The Effectiveness of Discovery Learning-Based E-Modules to Improve Student Understanding

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ABSTRACT: This research aims to produce thematic e-module products based on discovery learning that are feasible and effective in improving the comprehension ability of learners. This research is a type of Research and Development (R&D) research. The research was conducted referring to the theory of Borg & Gall (2003). The population of this study was class V students of the Ki Hajar Dewantara Cluster. The sample of this study was determined by Cluster random sample and saturated sampling taken at two different schools and obtained as many as 50 students. Data collection tools use valid and reliable test instruments. The effectiveness data analysis technique uses an effect size test with results of 0.937 in sample A and 0.932 in sample B. Based on data analysis from the results of the study, it is concluded that thematic e-modules based on discovery learning are effective for improving the ability of elementary school students to understand.

KEYWORDS: Discovery Learning, E-module, Learners' Comprehension Ability, Thematic.

INTRODUCTION

Thematic learning is included in an active, innovative, creative, and effective learning approach, and combines several subjects. Thematic learning is a learning system that allows learners, both individuals and groups, to actively search, explore, and find concepts. Learning that occurs is only centered on the teacher (teacher center) and not vice versa, so that students are not directed to learn independently. The learning resources used have not fully encouraged directing students to learn independently and / or student-centered learning (student center). The use of modules is expected to solve the problem.

Based on the results of several previous studies, modules can be used as a learning resource that can instill student independence. Modules are teaching materials to train students in independent learning. The main elements of the module that are used as alternatives for independent learning learners. Modules are expected to provide guidance for students in carrying out certain activities, so that at the end of learning students more easily master the basic competencies that must be achieved (Sonia & Kesumawati, 2022).

The teaching materials used by students have not fully improved student understanding, because of the lack of material contained in these teaching materials. The teaching materials used so far are only printed teaching materials and there are no electronic-based teaching materials (e-modules). Researchers also found that in the learning process, the teaching materials used have not fully invited students to find concepts or principles in learning (discovery learning). Discovery learning is a series of learning activities that involve the maximum of all students' abilities to search and investigate systematically, critically, and logically so that they can find their own knowledge, attitudes, and skills as a form of behavior change.

The results of the needs analysis given to students regarding teaching materials show the need for the development of teaching materials in the form of e-modules as teaching materials for students that can increase understanding and provide new learning experiences for students. The needs questionnaire analysis shows that in learning activities students have not only used printed modules and there is no discovery learning-based e-module.

The results of the educator need analysis show that the learning process uses the same way, the teaching materials used have not varied, so this is less attractive to students. Educators are interested in developing e-modules based on discovery learning approaches to improve students' comprehension skills. Educators apply the material by guiding students to find and express ideas related to the topic studied. who are able to explore ideas for students' comprehension abilities.

One way to develop students' comprehension skills is through innovative teaching materials. Referring to these problems, efforts are needed to be able to improve learning. One of them can be done by developing teaching materials in the form of Discovery Learning-based modules which will later be converted into electronic modules or E-Modules. The discovery learning model is a

learning model and is aimed at a number of references to carry out learning and has differences at a certain level based on discovery experience from previous learning experiences (Laili et al., 2019).

The use of this learning e-module is intended to make student learning outcomes better, and arouse student curiosity. Researchers want to develop e-modules on thematic learning based on Discovery Learning because not many have developed class V modules in thematic learning in elementary schools, for that researchers are very interested in developing this module.

Through e-modules the learning process is expected to be more interesting, interactive, able to convey historical messages through images and videos, able to develop students' auditive or auditory senses so that the material delivered is easier to understand. Based on the description above, researchers are interested in conducting research with the title: "Development of Thematic E-Modules Based on Discovery Learning to Improve the Comprehension Ability of Grade V Elementary School Students"

Modules are self-study packages that include a series of learning experiences systematically designed to help learners achieve learning goals. A module is a program package that is arranged in the form of certain units and is designed in such a way for the benefit of student learning. A module package usually has teacher instruction components, student activity sheets, student worksheets, worksheet keys, test sheets, and test sheet keys (Brigenta et al., 2017). Good modules should be systematically structured, attractive and clear. Modules can be used anytime and anywhere according to the needs of students. According to the Ministry of National Education, a good module must be prepared in accordance with the characteristics applied. The characteristics of the module include: 1) Self Intructional, 2) Self Contained, 3) Stand Alone, 4) Adaptive, 5) User Friendly.

Teaching materials must be mastered and understood by learners because they help in achieving learning objectives (Alliyah, 2020). (Irawati & Saifuddin, 2018), Broadly speaking, teaching materials consist of two types, namely printed teaching materials and non-printed materials.

Table I. Difference between Print Module and Electronic Module.

Electronic Module	Print Module
Print Electronic format (can be .doc, .exe, .pdf, etc.)	Printed format (paper)
Displayed using special electronic devices and software (laptop, PC, HP, Internet)	It looks like a collection of printed paper
Cheaper production costs	More expensive production costs
More practical to carry	In physical form, to carry it takes space to put
Durable and won't weather over time Durability	Paper durability is limited by time
Using a power source	No special resources are needed to use it
Can be equipped with audio or video in its presentation	Cannot be equipped with audio or video in its presentation.

(Laili et al., 2019)

Discovery Learning is one model for developing a way of learning students actively find themselves, investigate for themselves, then the results obtained will be faithful and long-lasting in memory, will not be easily forgotten by students. Children can also learn to think, analyze, and try to solve the problems faced by themselves (Puspitasari & Nurhayati, 2019).

The main characteristics of learning to find, namely (Hendrizal et al., 2021): (1) explore and solve problems to create, combine, and generalize knowledge. (2) learner-centered. (3) activities to combine new knowledge and existing knowledge.

Learning resources can use e-modules and the learning process can be done by applying a discovery-based learning approach so that the process is more fun and further improves the understanding ability of students, students are more active in the learning process, students participate more in the learning process, in the end it can increase the understanding ability of students.

METHODS

The research and development model used refers to the development model of Brog and Gall (2003), suggesting that the stages of R&D can be simplified into 3 stages, broadly speaking the stages of research and development, namely: (1) preliminary studies; (2) product development; (3) Product testing (Pargito, 2009). This study was carried out in two different elementary schools, namely, public elementary school 2 middle onion bones as sample A and muhammadiyah elementary school middle onion bones as sample B by assigning 1 class from each school. Test design using one group pretest-posstest design (Creswell, 2018). Research instruments use tests and non-tests that are tested for validity and reliability to obtain instruments that meet the standards.in the effectiveness analysis test using the effect size test (Cohen, 1988).

DISCUSSION

The results of research conducted in two schools showed good results, this is evidenced by the results of calculations on sample A and sample B shown in the following figure.
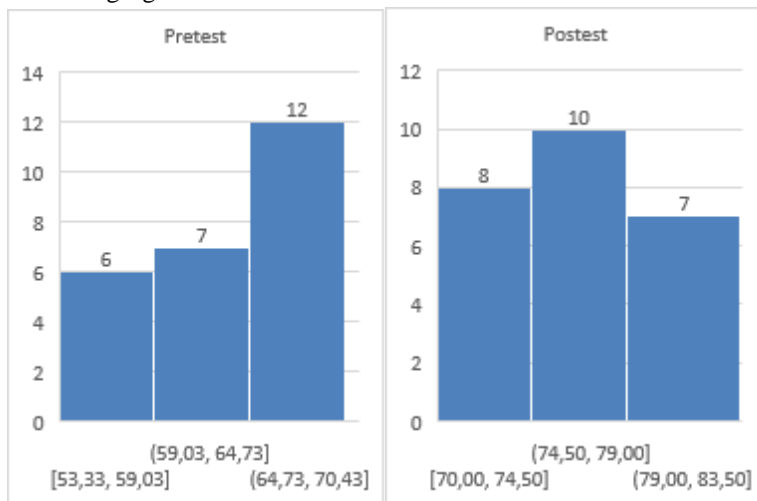

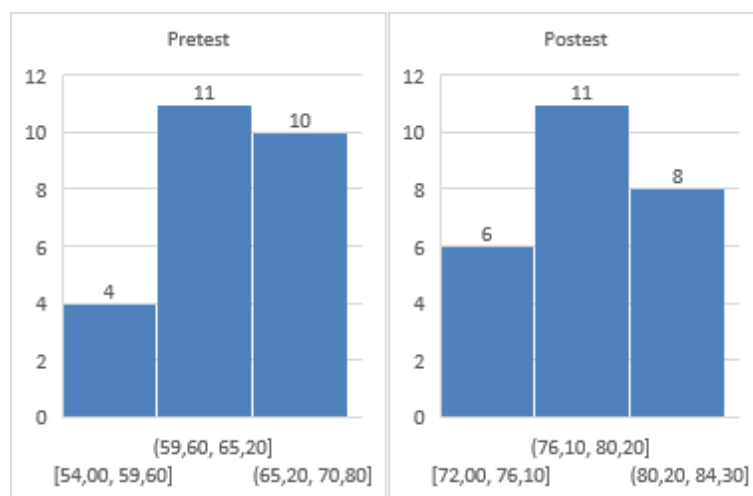
Figure 1. Hasil Analisis Nilai Sample A

Figure 2. Hasil Analisis Nilai Sample B

Based on the results of the analysis conducted on sample A and sample B showed an average increase in both samples seen based on the scores obtained by students based on pretest and posttest. This analysis is then continued on the n-gain test to see the real difference in the difference in students' comprehension ability. The n-gain result can be seen in the table below.

Table II. N-Gain Analysis

Sampel	Pretest	Posttest	N-Gain	Ket
A	63,37	76,76	0,36	Keep
B	63,60	79,24	0,42	Keep

Source: Results of research data analysis

Data testing is then continued on the paired sample t-test to see if there is a significant average difference. Based on the results of the t-test analysis, a significance value of 0.00<0.05 can be concluded that the use of discovery learning-based e-modules can improve students' comprehension abilities. Furthermore, the last test is an effect size test to see the effect of using discovery learning-based e-modules. The results of effect size analysis can be seen in Table III.

Table III. Effect size analysis results

Sample	Pretest	Posttest	StDev		Effect Size (Cohen d)
			Pretest	Posttest	
A	63,37	76,76	4,80	3,77	0,937 (Tinggi)
B	63,60	79,24	4,68	3,40	0,932 (Tinggi)

Source: Effect Size Analysis

Based on the results of the effect size test, it can be concluded that the use of discovery learning-based e-modules has a high magnitude of effect to improve the comprehension ability of grade V students, in other words, the products developed in this study can effectively improve the comprehension ability of students. So it can be concluded that there are differences in students' understanding by using discovery learning-based e-modules with those who do not use. The results of this test also show that discovery learning-based e-module products can be used in schools that have different characteristics at the level of certain wider areas. Electronic books or e-modules are software and hardware systems that can display information in the form of large amounts of text to users, and users can explore the information contained in the books and electronic modules (Prihatiningtyas & Sholihah, 2020). The electronic module can be said to be a learning resource unit that is specially arranged and detailed with appropriate components in it to achieve the desired learning goals. Therefore, educators must have a solution that provides electronic modules that are interesting and informative and their orientation stimulates the understanding of learners. Modules can be likened to subject matter that has been arranged in such a way that it is expected that readers or students can learn independently (Selviani, 2019). Student involvement in the learning process is the implementation of student activities in the classroom. Students contribute actively by carrying out activities that support the learning process including discussion, reading and doing assignments that have been given by educators (Indah et al., 2020). This is in line with the basis of discovery learning where the concept of learning directs students to find their own knowledge to be conveyed in learning. Learning activities that involve the maximum of all students' abilities to search and investigate systematically, critically, and logically so that they can find their own knowledge, attitudes, and skills as a form of behavior change.

Increasing student understanding in learning using discovery-based thematic e-modules cannot be separated from the activeness of students in the process of presenting assignment results and exchanging opinions on the answers to questions in the e-module. This is in accordance with opinion (Febriana & Sakti, 2021) which explains that e-modules that are systematically designed starting from methods, learning instructions, boundaries, materials, and practice questions can make it easier for students to learn independently. E-modules can be used as an interactive media because they can contain images, animations, audio, video and are equipped with quizzes as evaluations so that they can get feedback from students.

CONCLUSION

Thematic e-modules based on discovery learning are effective for improving students' critical thinking skills with an effect size of 0.937 and 0.923 high interpretation so that it can be concluded that there is an increase in student understanding by using discovery learning-based thematic e-modules with those that do not use students. E-modules based on discovery learning are effectively used to improve students' understanding of concepts, moreover improve the learning process that takes place for the better.

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