Sumatra Journal of Disaster, Geography and Geography EducationJune, 2022. Vol.6. No.1. pp. 28-35
Disaster, Geography, Geography Education http://sjdgge.ppj.unp.ac.id/index.php/Sjdgge
ISSN : 2580 - 4030 **(Print)** 2580 - 1775 **(Online), Indonesia**

DEVELOPMENT OF E-MODULES IN GEOGRAPHY SUBJECT TO IMPROVE SELF REGULATION, MOTIVATION AND LEARNING OUTCOMES

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*Corresponding Author, Received: February 20, 2022. Revised: April 21, 2022. Accepted: June 26, 2022

ABSTRACT: Mastery of learning technology by teachers is highly necessary for the digital era. For example, the ability of teachers to package learning materials using various software in various formats. One form of presenting learning materials with technology is an e-module. E-modules serve as the main teaching material in online learning and can also be used in face-to-face learning. The purpose of this study was to develop an e-module, evaluate its feasibility and analyze its effect on motivation, self-regulation and learning outcomes in online learning. This research used the ADDIE model and then continued with a quasi-experimental research design with two pretest-posttest groups. The subjects of this study were students who participated in the Geography Learning Planning course. Class A (control group) and Class C (experimental group) students each consisted of 20 people. Data was collected through questionnaires and tests. The data analysis used is descriptive statistics and inferential statistics. The statistical tests carried out were t-test and ANCOVA by using SPSS version 24 software. The results showed that the e-module developed was very feasible and the application of e-module in online learning was significantly increase self-regulation, motivation, and learning outcomes.

Keywords: e-modules, feasibility, self-regulation, motivation, learning outcomes

1. INTRODUCTION

Learning on digital era needs the ICT skills among teachers and students alike. Moreover, the Covid-19 pandemic situation does not allow face-to-face learning in class. Therefore, online education or e-learning has become the primary choice. E-learning is an electronic learning method supported by internet, the use of digital platforms and devices such as computers, laptops, smartphones and their likes [1]. Electronic learning is thus also supported by electronic learning resources [2], one such resource being e-module.

E-modules are teaching materials or learning media that are presented electronically to support active learning. E-modules would make it easier for teachers to convey material to their students as well as make learning more interesting for being in accordance with present-day technological developments. Presentation of material in e-modules is not only done textually, but can also varythrough multimedia in the form of video, audio, short films and others [2] [3]. The development of electronic-based teaching materials is similar to that of e-books. Characteristics that must be met by e-modules include self-instructional, self-contained, stand-alone, adaptive, and user friendly [5]. Thus, e-modules can serve as the main learning resource for students, packaged according to their characteristics and in an interesting manner in order to avoid boredom among students when studying them [6].

E-modules are part of learning tools that contain learning outcomes or competencies in each learning activity, material, limitations, and systematic evaluation. This e-module facilitates students to learn independently, in groups or conventionally. E-modules are equipped with self-study instructions so that students can learn with their own pace. E-modules are able to improve learning effectiveness, learning independence [7] [8], self-direction, motivation, learning performance and learning outcomes [9] [10]. When learning independence, self-direction and motivation in students can be increased, learning outcomes will also improve. The ability of teachers to develop technology-based teaching materials must be a concern,since learning resources in the form of e-modules are required in education, especially in the face of the current situation which adopts online learning policies. With online learning, teacher and students' physical interactions are limited, and e-modules can help students learn more independently, thereby minimizing teacher guidance and being able to conduct independent evaluations of learning [5]. This of course affects the extent of learning outcomes among students. However, there are still

few teachers who developed learning resources independently and are more likely to use teaching materials that have been developed by others. This includes materials that are downloaded from internet or attained from other teachers who also dabble in the same subject. However, teaching materials need to be prepared based on the needs and characteristics of its diverse learners [11].

The Geography learning planning course has one topic, namely the Development of Learning Tools Oriented to High Order Thinking Skills. One of the outputs of this course is the Learning Implementation Plan (RPP). The initial survey using google forms distributed to 95 students showed that as many as 91.6% stated that it was difficult to design lesson plans independently, and they preferred to choose lesson plans that were already available on the internet. This would result in low competence of students in learning design as prospective teachers. Next, 96.8% of the students stated that they needed a module for the Geography Learning Planning course. Based on the above problems, e-modules were developed as the main teaching materials in online classes. The purpose of this research is to develop e-modules, evaluate the feasibility and apply them in online classes to improve self-regulation, motivation and learning outcomes. Similar studies related to e-modules are still few and far between, so the results of this study are expected to enrich the literature and to be developed in further research with different methods and variables.

2. METHOD

E-module development uses R&D (research and development) with the ADDIE development research model (Analysis, Design, Development, Implementation and Evaluation). In this development, the feasibility of e-module was assessed by a team of media experts and a team of material experts. After the e-module is declared feasible, it can then be used in lectures. Next, the effect of the e-module implementation to increase self-regulation, motivation and learning outcomes is used a quasi-experimental method with two groups of pretest-posttest research design. The research was conducted through 6 meetings (2 x 50 minutes). The learning topic is the Development of HOTS-Based Learning Tools. Learning in the control class is not carried out with e-modules, whereas the experimental class uses e-modules.

Participants

The students involved in this study consisted of class A (control class) and class C (experimental class). There are 20 students in each class who participated in the Geography Learning Planning course.

Data Collection

Self regulation contains 3 indicators, namely planning, controlling and reflection adopted from [12] . The data was obtained from a questionnaire consisting of 15 questions. Data on student motivation was collected using a questionnaire in the ARCS format (attention, relevance, confidence, and satisfaction) developed by Keller (1987). This questionnaire consists of 17 items which contain all indicators. Self regulation and motivation instrument reliability was measured using Cronbach's alpha with values ranging between 0.90 and 0.83. The measurement of self-regulation and motivation uses a Likert scale with scoring method in the form of 1) strongly disagree; 2) disagree; 3) agree; and 4) strongly agree. Learning outcomes data were collected through pretest and posttest. Questions are given in the form of multiple choice and instructional design practice. The instrument validation qualitatively on the construct aspect was carried out by 3 expert team. Based on the results of the analysis, the instrument is declared valid and reliable.

Data Analysis

The e-module feasibility data was validated by expert team and analyzed using descriptive statistics. Analysis of this data produces averages and percentages which are then presented in the table. Self regulation, motivation, and learning outcomes data were analyzed using SPSS version 24 software.Tests on normality and homogeneity of data were carried out using the Shapiro-Wilk and Levene tests. The statistical analysis was continued using the independent samples t-test and ANCOVA test at 5% significance level.

3. RESULT AND DISCUSSION

3.1 E-Modules Feasibility

The E-Module contains materials related to the development of learning devices with 4 types of learning activities, namely Analysis of SKL, KI, KD; Syllabus Analysis; Development of RPP and Practice of Preparation of HOTS-Based RPP. Each learning activity contains learning achievement components, learning achievement indicators, material descriptions, discussion forums, summaries and exercises. The results of the development of this module can be seen in Figure 1 below:

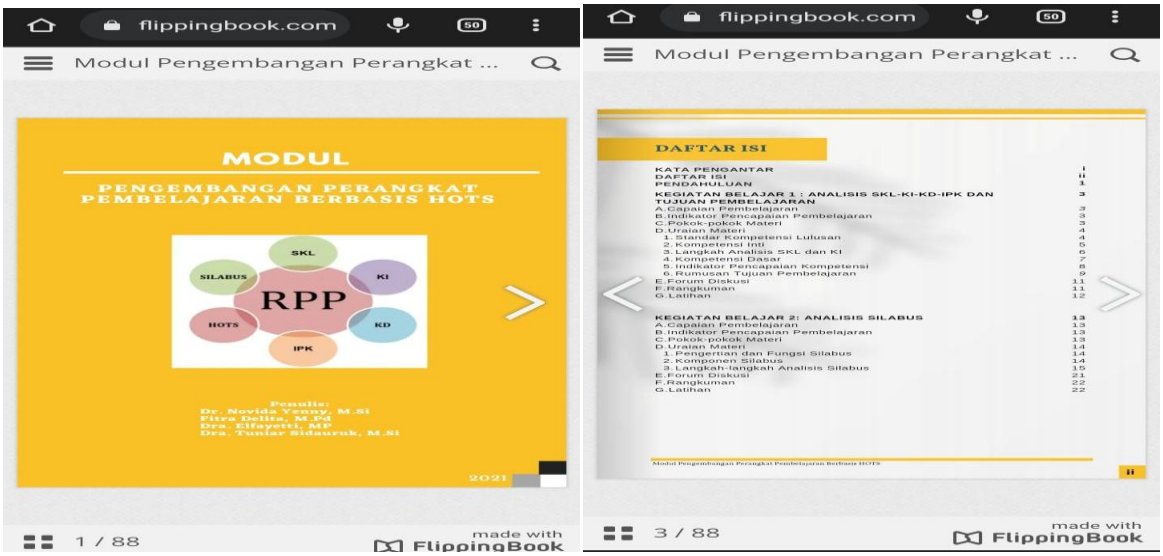

Figure 1. Display and Content of E-Modules

The feasibility of the E-Module was analyzed through validation by a team of experts, namely media and material experts. This validation process was carried out twice with the consideration that the e-module was in the very feasible category for use. Table 1 shows the results of e-module validation by *2* media expert teams (V1 and V2) as follows:

Table 1. Result of Media Validation

Indicators	Phase I		Phase II	
	V1	V2	V1	V2
Organization	2.5	2.5	4	4.5
Attractiveness	2.6	2.3	4	4.3
Letters and Picture	3	2.5	4	4.5
User Friendly	3	3	4	4.25
Adaptive	3	3	4	4.25
Average	2.74		4.18	
Category	Fairly		Very Feasible	

Based on table 1, it can be seen that in the first stage of e-module validation, it was still in the fairly decent category and therefore needs to be revised according to the validator's suggestions for improvement. In the second stage of validation, the e-module was very feasible for learning. Validation of e-module feasibility by material experts was also carried out through *2 phases. This validation is carried out by 2 lecturers as validators* 1 (V1) and validator 2 (V2). E-module validation results from *2* teams of material experts on each indicator can be observed in the following table *2*:

Table 2. The Result of Material Validation

Indicators	Phase I		Phase II	
	V1	V2	V1	V2
Self-Instruction	2.70	2.57	4.14	4.28
Self Contained	3	3	4	4
Adaptive	3	3	4	4
User Friendly	3	2.50	4	4.5

Average	2.846	4.115
Category	Fairly	Very Feasible

Table 2 shows that based on the first stage of validation, the e-module still needs to be revised. Meanwhile, in stage 2 validation, the e-module is in the category of very feasible for learning.

Measurement of e-module feasibility must be carried out before the module is tested on students. Validation of e-module feasibility is carried out by involving a team of experts as media and material experts. The module is declared valid and feasible if it meets the standards assessed by a team of experts [13] [14]. Aspects validated by media experts include organization, attractiveness, font and image, user friendliness and adaptibility. Each aspect is further divided into several indicators. Organizational aspects include the ease of achieving learning objectives and material clarity. Attractiveness includes the attractiveness of the content display, clarity of instructions and neatness of presentation. Aspects of font and image include the suitability of colors, text and images and the clarity of the use of font. User friendly aspects include user-friendly instructions, user-friendly information, comprehensive language and terminology. The adaptibility aspect includes e-modules that are relevant with present-day technological developments and can be used on various devices such as computers, laptops and smartphones.

While the aspects validated by material experts consist of self-instruction, self-contained, adaptive and user friendly. Self-instruction is divided into indicators of clarity of learning objectives, conformity of material with competencies and learning objectives, coherence of presentation of material, material accompanied by examples and illustrations that clarify the material, practice questions are in accordance with the material, language used is simple and communicative, has a summary, has answer keys and feedback. The self-contained aspect includes indicators of having complete and complete learning materials in accordance with competence. User friendly aspects include easy-to-use instructions, easy-to-understand information, understandable language and terms used. The adaptive aspect includes e-modules following technological developments and can be used on various hardware devices such as computers, laptops and smartphones.

All aspects and indicators of validation by material experts are in accordance with the theory of e-module development [15]. This is also in accordance with the characteristics of e-modules, namely self-instructional, self-contained, stand-alone, adaptive, user-friendly, consistent fonts and layouts, and using electronic media and compiled based on learning principles [5]. The average results of the validation of the two media experts for each aspect of e-module at this stage are organization (2.5), attractiveness (2.45), letters and picture (2.75), user friendly (3) and adaptive (3). Suggestions for improvement given by media experts include organizing the material in a coherent and clear way to achieve the expected final competence, adding icons and reducing verbal presentation of material, inserting pictures or videos, using bookman old or comic fonts, reducing the table font size, writing instructions which is clear in every learning activity, if there is a term, include its meaning or definition, especially for foreign terms, compress the e-module so that it can be used on various devices and does not consume data storage on the device. After being revised according to media expert suggestions, in phase II each component increased, namely organization (4.25), attractiveness (4.15), letters and picture (4.25), user friendly (4.13) and adaptive (4.13).

Phase I validation by the two material experts with an average value per indicator, namely Self-Instruction, (2.64), Self Contained (3), Adaptive (3), and User Friendly (2.75). Suggestions for improvement from material experts include presenting material that is more up-to-date and contextual. In order for the material to be better understood by the reader, each term should be given further explanation, the examples presented are related to actual conditions, the packaging of the material is in the form of a complete and complete description of each learning activity, the presentation of the material should be in the form of other media in the form of videos to make it clearer and motivate readers, and make sure that the e-module can be used in a variety of hardware, and complete the instructions for using the e-module to make it clearer. After being corrected according to the advice of material experts, in stage II validation, the average value per indicator increased, namely Self-Instruction (4.21), Self Contained (4), Adaptive (4), and User Friendly (4.25). Overall, in phase II, the e-module was in the very appropriate category to be used in the learning process for the Geography Learning Planning course for the topic of HOTS-Based Learning Device Development. The E-Module in the Lesson Planning course on the topic of HOTS Learning Device Development has met the eligibility standards. This can be seen in the results

of the stage II assessment of media experts with an average of 4.18 and material expert 4.115. If it is a percentage, the eligibility reaches 82.95 % in the very decent category [8] [5].

The e-module in this study is the main teaching material for the Geography Learning Planning course topic. The stages of e-module development are in accordance with the ADDIE (Analysis, Design, Development, Implementation and Evaluation) model proposed by Dick & Carey (1996). The analysis stage is aimed at analyzing the need for e-modules, analyzing basic competency/KD and the achievements of each lesson, outline of material, the materials and tools needed. The design stage is carried out to design the e-module framework into a prototype. The development stage is in the form of e-module development involving a team of experts as validators. This validation process goes through 2 stages involving 2 media expert teams and 2 material expert teams from lecturers.The implementation stage used e-modules in learning. E-modules are used in the Geography Learning Planning course as the main teaching material for the topic of HOTS-Based Learning Device Development. The e-module is implemented in the experimental class in online learning in the form of virtual meetings using Google Meet for 6 meetings (2 x 50 minutes). The next stage is the evaluation of e-module. The evaluation in this study was to measure the use of e-modules in improving self-regulation, motivation and learning outcomes. Then after going through these various stages, the development of each e-module component is carried out on an ongoing basis in order to obtain maximum results and be used for learning the same courses in the following semester.

3.2 The Effect of E-Module Use on Self-regulation, Motivation and Learning Outcomes

The comparison between the results of pretest and posttest in the control group and the experimental group showed an increase in each variable, namely self-regulation, motivation and learning outcomes. A significant improvement occurred in the experimental group after implementing the e-module as the main learning resource. In the control class there was also an increase in the three variables, but the increase was not as significant as in the experimental group. The results of the analysis of the pretest and posttest scores of the two groups can be observed in table 3 below:

Table 3. The Comparison of Pretest dan Posstest Scores

Data	Group	Pretest	Posttest	Increase
Self Regulation	Experiment	24.39	36.97	12.58
	Control	26.30	34.25	7.95
Motivation	Experiment	27.86	48.97	21.11
	Control	26.25	32.39	6.14
Learning Outcomes	Experiment	59.73	89.42	29.69
	Control	60.75	76.07	15.32

The results of analysis using ANCOVA test on the three variables showed significant differences in self-regulation, motivation and learning outcomes. The ANCOVA analysis is shown in table 4 below:

Table 4. The Results of the ANCOVA Test of the Research Data

Data	Degree of Freedom	F	Sig.
Self Regulated	1	14.501	< 0.05
Motivation	1	23.846	< 0.05
Learning outcomes	1	39.658	< 0.05

This digital era learning certainly requires learning resources that can also be accessed in electronic or digital form. These electronic teaching materials can support online and offline learning processes and face-to-face learning in the classroom. One such electronic learning resources is e-module. Electronic modules (e-modules) are similar to electronic books in that they are arranged as such so that students can study independently, either with or without teacher's guidance. E-modules as learning programs can be studied by students only with minimal supervision from the teacher because they are designed with complete and intact components [13] [14]. This

component includes competencies and learning outcomes, instructions for use, tools and materials needed, material descriptions, material summaries, exercises and assignments, discussion forums, and disclosed answers that allow for independent assessment.

Learning resources in the form of e-modules can be developed using software and presented in various formats. Software that can be used in the development of e-modules includes Sigil, Canva, Book Creator, Flip Book Maker, and various other software that can be used for free either by download/installation or online [5]. The e-module in this study was developed using Sigil software in .epub (electronic publication) format. The advantages of this epub, among others, are that it can be used in various software, easy to transform to other formats, video can be inserted and can be accessed on various devices [16]. Thus the use of e-modules becomes more practical, effective and efficient. The development of e-modules can be aimed at facilitating students to learn independently and strengthening the mastery of a competency. E-modules can also be aimed at increasing learning independence and learning outcomes [7], knowledge and skills [17], self regulation [8], improve perception, interest and motivation students [6]. In this study, the development of e-modules was carried out to measure the impact on students' self-regulation, motivation and learning outcomes in the Geography Learning Planning course, especially the topic of HOTS Oriented Learning Device Development. In detail, the discussion on each variable is as follows:

The Effect of E-Module Use on Self Regulation

Self regulation is the ability of students to independently and actively motivate themselves in order to achieve a specific goal [18], an active and constructive process in students to guide and control their cognition, motivation and behavior [19]. Self can be improved through technology-regulation based learning. This can be in the form of learning activities using ICT, digital media, managing learning with e-learning platforms such as LMS and presenting material electronically. The development of learning materials that can be accessed with various hardware such as computers, laptops and smartphones can increase [20]. One of the materials with these characteristics is in the form of e-modules.

Based on the data analysis of control class and the experimental class, it can be seen that there is an increase in the variable. The average measurement indicators in the pretest are planning (1.83), controlling (1.68), and reflection (1.56).While in the post-test, there was an increase in each indicator, namely planning (2.33), controlling (2.38), and reflection (2.52). Planning indicators are related to student planning towards the goals to be achieved in the learning process, namely mastering the material and getting the best grades and strategies adopted. For this indicator, students have planned goals, targets to be achieved and the efforts that will be made to achieve these targets. Controlling is the same as independent monitoring of processes and efforts in achieving the planned goals. This indicator also increases, which means that students' independent supervision of activities in learning increases. Reflection is carried out in the form of self-reflection on what has been done, the results and how to improve it in the future. In this indicator there is also an increase where students are able to identify their weaknesses in mastering competencies and determine improvement strategies. If students are able to plan, control and reflect on their learning activities independently, then their will be very good [12].

The experimental class with learning guided by e-module contains theory and practice, so that can be improved. In the experimental class, the increase on self regulation score was 51.58%, while in the control class the score was only 30.23%. Then the results of the ANCOVA test with an F value of 14.501 at Sig. < 0.05. This indicates that the use of e-modules in the Geography Learning Planning course can significantly improve self regulation among students.

The Effect of E-Module Use on Motivation

The use of technology in learning will make the learning process more interesting and motivate students [9]. The integration of technology in lectures, for example, is carried out in the presentation of material. Materials presented electronically in the form of e-books, e-modules, videos, animations, graphics and images will clarify concepts and increase motivation and create a pleasant learning atmosphere [3]. In this study, the use of e-modules was proven to increase student motivation in the material studied in lectures. Based on observations, in the experimental class, when learning took place, students were more motivated than the control class. Students were more enthusiastic and learning activities were also better. This can be seen in the frequency of students who actively ask questions, give arguments, show concern and confidence in learning, and the ability to complete assignments correctly and in a timely manner.

Based on each indicator, the motivation in the experimental class also increased. The ARCS model used to measure motivation consists of indicators of attention, relevance, confidence, and satisfaction. In the pretest, the values of each of these motivation indicators are attention (1.32), relevance (1.63), confident (1.56), and satisfaction

(1.68).While the post-test increased to attention (2.82), relevance (3.12), confident (2.61), and satisfaction (2.35). The results of the post-test on the attention indicator, the highest score on student statements that they were paying attention and taking notes from the lecturer's explanation, while the lowest score was on student statements of having understood everything the lecturer explained. In the relevance indicator, the highest score is on student statements that they know the purpose and benefits of the material, while the lowest score is on student statements that they are able to connect the material with the learning tools used by teachers at school. Confident indicator, the highest score in student statements can complete every question and exercise, while the lowest value in student statements is confident in what they have done. Satisfaction indicator, the highest score on the statement of methods and teaching materials used can help master the material, while the lowest score on the statement of satisfaction in solving problems and exercises.

Posttest results in the experimental class as a whole on the motivation variable increased by 75.77%, while in the control class the increase was 23.39%. The increase in student motivation was higher in the experimental class compared to the control class. The results of the ANCOVA test also show the impact of using e-modules on student motivation where the F value is 23,846 with sig. < 0.05. So it can be stated that there is a significant effect of using e-modules in increasing student learning motivation in Geography Learning Planning lectures. Similar findings were also found by [6] where e-modules were able to increase students' perceptions, interests and motivations to take part in the learning process. The perception variable in the sufficient category and perception and motivation in the good category.

The Effect of of E-Module Use on Learning Outcomes

Learning outcomes are the achievements of students after participating in the learning process. This achievement is often referred to as learning outcomes. The learning outcomes include cognitive, affective and psychomotor aspects. Measurement of cognitive aspects can be viewed from the mastery of students on the material they have learned. Since it is related to the material, this cognitive aspect can be improved by the teacher by packaging the material. Packing material into a format that is more accessible, easy to understand and can be used flexibly by students certainly improves mastery of the material. Presentation of material in electronic form will facilitate students to learn more effectively according to their conditions and needs so that they can directly build their skills and knowledge [21].

In this study, the material is packaged in the form of an e-module. E-modules are developed with appropriate criteria such as self containment and self instruction, so that students can improve their mastery of the material both independently and through collaboration. Material mastery tests in the form of multiple choice questions and practical tests to design learning tools. The experimental class performed better on both these knowledge and skills tests. This happens because the learning activities in the module provide guidance to students specifically. Module content can enrich knowledge about learning tools and strengthen skills. In the multiple choice test, the tendency of students' errors in questions related to learning models and higher order thinking skills. While in the practice test of designing lesson plans, students were still wrong in planning core activities oriented to a scientific approach and planning authentic assessments that included attitudes, knowledge and skills.

The results of the students' pretest and posttest analysis showed a more significant increase in the experimental class compared to the control class. In the experimental class there was an increase in learning outcomes by 49.70%, while in the control class it was only 25.22%.Then according to the results of the ANCOVA test, the F value is 39.658 at Sig. < 0.05. So it can be stated that the use of e-modules in learning the Geography Learning Planning course on the topic of HOTS Learning Device Development can significantly improve learning outcomes. The results of this study are in line with research conducted by [16], where the use of e-modules can improve results more significantly on the knowledge and skills of students. [7] also found that e-modules increase learning independence and learning outcomes.

4. CONCLUSION

The development of e-modules in learning can improve the quality of the students' learning process and outcomes. E-modules are very useful as the main learning resource because they are arranged based on the characteristics of students, the uniqueness of the material and in order to meet the principles of active, interactive learning and integrating technology. E-modules can clarify the meaning of the concept of a material because it is presented in various forms, namely textual, visual, audio and audiovisual. The use of e-modules in learning in this study was proven to increase self regulation, motivation and learning outcomes. Apart from being related to cognitive learning outcomes, e-modules can also improve learning outcomes in terms of skills. Thus, teachers must improve their ability to master learning technology to produce teaching materials that are relevant and

in accordance with the demands of 21st century learning.

5. ACKNOWLEDGEMENTS

We are grateful to the Research and Community Service Institute Universitas Negeri Medan for funding this study. The authors also thank the Geography Teachers who have contributed to this study.

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