

# Development of Tutoring E-Modules Through Metacognitive Strategies to Improve Self-Regulated Learning for Junior High School Students

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## ABSTRACT

Education is a business or activity operated intentionally, regularly, and planned to develop desired behavior. This study aims to (1) produce a metacognitive strategy e-module that can improve junior high school students' self-regulated learning, (2) produce an appropriate metacognitive strategy e-module to improve junior high school students' self-regulated learning, (3) examine the effectiveness of using e-media media. This research is a Research and Development (R&D) research using the five states of ADDIE model such as analysis, design, development, implementation, and evaluation. This study involved 40 VIII graders and 7 Guidance and Counselling teachers in South Cilacap Subdistrict. The results of the study show the developed E-module is classified as "Very Appropriate" by the media and material experts to be used as a supporting media to improve self-regulated learning for junior high school students. In addition, the e-module used is effective to support learning activities based on the measurement of the self-regulated learning of junior high school students, with the results of an increase in self-regulated learning of junior high school students. This development research resulted in an appropriate metacognitive strategy e-module that could improve students' self-regulated learning. Thus, it can be concluded that the metacognitive strategy e-module is feasible and effective enough to be used to improve the self-regulated learning of junior high school students.

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## 1. INTRODUCTION

Education is a business or activity that is done by intentionally, regularly and planned with the purpose of changing or developing desired behavior. Education has a very important role for the development and ability of students (Afifah, 2015). In Indonesia, the obligation to study is regulated in the government regulation of the Republic of Indonesia number 47 of 2008 chapter III that the implementation of compulsory formal education is at least at the elementary, MI, SMP, MTs and other equivalent forms of education. This shows the government's efforts to increase the education distribution of its citizens, at least they have taken junior high school education or its equivalent (Kadi & Awwaliyah, 2017).

Junior high school students are known as early teens ranging from 12-17 years of age, a transitional period that can determine their future life due to behavioral development, so that they are able to set better future plans (Nuryanti, Zubaidah, & Diantoro, 2018). This is in accordance with what Octavia (2020) stated, that adolescence is related to determining how to choose the future life so that it can be planned properly. Determining the right learning strategy is very influential on learning outcomes, when students are able to determine the right learning strategies for themselves, their self-regulated learning abilities will also increase.

Statistically, based on a normal distribution, a person is said to be successful if students can master at least 60% of all goals that must be achieved (Khotimah & Yuliastuti, 2019). However, if use the concept of mastery learning by using a benchmark reference assessment, a person is said to have succeeded in learning if he has mastered the minimum standard of completeness that has been determined previously or is now commonly called the Minimum Completeness Criteria (Subawa, 2022). Otherwise, if the mastery of completeness is below the minimum criteria, the student is said to have failed in learning.

The tendency of independent students in learning is directly proportional to the students ability to regulate themselves. Students who regulate themselves will control themselves in order to get achievement in learning. The ability to self-regulate students in the learning process is often referred to as the ability to self-regulated learning (Aisyah, 2020). Self-regulated learning itself in Indonesian is often referred to as independent learning or self-regulation in learning. Aziz & Putri Siswanto (2018) revealed that there are three aspects in self-regulated learning that need to be understood, that are: 1). Metacognition aspects, 2). Intrinsic motivation aspects, 3). Behavioral learning aspects. van Houten-Schat et al. (2018) one of the components in self-regulation, namely regulating businesses that have a relationship with achievement and refers to students' intentions to get resources, energy, and time to be able to complete academic assignments. Saputra, Handaka, & Sari (2019) also argue that students who explore how goals and self-evaluation will affect their achievement results. Therefore, objectives and evaluation are part of the self-regulation cycle.

The self-regulated learning ability itself is needed by students to be able to regulate and direct themselves, be able to adjust and control themselves in dealing with learning tasks (Kriswanti & Mastuti, 2021). Self-regulated learning is an individual's ability in self-monitoring, regulation, and control that is directed by learning goals and environmental conditions. Therefore, with the existence of self-regulated learning students are expected to be able to show more behaviors or businesses that can support success in the learning process (Nurfiani, 2015).

Guidance and counseling teachers are at least able to develop a learning/academic guidance strategy that able to help the younger generation choose an experience that suitable for them which will later enable them to be able to conquer most of the learning situations they face. To overcome the learning problems as stated earlier and to improve self-regulated learning student, a metacognitive strategy e-module was compiled to improve self-regulated learning student (Putri, 2019).

Metacognition has an important meaning in a learning process, because the knowledge of cognitive process can guide in setting the atmosphere and selecting strategies to improve cognitive abilities in the future (Puspitasari, 2019). Metacognitive strategy is one of the important aspects of cognitive skills mastered by students in learning or solving problems. This metacognitive strategy can be learned by students, meaning that guidance and counseling teachers can teach it (Fitri, 2017).

Various phenomena that found in the field show that the learning problems faced by students are not normally anymore but must be a concern and solutions are found. The application media used, especially e-modules, in technological advances is now a form of novelty that aims to make students able to learn independently and easily access materials, especially self-regulated learning materials Irwandani, et al. (2017). Therefore, the e-module that is being developed is considered to be able to help improve the self-regulated learning of junior high school students.

The facts that occur in the field show that self-regulated learning student is still low in the teaching and learning process (Kurnia & Warmi, 2019). There is a phenomenon that occurred in 1 Nagreg in 2012, data obtained as much as 2.73% were at a high level of self regulated learning, 15.45% of a medium level of self regulated learning, 46.36% of a very low level of self regulated learning. It is strengthened by Anis Rahmiyanti's research in 2017 that self-regulated learning of class X students at State Senior High School 5 Pontianak in the 2016/2017 academic year based on research results shows a percentage of 76% and is included in the high category because it is between the range of 61% - 80%. This means that in general, class X students at State Senior High School 5 Pontianak in the 2016/2017 academic year have high self-regulated learning and are able to self-regulate to achieve learning goals. Quite a lot of students are able to link their current learning goals to achieve their goals in the future.

Based on data low self-regulated learning from previous studies, in addition to the results of pre-study observations in July-August in four schools in the southern Cilacap sub-district, directly coming to school using health protocols was carried out using observation guidelines aimed to guidance and counseling teachers in each school. The results obtained from observations are, most students learn to use the general rule that community study hours are 19.00-20.30, this causes students to be forced to study, so that it is not according to their wishes and desires, students study only because they are afraid of being scolded by their parents. In addition, some student notebooks look a lot of notes that are not concise, because students still use the old stigma that taking notes is just transferring the contents of the book, it makes students lazy to read it again. This has an impact on the decrease in the desire to learn and does not create maximum learning outcomes (Mukhid, 1998).

Based on the above phenomenon, we can see that there is still a lack of self-regulated learning in the learning process. The learning process should be done because own will, choice and responsibility, not just following friends, social status, or just pleasing parents. Self-regulated learning leads to several stages which include having and determining learning goals, making plans, choosing strategies for achieving goals (Azmi, 2016).

Through a comprehensive group guidance framework, a guidance and counseling teacher can develop a metacognitive strategy e-module that aims to improve student competence in the academic realm. The initial step for guidance and counseling teachers is to collect data by using instruments to see and record how the level of self-regulated learning in students. To improve self-regulated learning in students, guidance and counseling teachers can provide basic services through group guidance, providing information on effective learning methods and metacognitive abilities and not only using the lecture method but can use inspiring media (Ishtifa, 2016).

In accordance with research by Richma Hidayat (2015: 9) the lecture method is considered to cause boredom for students because there is no feedback, students are fully listeners. Based on the results of pre-research interviews in July-August, several students and three guidance and counseling teachers came to school. The results of the interview showed that some students in four schools in the South Cilacap sub-district still had unfinished grades, cheated on exams, were late in collecting assignments, besides that students tended to not be able to determine the right learning strategy for themselves. Students tend to follow the learning styles of their closest friends, while it is known that the cognitive abilities of each student are different, thus affecting student learning outcomes.

The problems mentioned above are triggered by the lack of information provided to students, especially regarding learning strategies, this is due to the limited time allocation for guidance and counseling teacher services. It would be better, providing information services related to learning strategies using media to support the achievement of the goals desired by guidance and counseling

teachers. One of them is to use e-modules (Mumpuni, 2018). The advantages of e-modules in the learning process lie in the stages of problem-based learning, that are student orientation to problems, organizing students to learn, guiding individual and group investigations, developing and presenting work as well as analyzing and evaluating problem solving processes (Zhafirah, Erna, & Rery, 2020).

The use of e-modules helps deliver more information because it is easily accessible and the materials in e-modules are complete, thus triggering an increase in self-regulated learning. The related information provided in the e-module is not only in the form of text, but audio, video, and animation are available so that the material in self-regulated learning is interesting. Therefore, the development of this metacognitive strategy e-module became the research alternative chosen by the researcher. E-modules can help convey information and materials to make it easier for guidance and counseling teachers to convey information and materials (Imansari & Sunaryantiningsih, 2017).

The development of e-modules through this metacognitive strategy pays special attention to eighth grade junior high school students in the southern sub-district, especially those who have learning difficulties. The metacognitive strategy e-module was prepared with the great hope that it could improve the self-regulated learning of junior high school students in South Cilacap District so that they are able to determine independent learning strategies that suit themselves. Improving problem solving skills cannot be separated from the process applied in the classroom. In addition, in the learning process, it often happens that students who lack achievement are not caused by their lack of ability, but because of a lack of motivation. In fact, based on the results of the study, it shows that there is a positive significant relationship between self-regulated learning and achievement motivation (Inayah, 2013). Both the motivation of the students themselves and the motivation of the teacher. This results in low student self-regulated learning. Whereas motivation has an important role in the teaching and learning process for both teachers and students.

In learning activities, self-regulated learning is very important because it is a personal attitude that is needed by every individual who learns to move his potential to study the object of learning without any pressure or foreign effect outside himself. This is in accordance with the research results of Husna, et al. (2013) that the provision of self-regulated learning exercises has a positive effect on the development of academic achievement. In the learning process, students are required to have independence in learning. This independence can be shown by students by organizing all the learning that will be carried out. Students who can manage their learning process tend to be more successful in improving their academic achievement. The learning model that needs to be applied is a learning model that is able to increase self-regulated learning, so that self-regulated learning makes students self-aware of the functional relationship between thought patterns and actions which then makes students become actively involved during the learning process. This can make the knowledge gained by students become more meaningful and increase in learning outcomes. Self-regulated learning is the degree of metacognition, intrinsic motivation and individual behavior in the learning process which contains three main elements, that are self-regulation strategies for learning, perceptions of self-ability to display skills and commitment to achieving learning goals.

In another study, Kamelia & Pujiastuti (2020) discussed the Application of Metacognitive-Scaffolding Learning Strategies to Improve Students' Mathematical Problem Solving and Self-Regulated Learning Ability. The results stated that students who received metacognitive-scaffolding learning had higher average scores and self-learning abilities. Permatasari & Akip (2019) stated that science learning based on self-regulated learning was able to improve the metacognitive skills of elementary school students in West Kalimantan.

## 2. METHODS

Development of Metacognitive Strategy E-Module to Improve Self-Regulated Learning Students use the Research and Development (R&D) method (Hanafi, 2017). The procedure used in this study uses the ADDIE development model which consists of five stages which include analysis, design, development, implementation, and evaluation (Hakim, et al. 2020) .

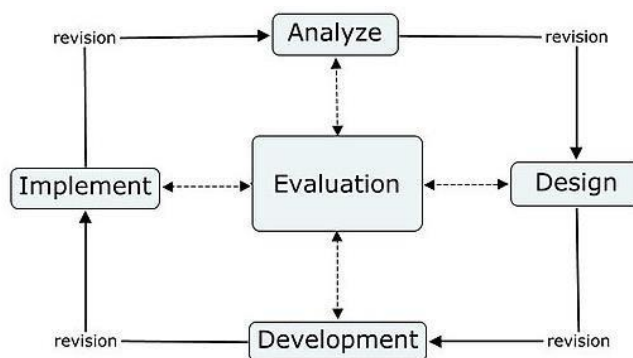


Figure 1. ADDIE Learning Model

This study uses the ADDIE model because it considers the model used to be effective in supporting the performance of a program. The ADDIE development model is divided into five stages that are systematically arranged and each stage must be carried out without exception. The ADDIE research design model is very simple and considered very easy compared to other research models (Tegeh, Jampel, & Pudjawan, 2015).

The steps carried out as a procedure that must be done by researchers in the development of e-learning guidance modules to improve self-regulated learning for junior high school students are as follows:

1. Analysis Stage

This stage aims to analyze and determine learning needs and requirements. The steps taken at this stage are usually called pre-research or preliminary studies which include curriculum analysis, student analysis, and material analysis. The next step is to analyze the learning indicators. Meanwhile, in this preliminary study, the researcher conducted interviews and observations aimed at obtaining information about the learning problems faced by students. Preliminary studies were also conducted to obtain data on tutoring services that have been provided to junior high school students in South Cilacap District, problems experienced by students, descriptions of students' self-regulated learning levels, and descriptions of student learning outcomes.

2. Design Stage

At this stage the results of the analysis needs obtained from the analysis stage. This stage aims to design or compile learning tools in the form of prototypes. This prototype is a product design that will be produced. The steps for making this prototype consist of collecting references and designing the initial product referred to in this study, which is an e-module tutoring through metacognitive strategies. The product design steps carried out are designing the initial layout design and designing e-modules

3. Develop Stage

This stage is an advanced stage of product design carried out for the product development stage so that it becomes a complete product in the form of an e-module. This stage aims to produce learning tools that have been revised by material experts, media experts, guidance and counseling teachers. This stage includes device validation by expert lecturers and guidance and counseling teachers which will then be revised.

4. Implementation Stage

At the implementation stage, it was carried out by field large groups test. The e-module product trial was conducted on 20 students pre-test and 20 post-test students at Junior High

School South Cilacap District. Each student uses an e-module. Students are given the opportunity to study the material available in the e-module, including the content in the e-module. This stage is a pre-experimental that is comparing before and after being given treatment.

#### 5. Evaluation Stage

This stage is the last stage in ADDIE development. The evaluation stage is the final revision stage of the product which can be seen from the post-test results. Revisions are carried out to see what still needs to be improved from the e-module from suggestions and inputs given by users. Finished product revisions can be reused with a wider range of users.

The research was done in four junior high schools in South Cilacap District which consisted of three public schools and one private school, that are Public Junior High School 1 Cilacap, Public Junior High School 3 Cilacap, Public Junior High School 8 Cilacap and Junior High School of Muhammadiyah 1 Cilacap. Subjects or respondents who took part in this study were class VIII junior high school students in South Cilacap District with the following details: a) main trial to 13 students, b) main field trial to 26 students, c) operational field trial to 40 students, c) testing the effectiveness of the pre-test to 20 students, d) testing the effectiveness of the post-test to 20 students. The research was carried out in July-August 2020/2021.

Data collection techniques in this study were interviews, observations, and questionnaires. Meanwhile, the instruments used were a feasibility questionnaire for media experts, a feasibility questionnaire for material experts, a student response questionnaire and a self-regulated learning instrument. The data analysis technique used to manage the data obtained in this research is qualitative data analysis and quantitative data analysis.

Qualitative data analysis was used to analyze the data obtained from material experts, media experts and students, while the product test was in the form of responses, input and suggestions as material that would be taken into consideration for product revision. Meanwhile, quantitative data analysis aims to describe the product development process until a metacognitive strategy e-module is obtained to improve self-regulated learning in junior high schools that is "appropriate" for students to use. Technical data analysis uses statistical methods.

### 3. FINDINGS AND DISCUSSION

#### *Analysis Result and Data Collection*

The first step in this research is to conduct a analysis requirement and then proceed with data collection. At this stage of analysis requirement and data collection, data were obtained through interviews and questionnaires. Based on the results of interviews with guidance and counseling teachers, the following information was obtained:

- a. There is no learning media used by guidance and counseling teachers in junior high schools in South Cilacap District that can facilitate students to learn independently, especially in terms of determining appropriate learning strategies.
- b. Junior high schools in South Cilacap District have used adequate Android as a support for student learning activities, when the research process students are allowed to bring cellphones to school.
- c. Information about learning strategies is only limited to learning according to habits, not in accordance with the abilities and potential of each student.

The step taken to strengthen the research data is that students are given an open questionnaire related to analysis requirement to find out the needs and characteristics of students. Questionnaires were given to 30 students of class VIII as respondents related to needs analysis to determine the needs

and characteristics of students in self-regulated learning. Researchers classified the scores of the self-regulated learning scale of junior high school students into three categories, that are low, medium and high. This categorization is based on the normal distribution model formula according to Azwar (2012:146).

**Table 1.** Categorization of Normal Distribution Model

Categorization	
$X < (\mu - 1,0)$	Low
$(\mu - 1,0) X < (\mu + 1,0)$	Medium
$(\mu - 1,0) X$	High

Esplanation

X = Score value scale

$\mu$  = Mean = Unit standard deviation

**Table 2.** Categorization of Self-Regulated Learning Scores for Class VIII Junior High School Students

Category	Score Range
Low	< 60
Medium	60 – 90
High	>90

**Table 3.** Results Distribution of Self-Regulated Learning Scale to 30 grade VIII SMP students in South Cilacap District

		Category	
		Total students	Percentage
Valid	Low	15	50%
	Medium	9	30%
	High	6	20%
	Total	30	100%

From table 9 which is calculated using Ms. Excel, it is known that of the 30 students who were given a self-regulated learning scale, there were students who had low self-regulated learning of 50% or 15 students, students who had moderate self-regulated learning of 30% or 9 students, and who have high self-regulated learning by 20% or 6 students. It can be concluded that the self-regulated learning of junior high school students in South Cilacap District is still said to be low.

### Product Design Results

Before entering the development stage, an important step that needs to be done is to design the product. Planning is very important in designing a metacognitive strategy e-module product. At this stage it produces several product design components that will be developed, that is the e-module design in the form of determining the material, as well as the storyboard used in the e-module. The contents of the e-module design are as follows: cover, basic competencies, instructions, materials, reflections, videos, quizzes, references and profiles.

The storyboard design was made using powerpoint which was created as an initial product series prior to the development stage. The storyboard of the initial metacognitive strategy e-module design is as follows:

a. Cover Design Results

The appearance of the e-module cover design uses power point so that it is adjusted to the needs of the material content contained in the e-module.



Figure 2. Initial E-module Cover Design

a. The results of the initial design of the main/home page

In the initial design of the main page the developer makes the overall points contained in the e-module.

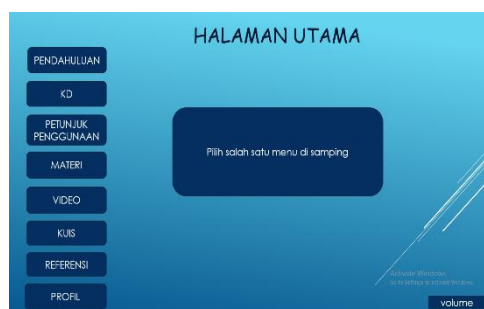


Figure 3. Initial Design of the Home/Main Page

b. Introduction design results

In the initial preliminary design, the developer describes the e-module in a simple way, then writes down the developmental aspects of junior high school students and their development tasks.

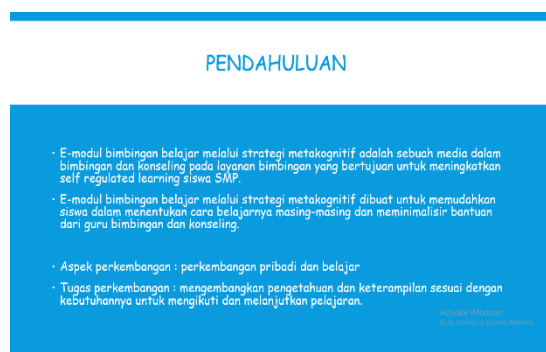


Figure 4. Initial Design Introduction

c. The results of the initial design of basic competencies

In the initial design of the basic competencies, the developer makes points on the basic competencies that are adjusted to the material and goals to be achieved.

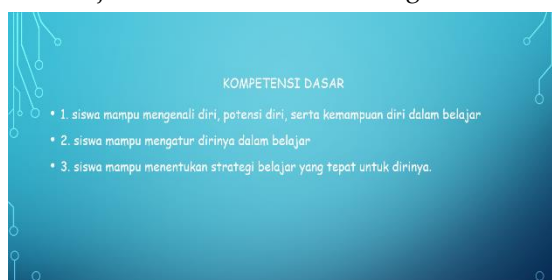


Figure 5. Initial Design of Basic Competencies

d. Initial design of the e-module user guide

The initial design of the e-module guide was made using the e-module first. The e-module instructions aim to make users understand the functions of the navigation buttons created in the e-module.

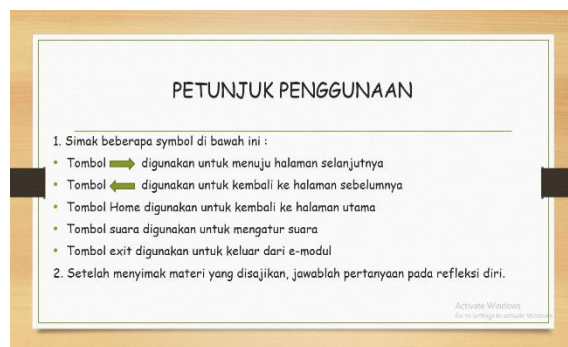


Figure 6. Initial Design Instructions for Use

e. Initial design of e-module material

In the material design, the developer adapts the material to the needs and learning goals to be achieved by determining the content of the material to be included in the e-module into three materials, made first through power point after which the complete material is made directly in the e-module.

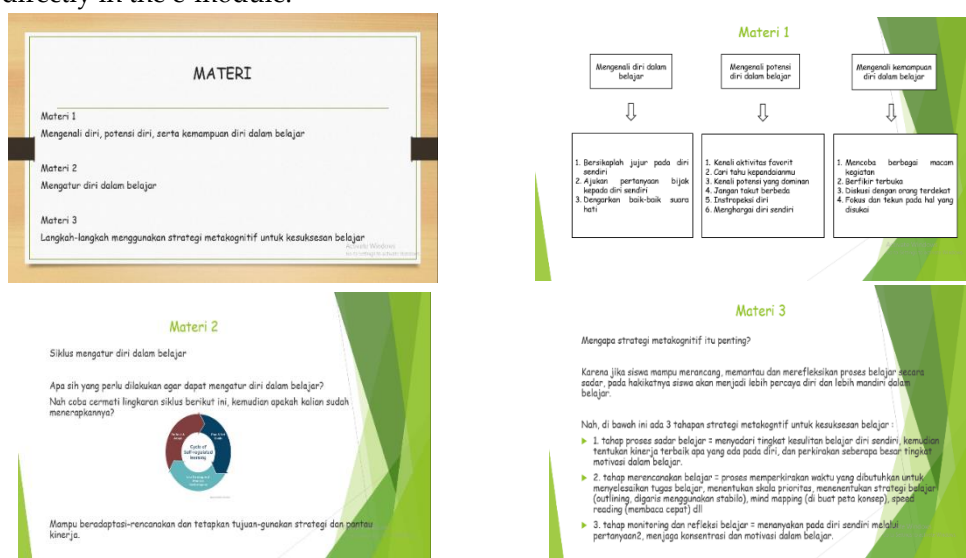


Figure 7. Initial Design of Electronic Material Module

f. Initial design reflection

In the initial design reflection consists of stages using metacognitive strategies, then contains several questions that must be answered by each student.



Figure 8. Initial Design Reflection

g. Initial video e-module design

In the initial video e-module design, the developer linked a link that was connected to YouTube, so that when clicked it would automatically be connected to the video display on YouTube.

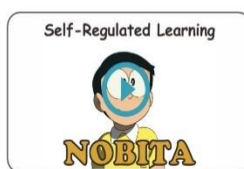


Figure 9. Initial Video Design

h. Initial design of the e-module quiz

In the initial design of the e-module, the developer made 5 quizzes that were adapted to the material in the e-module. The quiz in the e-module is designed with four multiple choice in each question. At the end of the session the scores from the quiz results will appear.

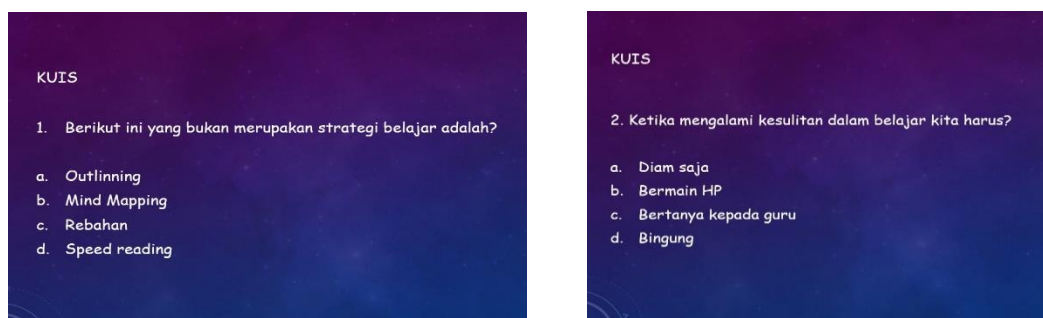


Figure 10. Initial Quiz Design

i. Initial design reference

In the reference design, the developer makes a reference list based on the source of the material taken and used as a reference in making the material in the e-module content.

Referensi

Contoh Kasus : <https://sahabatguru.wordpress.com/2008/12/11/metakognitif-belajar-bagaimana-untuk-belajar/>  
 Gambar : Google, dll  
 Sumber Pustaka :  
 Kalantzis, M. & Cope, B. (2015). Learning and new media. In D. Scott & E. Hargreaves *The SAGE Handbook of learning* (pp. 373-387). 55 City Road, London: SAGE Publications Ltd doi: 10.4135/9781473915213.n35  
 Teachers Guide V.02 Edisi 05.08, hal.46-47).  
 Yee, M. H, Zainol, N. S. I, Che Wan Razak, C.W.H.S, Tee, T. K, Kok, B. C. (2019). *Level of Metacognitive Awareness Strategies among Technical Students*. International Journal of Engineering and Advanced Technology (IJEAT): Blue Eyes Intelligence Engineering & Sciences Publication.

Figure 11. Initial Design Reference

j. Initial design of e-module developer profile

In the initial design the developer profile included 2 images. The first is an e-module developer image and a thesis supervisor image.



Figure 12. Initial Design of Author Profile

**Product Development Results**

The development of this metacognitive strategy e-module product is intended for class VIII junior high school students which is designed using a codular application. The e-module product is made in the form of a soft file with an apk format so that there is no need to install additional reader applications on the device. The use of this e-module can only be used on Android at least Android Kitkat. The steps taken in creating an e-module:

a. Prepare concepts and material content

The concept and material content at the design stage have been attached by the developer to the storyboard section created through Power Point. Then at the design development stage of the storyboard, a basic layout is made, using CorelDraw to edit images and Microsoft Word to edit text and a movie maker to make video case examples.

b. Creating basic layouts

The next stage after the material is made a storyboard which was designed initially as a reference for making the basic layout for the e-module. In this section the development of making designs using coreldraw.

c. Collect material as e-module content

This e-module contains material on self-regulated learning taken from various book sources, the relevant articles are made into three materials based on the aspects of self-regulated learning that want to measure. Guided to the study of the criteria for e-modules that have been described in chapter 2, e-modules are arranged based on a predetermined order framework.

The component that become characteristic of the e-module is contain the learning section where this e-module contains a study plan and student learning activities consisting of learning goals, material descriptions, practical activities, summaries, assignments, and formative tests that are packaged completely. with the aim of achieving complete and independent learning in accordance with the abilities of each student. E-modules are made in communicative language and accompanied by interactivity with the aim that students are more interested and easy to understand each material discussed in the e-module.

The material collected is arranged in three learning activities where each learning activity has a purpose that has been adjusted to the basic competencies determined to support students' practical learning. The material compiled is in the form of text and images that are relevant to the learning objectives which can then open the application again.

d. Setting Up Audio

The audio used in the e-module is obtained from the internet (free license) which is customized to the needs of the e-module, with the audio in the e-module being the main attraction for students in using the e-module.

e. Creating e-module programs

Programs created using codular software.

f. The process of unifying all e-module content

After all content, in form of text, images, reflections, videos and quizzes, has been created, the next step is the process of unifying the e-module content. After everything is prepared to be put into the codular, at this stage the layout begins to be arranged again. After that the developer creates animations/transitions and navigation. After the e-module program has been created, it is inserted into the codular. The e-module is saved using the android.apk format and then uses the link to share the e-module with students

g. Applications of e-modul

The ready-to-use metacognitive strategy e-module can be opened on Android-based mobile phones, at least Android Kitkat. The steps taken to run this application are by directly clicking on the e-module link URL.

Click <https://bit.ly/e-modulstrategimetakognitif> then directed to install the e-module apk. Here is the initial screen when the e-module is opened.



### *E-module Product Trial Results*

The test results in this development research were obtained through the implementation of initial trials, main field trials and operational field trials.

#### 1. Experts Validation

The process of developing the electronic module used in this study went through several stages of validation carried out by material experts and media experts before being tested in the field. Validation carried out by media experts and material experts aims to obtain input related to the development of appropriate learning products. The data obtained is used to improve the product so that the product is suitable for use. The initial step taken is to submit the product in the form of a validation letter and media in the form of applications and instruments which will be used by validators to test the feasibility of the product. Instrument validation is needed to find out the correctness of the important aspects of a developed product. Furthermore, the feasibility test is carried out by media experts, material experts and practitioners (guidance and counseling teachers) which aims to determine the quality of the products developed based on the underlying theories.

**Table 4.** Material Expert Validation Results

Aspects	Indicator	Valuation	Explanation
<b>Content Feasibility Aspect</b>	The suitability of the material with aspects of student needs	4	Very feasible
	Tutoring materials through metacognitive strategies are easy to understand	3	Feasible
	Clarity of learning goals	4	Very feasible
	Material updates	4	Very feasible
	The suitability of the selected video with the material	3	Feasible
	The material in the e-module is useful in increasing students' insight about learning strategies	4	Very feasible
	Readability of writing	4	Very feasible
<b>Language aspect</b>	Use of communicative language	3	Feasible
	Dialogic and Interactive	3	Feasible
	Use of terms, symbols or icons	3	Feasible
	The language used is in accordance with the level of development of students	3	Feasible
<b>Presentation Aspect</b>	The material used is coherent	4	Very feasible
	Each learning activity presented is equipped with materials, evaluation sheets, quizzes and videos	3	Feasible

<b>Cohesiveness Aspect</b>	The steps in the material can be understood by students easily	4	Very feasible
	Interesting material content	4	Very feasible
	E-module material can increase students' motivation to planning their careers	4	Very feasible
	The material presented is in line with the needs of students	4	Very feasible
	Confusion and coherence of the flow of thought	4	Very feasible
	<b>Total</b>		65
	<b>Score</b>		90,28
	<b>Category</b>		Very good

$$\begin{aligned}
 \text{Final score} &= \frac{\text{Total score obtained}}{\text{Total score maximum}} \times 100 \\
 &= \frac{65}{18 \times 4} \times 100 \\
 &= \frac{65}{72} \times 100 \\
 &= 90,28
 \end{aligned}$$

The results obtained are then converted into qualitative data as follows:

**Table 5.** Percentage of Eligibility Based on Expert Validation

Score	Conversion Value	Qualification	Explanation
67-88	76-100	Very good	Very feasible
45-66	51-75	Good	Feasible
23-44	26-50	Enough good	Lack of feasible
0-22	0-25	Not good	Not feasible

The results of the material expert's assessment of the feasibility of the metacognitive strategy e-module to improve self-regulated learning of junior high school students totaled a score of 90.28 with a very good category. The advice given by the material expert for improving this product is to consider the answer options on the instrument, preferably using numbers, then the linguistic aspect is adjusted to the subject, so that it will be more communicative.

## 2. Media Experts Validation

Media validation was carried out to test the quality of the media presented by the e-module. The media validation sheet consists of assessment components in the aspects of screen design display, user ease, consistency, graphics and usability.

**Table 1.** Media Experts Validation Result

Aspect	Indicator	Valuation	Explanation
Screen Design Display Aspects	Module background color match	3	Feasible
	Layout suitability	3	Feasible
	Graphics and illustrations that used visually and verbally are appropriate	3	Feasible
	Clarity of title display	3	Feasible
	The attractiveness of e-module design	3	Feasible
	E-module is easy to operate on Android	3	Feasible
	The operation of the multimedia content contained in the e-module can be used easily	3	Feasible
User Ease Aspect	Instructions for using the e-module are easy to understand	3	Feasible
	Quiz navigation buttons work good	3	Feasible
	Material navigation buttons work good	3	Feasible
<b>Consistency Aspect</b>	The use of words, terms, and sentences in the learning material is consistent	4	Very feasible
	Shapes and letters used is consistent	4	Very feasible
	The layout appearance is consistent	3	Feasible
<b>Graphic Aspect</b>	The use of color in the e-module is appropriate and not excessive	3	Feasible
	Font size compatibility	3	Feasible
	The type of alphabet used is easy to read clearly	3	Feasible
<b>Benefit Aspect</b>	The illustrations used are clear (not blurry)	3	Feasible
	E-modules make it easier for students to learn the material being taught	3	Feasible
	The e-module steps make it easier for students to learn independently	4	Very feasible
	Ease of teacher interaction with e-modules	4	Very feasible
	<b>Total Score</b>		
			80,56
			<b>Category</b>
			Very good

$$\begin{aligned}
 \text{Final Score} &= \frac{\text{Total score obtained}}{\text{Total score maximum}} \times 100 \\
 &= \frac{58}{72} \times 100 \\
 &= \frac{18 \times 4}{72} \times 100 \\
 &= \frac{58}{72} \times 100 \\
 &= 80,56
 \end{aligned}$$

Based on the assessment data from media expert validators, it was concluded that the metacognitive strategy e-module to improve self-regulated learning was very feasible for field trials with revisions according to the suggestions given. The average score obtained from the assessment is 80.56 which qualitatively means it is very proper.

### ***The Response Results of Student and Guidance and Counseling Teachers***

The following are the results of students' responses to the metacognitive strategy e-module product test.

#### **a. Initial Field Trial**

Students who have carried out experiments on e-module products are given a questionnaire related to material interest and appearance and usefulness. The questions asked in this questionnaire consisted of 8 items and were carried out by 13 students and 2 guidance and counseling teachers.

$$\begin{aligned} \text{Final Score} &= \frac{\text{Total score obtained}}{\text{Total score maximum}} \times 100 \\ &= \frac{373}{8 \times 4 \times 13} \times 100 \\ &= \frac{373}{416} \times 100 \\ &= 89,67 \end{aligned}$$

Based on the results of the initial field trial of the metacognitive strategy e-module to improve self-regulated learning of junior high school students, the results above show a score of 89.67 with a very good or very feasible category value.

#### **b. Main Field Trial**

The main field trial was carried out by 23 students and 4 guidance and counseling teachers. Students who have used e-module products are given a questionnaire related to their interest and appearance and usefulness. The following is the data obtained from the students' responses in the main field trial.

$$\begin{aligned} \text{Final Score} &= \frac{\text{Total score obtained}}{\text{Total score maximum}} \times 100 \\ &= \frac{730}{8 \times 4 \times 26} \times 100 \\ &= \frac{730}{832} \times 100 \\ &= 87,74 \end{aligned}$$

Based on the results of the implementation of the main field trial of the metacognitive strategy e-module to improve self-regulated learning of junior high school students, the results above show a score of 87.74 with a very good or very feasible category.

#### **c. Operational Field Trial**

The results of student responses in this operational field trial were carried out by 40 students who were divided into 2 groups, namely the pretest and posttest groups and to 6 guidance and counseling teachers. Before students use the e-module product, students are given a pretest, then students who have used the e-module are given a posttest. The pretest and posttest filled out a questionnaire about students' self-regulated learning abilities, while the student response questionnaire provided an assessment of the e-module. The following are the results of the assessment of student responses to e-modules-2676 in operational field trials.

$$\begin{aligned}
 \text{Final Score} &= \frac{\text{Total score obtained}}{\text{Total score maximum}} \times 100 \\
 &= \frac{1111}{8 \times 4 \times 40} \times 100 \\
 &= \frac{1111}{1280} \times 100 \\
 &= 86,80
 \end{aligned}$$

Based on the results of the operational field trials of the metacognitive strategy e-module to improve self-regulated learning of junior high school students, the results above show a score of 86.80 with a very good or very feasible category.

#### d. Overall Results of Student Responses in Field Trials

The following are the results of student responses and the categories of each test that has been carried out, that are initial field trials, main field trials and operational field trials.

**Table 2.** Overall Results of Student Responses

No	Product Trial	Result	Category
1.	Initial Field Trials	89,67	Very Proper
2.	Main Field Trials	87,74	Very Proper
3.	Operational Field Trials	86,80	Very Proper
	<b>Rata-rata</b>	88,09	Very Proper

Based on the final results, the average student response results in the initial field trials, main field trials, and operational field trials were 88.09. The average shows that the results of student responses to the feasibility of e-modules are categorized as very feasible.

#### e. Pretest and Posttest Self Regulated Learning Student

The pretest and posttest in testing this product were carried out to 40 students. The purpose of this trial is to determine the effectiveness of the e-module to improve the self-regulated learning of junior high school students. Therefore, the tests carried out in this trial were carried out using the pre-experimental design method

In the initial stage, students were given pretest treatment which aims to determine the students' initial abilities towards self-regulated learning before using the e-module metacognitive strategy. From the results of the pretest, the average score obtained was 125.25. Furthermore, students are given a posttest using e-module which aims to determine the effectiveness of the product. From the posttest results obtained an average result of 132.75. Based on the values obtained, the average for self-regulated learning of junior high school students in South Cilacap District is in the Good or Medium category.

### Discussion

Based on the assessment of the material experts, it is included in the very proper category with a score of 90.28. Based on the assessment of media experts, it is included in the very proper category with a score of 80.56. The developed e-module is quite effective as a support for learning activities. Based on the measurement of students' self-regulated learning with the results of the pretest and posttest showing an increase in the self-regulated learning of junior high school students, the N-gain was 0.60 which was included in the medium category and the N-gain percentage was 40.00. Based on the categorization of the results of the analysis using a gain score and N-gain percentage, it is included in the medium category and quite effective. This shows that the use of e-modules is quite effective in increasing the self-regulated learning of junior high school students.

From the presentation of the results above, it was found that the development of electronic modules carried out by material experts showed that the development was able to increase the self-regulated learning of junior high school students. Self regulated learning or students' ability to self-regulate is a form of independent learning. Self-regulated learning is important to improve students' academic achievement because it will lead to an increase in the quality of a country's education. Good academic

achievement reflects maximum learning outcomes and learning goals that have been achieved. Individuals who have self-regulated learning are individuals who are active in metacognition, motivation, behavior in the learning process (Astuti, Irawan, & Hindrasti, 2021). From the results of the self-regulated learning process, it can be seen that there is a change in the character experienced by students. They become confident enough to be able to complete the tasks given. Students are able to do learning independently but teachers can still deliver material practically (Nugraha & Hendrawan, 2020).

Aziz & Putri Siswanto (2018) describes this rotating process with a three-stage management model. First, the forethought phase, that is the actual performance that precedes and relates to the process of collecting steps for an action. Second, the performance (volitional) control phase, which includes processes that occur before learning that affect attention and behavior. Third, as long as it occurs after the individual's performance responds to his efforts. Metacognition as one aspect of self-regulated learning is the individual's ability to plan, set goals, regulate, monitor oneself, and evaluate oneself on various sides during the acceptance process. Metacognitive knowledge involves monitoring and reflecting on one's recent thoughts. It includes factual knowledge such as knowledge of tasks, self goals and strategic knowledge such as how and when we should use certain procedures to solve problems. Metacognitive activity occurs when students consciously complete and organize their thinking strategies during problem solving and purposeful thinking (Astuti et al., 2021).

#### 4. CONCLUSION

Based on the results of research and development of e-modules to improve self-regulated learning for junior high school students, several conclusions are drawn. This development research resulted in an appropriate metacognitive strategy e-module that was able to improve students' self-regulated learning. The physical form of the e-module is packaged in the form of a url link with the format (apk.) which can only be accessed on Android devices at least Kitkat 4.4. The e-module has cover components, introduction, basic competencies, instructions, materials, reflections, videos, quizzes, references and developer profiles. The e-module developed is classified as "very feasible " to be used as a supporting medium in an effort to improve self-regulated learning for junior high school students, based on the results of several expert assessments.

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