learning steps (construct (let's understand), inquiry (let's find), questioning (let's answer), learning community (let's discuss), modeling (let's think), reflection (let's recall), authentic assessment (let's practice)), instructions for using e-modules, a glimpse of history, learning activity pages, quiz pages, summaries, glossaries, bibliography, author biodata.

3. Development Results

The development stage is the process of realizing what has been done at the design stage. At this development stage there are two main activities carried out, the first is to prepare all instruments such as questionnaires, questions, and lesson plans, and media elements which are then combined into a complete e-module. While the second activity is the assessment or validation stage by experts on various components that have been completed previously.

4. Preparing and Combining E-Module

Components Various media components are needed and prepared to support the explanation of cube and block material in the e-module product. The media needed include: modules in the form of pdf, images, animated videos, audio, interactive quizzes. If the components above have been prepared, then enter the merging process. The incorporation of interactive teaching material components is carried out according to the story board using a professional flip PDF application.

Interactive e-modules using a professional flip pdf based on a contextual approach to the material for building a flat side space based on the previous design stage are as follows:

Table 7. Results of Interactive E-Module Development

No	Part E-Module	Display
1	**Cover/Title Page**	**Figure 4. Cover Page Design *E-module* Interactive**

2	**Foreword**	**Figure 5. Preface Page Design**
3	**Table of Contents**	**Figure 6. Design of Contents Page**
5	**Concept Map**	**Figure 7. Concept Map**
6	**KI KD Pages, and Achievement Indicators**	**Figure 8. KI and KD**

7	**Pages of Contextual-Based Learning Steps**	**Figure 9. Learning Steps Page**
8	**Instructions for Using *E-Modules***	**Figure 10. Instructions Page *of E-Module***
9	**History Overview**	**Figure 11. Design Pages at a Glance History**
10	**Pages of Learning Activities**	**Figure 12. Design of**
11	**Pages *Quiz***	**Figure 13. *Quiz***

12	**Summary**	**Figure 14. Design of Summary Page**
13	**Glossary**	**Figure 15. Design of Glossary Page**
14	**Bibliography**	**Figure 16. Bibliography Page Design**
15	**Author Biodata**	**Figure 17. Author Biodata Page Design**

Validation by the Expert Team

After the activity of combining the components of interactive teaching materials was completed, draft I was formed which consisted of a questionnaire instrument, Learning Implementation Plan (RPP), a contextual-based interactive e-module product for cube and block material and test instruments.

Draft I was then validated by expert validators in the field of mathematics to obtain corrections, criticisms, and suggestions that were used as the basis for revising and improving the

products developed. The revised product is a device that meets the valid criteria and is hereinafter referred to as draft II.

a. Contextual-Based Interactive E-Module Validation Results

The developed e-module must go through a validation stage to see the suitability of the substance with the expected learning outcomes. Contextual-based e-module validation consists of material validation and media validation. Validation was carried out by a lecturer in the mathematics department of UNIMED and a mathematics teacher at the Gajah Mada Foundation.

Based on the calculation results of the validation of 3 material experts and 3 media experts on the contextual-based interactive e-module above, the average percentage is 92.70% for material validation and 90.97% for media validation. Where the two percentages state that contextual-based interactive e-modules can be said to be valid in the very worthy category for testing. From the validator's assessment, corrections and suggestions for improvement are obtained which are used as consideration for revising the e-module. Suggestions for improvement can be seen in table 8.

Table 8. Validator's comments and suggestions on the E-Module

1. Change class VII to Class VIII a. Before revision b. After revision
2. Command questions fix, delete the word "continue" a. Before revision b. After revision
3. Correct the first sentence to "a rubik's cube is made up of smaller cubes" a. Before revision b. After revision
2. The *e-module* has not added a summary, while in the validation questionnaire there is a point to assess the presentation of the summary in *the e-module*. Add summary to *e-module*

a. Results of RPP Expert Validation

Expert validation of the RPP is carried out to pay attention to the RPP that will be presented in the learning process, whether the use of the RPP is in accordance with the learning process carried out. The validators for the lesson plan consist of 1 lecturer in mathematics education from UNIMED, and a teacher in mathematics from SMP Gajah Mada.

Based on the assessment given by the expert to the lesson plans for learning media through questionnaires, the average percentage is 92.26% which indicates that the lesson plans contained

in the learning process are said to be very feasible, even though it is said to be very feasible there are still improvements suggested by experts in order to maximize the use of lesson plans in the learning process using learning media that have been developed. The revision of the RPP assessment can be seen in table 9.

Table 9. Revision for RPP

NO	Validator	Suggestion
1	V1	· The steps of learning activities that have been made in the RPP must be appropriate when applied in front of the class. · The indicator is replaced with GPA (Competency Achievement Indicator) · technique
2	V2	· The tools used by students are *cellphones*/laptops

a. Test Validation Results

Expert validation of the test is carried out to pay attention to the tests that will be presented in the learning process, whether the use of the test is in accordance with the learning process carried out in the classroom. The tests carried out consisted of *pretest* and *posttest*. The validator for the test consisted of 1 lecturer in mathematics education from UNIMED, and 1 teacher in mathematics at Gajah Mada Middle School. The results of the expert's assessment can be seen from the following table.

Table 10. Expert Validation Results for *Pretest*

Validator	**Assessment Validator for each *Pretest***					
	Question 1	**Question 2**	**Question 3**	**Question 4**	**Question 5**	**Question 6**
Validator 1	**V**	**V**	**V**	**V**	**V**	**V**
Validator 2	**V**	**V**	**V**	**V**	**V**	**V**

Description:

V: Valid VDR: Valid with TV revision : Invalid

Based on the assessment given by the expert on the *pretest* used in the learning process, it shows that the *pretest*t contained in the learning process is said to be feasible, although it is said to be feasible there are still improvements suggested by experts in order to maximize the use of *pretest* in the learning process in the classroom.

Tabel 11. Revisi *Pretest*

Validator	**Assessment Validator for each *Pretest***					
	Question 1	**Question 2**	**Question 3**	**Question 4**	**Question 5**	**Question 6**
Validator 1	**V**	**V**	**V**	**V**	**V**	**V**
Validator 2	**V**	**V**	**V**	**V**	**V**	**V**

Adapun hasil analisis validasi *posttest* disajikan pada tabel 12.

Table 12. Expert Validation Results for *Posttest*

Validator	**Assessment Validator for each *Pretest***					
	Question 1	**Question 2**	**Question 3**	**Question 4**	**Question 5**	**Question 6**
Validator 1	**V**	**V**	**V**	**V**	**V**	**V**
Validator 2	**V**	**V**	**V**	**V**	**V**	**V**

Based on the assessment given by the expert to the *posttest* used in the learning process, it shows that *posttest* contained in the learning process is said to be feasible, even though it is said to be feasible, there are still improvements suggested by the experts in order to maximize the use of the *posttest* in the classroom learning process.

Table 13. Revision for *Posttest*

No	Validator	Suggestion
1	V1	• Item number 1 is adjusted again with the question indicator
2	V2	• The assessment is more attention

4. Implementation Results

After making revisions in stages and all the instruments and *e-modules* developed are valid, the next stage is implementation. The Learning Implementation Plan (RPP) will be used during field trials to see its practicality and effectiveness in learning. The following is a description of the results of the implementation phase.

Small Group Test

In the small group trial intended to test the attractiveness of the product, students in this small group test saw *the e-module* provided, and at the end of the product trial involving 8 students who were selected heterogeneously based on class ability and gender then students given a questionnaire to assess *of the e-module*.

The small group test was conducted at the Gajah Mada Foundation class VIII-B. The results of student responses to the *e-module* obtained an average percentage of 86.45% with the interpretation criteria achieved, namely "very feasible" to be used as a tool in teaching and learning activities on cube and block material for class VIII SMP/MTs.

Field Trial

After being declared eligible by the validator, *the e-learning module* is applied in the classroom. In the implementation of this stage, 20 students participated and realized 3 meetings in class, where at the first meeting it was used for introductions and preparation for all technical implementation of learning in the next 2 days for 2 x 40 minutes. Learning is done in the classroom. The data obtained are student learning outcomes, namely *pretest* and *posttest* on cube and block material, student response questionnaire data, and teacher response questionnaire data to *e-module* the developed interactive

The results of the trial show *e-module* meets the criteria for practicality, so the trial is only carried out once.field trials *e-module* the developed

a. Practicality Analysis

The practicality of learning media that has previously been validated can be seen through

student response questionnaires and teacher response questionnaires that have been filled out by students and teachers when researchers implement implementation in schools.
The results of the questionnaire analysis of student responses to *e-modules* were 87.05% from 20 respondents in class VIII-B to 14 questionnaires, so that *e-modules* can be categorized as very practical. This means *e-modules* interactive which was developed was responded positively by students. Also, the results of the questionnaire analysis of the teacher's response to *e-modules* were 87.5% by a teacher in the field of mathematics at Gajah Mada Junior High School to 26 questionnaires, so that *e-modules* can be categorized as very practical. This means that *the e-module* developed was responded positively by the teacher.

b. Effectiveness Analysis

Effectiveness of the learning media in this study can be seen from the students' ability to complete the test. The first test is called *pretest* which is done before using *e-module* and completes *posttest* after learning to use *e-module* interactive *professional flip pdf* on cube and block material.

1) Student Learning Completeness

Score *Pretest*

Figure 3. Diagram of *Pretest*

Based on the *pretest* on the flat-sided geometrical material in the table above, it can be seen that of the 20 students who did *pretest* , only 2 students, and the rest did not reach the specified KKM, which was 75. In this case, students' individual learning completeness met the criteria. classic by 10%.

Nilai *Posttest*

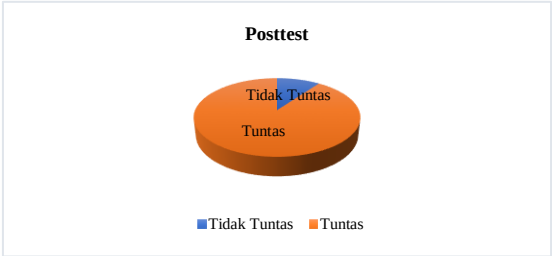

Figure 4. Diagram of Posttest Score *Results*

Based on the calculations that have been discussed previously, it can be concluded that the learning outcomes from *pretest* to *posttest* in the field test have increased through the application *e-modules* based on the contextual approach that was developed and is included in the effective category.

1) N-Gain Score

Untuk mencari nilai gain score dilakukan analisis dengan menggunakan rumus:

$$g = \frac{Sf - Si}{100 - Si}$$

$$g = \frac{83{,}25 - 40}{100 - 40}$$

$$= \frac{43{,}25}{60}$$

$$= 0{,}72$$

Berdasarkan pencapaian nilai pretest, posttest serta n-gain dapat diperoleh analisis peningkatan hasil belajar siswa yang disajikan pada tabel 14.

14. Analysis of Student Learning Outcomes Improvement

Material	Class	Mean		
		Pretest	Posttest	N-Gain
Cubes and Blocks	VIII-B	40	83.25	0.72

Based on the analysis of student learning outcomes, the *N-Gain is* 0.72, if g > 0.7, it is included in the high category. Based on these data, it can be concluded that *e-module* on the cube and block material developed provides the effectiveness of student learning outcomes.

1) Learning Objectives

Based on the achievement of learning objectives through the completion of the test, it is obtained for the learning objectives of the first question of 87.5%, the second 80%, the third 85%, the fourth 82.5%, the fifth 83.75%, and the fourth last 81.2%. With the acquisition of completeness. In accordance with the criteria for achieving learning objectives, it is said that the learning objectives are achieved with the criteria of 75% of the maximum score for each item. Thus the achievement of learning objectives has been achieved for each item.

Based on the calculations that have been discussed previously, it can be concluded that the learning outcomes from *pretest* to *posttest* in the field test have increased and obtained an *N-gain* of 0.72 through the application *e-module* based on a contextual approach that was developed and is included in the effective category. Meanwhile, the students' response to *the e-module* was 87.05% of the total students who responded positively to *the e-module* that was developed. Thus *e-modules* are effectively used in learning the material for building flat sides, cube and block sub-materials.

CONCLUSION

The results of this development research are in the form *e-module* interactive *a professional flip pdf* based on a contextual approach to the material for building flat sides, cubes and beams in class VIII SMP. *e-module* can provide convenience in understanding the concept through the given contextual problems. Based on the results of research and discussion, it can be concluded as follows:

1. The procedure for developing *e-module* using *a professional flip pdf* based on a contextual approach to the submaterial of cubes and blocks in class VIII SMP, using the ADDIE development model *(Analysis, Design, Development, Implementation, Evaluation)*. The *analysis* carried out was validating the work gap, setting instructional goals, analyzing students, identifying the required resources, potential introduction systems. Based on observations, learning mathematics at SMP Gajah Mada is expository. The boring lecture method has an impact on the loss of learning motivation which makes mathematics a difficult subject. The right solution was carried out by researchers by developing *interactive e-modules* so that students were more motivated in learning mathematics. This is supported by the availability of technological tools such as mathematics laboratories and infocus which are rarely used and can later be used as introductory media. Then the *design* , namely making lesson plans, making *e-modules*, making student ability tests, making validation instruments and response questionnaires that were in accordance with the state of Gajah Mada Junior High School which were obtained from the data from the previous analysis. Next is the *development* namely preparing and combining *e-module*, validation by a team of experts (material validation, media validation, RPP validation, and validation of *pretest* and *posttest*). An interesting media was obtained and it was ready to be tested on students.next stage *implementation* namely a small group test which is carried out on 8 students selected by the researcher and then a field test is carried out on 20 students of class VIII-B SMP Gajah Mada. The last stage *evaluation* stage where this stage is carried out at every stage of development starting from the analysis to the development stage. All suggestions and improvements will be applied to the module, resulting in an attractive and quality e-module.
2. Based on the results of the validation data analysis from the experts that: i) the results of the media expert validation with an average of 90.97%; (ii) material expert validation results with an average of 92.70%; (iii) the results of the validation of the Learning Implementation Plan (RPP) with an average of 92.26%; (iv) the results of the validation of the *pretest* and *posttest* are in the very valid category. So that the results of the validation *e-module* are in the validity criteria with the "very valid" category. Meanwhile, based on the results of practicality data analysis that: (i) *e-module* is said to be valid first from the validator's assessment so that it can be applied by improving *the e-module* according to the advice of the expert; (ii) the results of the student response questionnaire when learning with *e-modules* obtained a percentage of 87.05%; and (iii) the results of the mathematics teacher's response to *e-module* the average score obtained was 87.5%. The practicality criteria indicate that the development *e-modules* interactive *a professional flip pdf* based on a contextual approach to the cube and block sub-material belongs to the practical category.
3. Based on the results of the effectiveness data analysis that: (i) students' classical completeness reached 90% with an average posttest of 83.25 included in the complete category; (ii) The results of the calculation of the increase in the value of the pretest to the posttest obtained an *N-gain* of 0.72 which is included in the very effective category; (iii) Achievement of learning objectives 75%; (iii) the time in implementing learning in interactive e-modules based on a contextual

approach does not exceed ordinary learning; So that *e-module* interactive *a professional flip pdf* based on a contextual approach to the cube and block sub-material is in the effective category.

REFERENCE

Agung, Fitra Purnama, Suyanto, Slamet, & Aminatun, Tien. (2020). E-Modul gerak refleks berbasis pendekatan kontekstual untuk meningkatkan pemahaman konsep siswa SMA. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, *5*(3), 279–289.

Aulia, Rusdha, Patmantara, Syaad, & Handayani, Anik Nur. (2016). Perancangan Buku Digital Interaktif Berbasis Flipping Book TIK Kelas XI SMA. *SENTIA 2016*, *8*(1).

Faridah, Nenden, & Aeni, Ani Nur. (2016). Pendekatan open-ended untuk meningkatkan kemampuan berpikir kreatif matematis dan kepercayaan diri siswa. *Jurnal Pena Ilmiah*, *1*(1), 1061–1070.

Febrianti, Fitri Ayu. (2021). Pengembangan Digital Book Berbasis Flip PDF Professional untuk Meningkatkan Kemampuan Literasi Sains Siswa. *Caruban: Jurnal Ilmiah Ilmu Pendidikan Dasar*, *4*(2), 102–115.

Hidayatullah, A. Syarif. (2019). *Pengembangan Modul CorelDRAW Pada Pelajaran Dasar Desain Grafis Kelas X Di Smk Darul Ulum Layoa Bantaeng*. Universitas Negeri Makassar.

Laili, Ismi. (2019). Efektivitas pengembangan e-modul project based learning pada mata pelajaran instalasi motor listrik. *Jurnal Imiah Pendidikan Dan Pembelajaran*, *3*(3), 306–315.

Leung, Anggita Widyasari, & Hasratuddin, Hermawan Syahputra. (2018). Development of Learning Devices Based on Discovery Learning Assisted Geogebra Models to Improve Self-regulated Learning of Students at SMP Negeri 1 Stabat. *American Journal of Educational Research*, *6*(12), 1646–1653.

Marisa, Uci, Yulianti, Yulianti, & Hakim, Arief Rahman. (2020). Pengembangan E-Modul Berbasis Karakter Peduli Lingkungan di Masa Pandemi Covid-19. *Prosiding Seminar Nasional PGSD UNIKAMA*, *4*(1), 323–330.

Maryam, Masykur. (2019). *Pengembangan e-modul matematika berbasis Open Ended pada materi sistem persamaan linear dua variabel kelas VIII*. UIN Raden Intan Lampung.

Mawaddah, Siti, & Anisah, Hana. (2015). Kemampuan pemecahan masalah matematis siswa pada pembelajaran matematika dengan menggunakan model pembelajaran generatif (generative learning) di SMP. *EDU-MAT: Jurnal Pendidikan Matematika*, *3*(2).

Mufidah, Lailatul, Effendi, Dzulkifli, & Purwanti, Titi Teri. (2013). Penerapan Model Pembelajaran Kooperatif Tipe TPS untuk meningkatkan aktivitas belajar siswa pada pokok

bahasan matriks. *Jurnal Pendidikan Matematika STKIP PGRI Sidoarjo*, *1*(1), 117–125.

Nisa, Hanifa Ainun, Mujib, Mujib, & Putra, Rizki Wahyu Yunian. (2020). Efektivitas E-Modul dengan Flip Pdf Professional Berbasis Gamifikasi Terhadap Siswa SMP. *Jurnal Pendidikan Matematika Raflesia*, *5*(2), 13–25.

Putria, Hilna, Maula, Luthfi Hamdani, & Uswatun, Din Azwar. (2020). Analisis proses pembelajaran dalam jaringan (daring) masa pandemi covid-19 pada guru sekolah dasar. *Jurnal Basicedu*, *4*(4), 861–870.

Ruseffendi, E. T. (2010). Dasar-dasar penelitian pendidikan dan bidang non-eksakta lainnya. *Bandung: Tarsito*.

Satriawati, Helna. (2015). Pengembangan e-modul interaktif sebagai sumber belajar elektronika dasar kelas X SMKN 3 yogyakarta. *Universitas Negeri Yogyakarta*, *13*(3).

Siagian, Muhammad Daut. (2016). Kemampuan koneksi matematik dalam pembelajaran matematika. *MES: Journal of Mathematics Education and Science*, *2*(1).

Silviana, Dewi, Mikrayanti, Mikrayanti, Jauhari, Rista Salma, & Furqan, M. (2021). Penerapan Realistic Mathematics Education untuk Meningkatkan Aktivitas dan Hasil Belajar Siswa Sekolah Menengah Pertama pada Materi Pokok Fungsi. *JagoMIPA: Jurnal Pendidikan Matematika Dan IPA*, *1*(1), 21–35.

Siregar, Nani Restati. (2017). Persepsi siswa pada pelajaran matematika: studi pendahuluan pada siswa yang menyenangi game. *Prosiding Temu Ilmiah Nasional X Ikatan Psikologi Perkembangan Indonesia*, *1*.

Sugiyono. (2012). Metode Penelitian Kuantitatif, Kualitatif dan R & D.Bandung:Alfabeta. *Metode Penelitian Kuantitatif, Kualitatif Dan R & D.Bandung:Alfabeta.* https://doi.org/10.1017/CBO9781107415324.004

Zakiyah, Hanna, Purnomo, Djoko, & Sugiyanti, Sugiyanti. (2019). Pengembangan E-modul dengan Pendekatan Kontekstual pada Materi Bilangan Bulat SMP Kelas VII. *Imajiner: Jurnal Matematika Dan Pendidikan Matematika*, *1*(6), 287–293.