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Development of E-Modules Based on Discovery Learning on Temperature and Heat Material to Improve Communication Skills of Grade V Elementary School Students

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Abstract: The purpose of this study was to describe the results of the validity, practicality, and effectiveness of the development of Discovery Learning-Based E-Module Media to Improve Communication Skills of Fifth Grade Elementary School Students. With the development of E-Module science learning based on Discover Learning, it is expected to motivate students in the learning process and can increase student activity in learning Theme 6 Subtheme 1 Temperature and Heat. The research design used is Research and Development (R&D) development research. The development model in this study uses the ADDIE model. The research instruments used are expert validation questionnaires, teacher and student response questionnaires and learning outcome tests. Based on the research conducted, the results of the level of validity of the learning media obtained from the results of the validation of material experts and learning media experts obtained the Valid criteria. While the results of the practicality test of the media developed based on the results of the teacher and student response questionnaires obtained the criteria of very practical learning media and the results of the practicality test seen from student learning outcomes obtained the criteria of effective media used to improve student learning outcomes. Based on the results of the data analysis carried out, it can be concluded that the developed learning media has been proven to be valid, practical and effective for use to improve the communication skills of fifth grade elementary school students.

Keywords: E-Module, Discovery Learning, ADDIE, Communication Skills

PRELIMINARY

The Indonesian Education System is constantly changing from time to time. The most important thing to achieve quality education is a consistent and sustainable learning process. This expectation requires logical, systematic, critical, accommodating and sustainable thinking. The development of science and technology is growing rapidly from time to time. This phenomenon creates competition in the realm of life. There is a lot of competition, but one of them is in the field of education. To create quality human resources (HR), it is necessary to improve the quality of education in Indonesia.

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With the development of science and technology, especially information technology which greatly influences the preparation and implementation of learning strategies, teachers get a breath of fresh air to use it in achieving learning goals. By using information technology in the form of media, it can not only facilitate and expedite the learning process, but can also create teaching aids for innovative learning processes. One of the teaching aids that can help students understand the material is the use of electronic modules (E-Modules) as learning aids, where this E-Modul media is then presented using machine equipment that is calculated by the name of an electronic module and abbreviated as E-Modul (Suyanto & Murwaningsih, 2017).

E-Module (electronic module) is an electronic version of a computer-readable printed module designed with the necessary software. E-Module is a learning tool that contains materials, methods, limitations, and assessment methods that are designed systematically and attractively to achieve the expected skills according to the level of complexity in terms of electronics. Electronic Module or E-Module is a display of information in the form of a book that is presented in electronic form on a hard drive, floppy disk, CD, or flash disk and which can be quickly read by a computer or electronic reader (Salah & Thabet, 2021) The advantage of E-Module for learning is that E-Module is designed using a specific application. With the design and development of this electronic module, it is hoped that it can be used as a means of teaching and learning activities both offline and online today. The type of electronic teaching materials that will be designed and developed, which have been verified by many experts to suit the needs of use, reduce the monotonous and boring learning atmosphere, and help the learning process. This E-Module is designed based on Discovery Learning. Where Discovery Learning emphasizes that students play an active role in learning. So that the results and memory of students can last a long time. The electronic module is equipped with attractive images and easy-to-understand language, which can stimulate students to be more active in learning, meaning actively involving students in learning something and thinking about what they are doing in the learning process (Twiningsih, 2022). Based on the above, the development of a learning E-module based on Discovery Learning, which provides students with the opportunity to learn how to use different techniques to solve problems. In this E-Module, it is also hoped that there will be an increase in the communication skills of grade V students. Based on the results of the analysis of the

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problems that have been presented, the purpose of this study is to develop a thematic learning E-Module based on Discovery Learning to improve the communication skills of grade 5 elementary school students that are valid, practical and effective.

METHOD

The method used in the research is research and development (R&D) where according to Zef, Rachman and Aminol in Febri (2024), Research and development is a research activity that begins with research, then continues with product development, either producing new products or developing old products to be more effective so that they can be accounted for. For the reference point in the use of R&D, a model known as ADDIE is used, which is an acronym and also indicates the stages consisting of Analysis, Design, Develop, Implementation and Evaluation. The stages of the ADDIE model can be seen in Figure 1 below

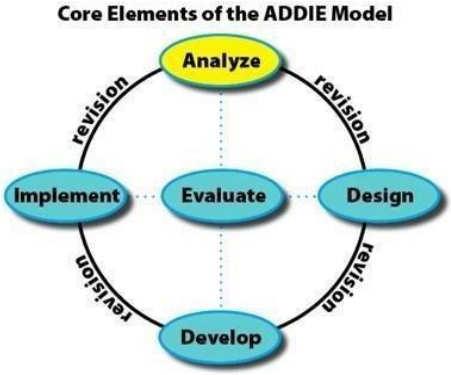

Figure 1: Desain ADDIE (Febri, 137:2024).

The research was conducted in 5 State Elementary Schools (SDN) where 3 SDN (Jabon 1, Jabon 2, Banyakan 2) as small groups and 1 SDN (banyakan 1) as large groups in Tarokan District, Kediri Regency, East Java. The samples needed in the study were teachers (8 people) and 5th grade students (30 students). The time needed to conduct the research was 3 months (February-April 2024). Before the data collection technique was carried out, the E-Module developed based on the stages (ADDIE) was first analyzed by the validators. The purpose of the analysis carried out by the validators was to ensure that the E-Module had met the requirements both in terms of design and development. The validators selected were adjusted to the indicators that had been set in this study, namely: material validator, media validator and evaluation validator. The final assessment of the E-Module from the three validators ensured that the E-Module Based on Discovery

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Learning Material on Temperature and Heat to Improve the Communication Skills of 5th Grade Elementary School Students was feasible to be implemented.

Table 1. Quantitative and Qualitative Paradigms

Information	Quantitative	Qualitative
Method	Development Trial	Comparison In depth interview study
Technique	Questionnaire Statistics	Observation Interview documentation
Subyek	Teacher 5th Grade Elementary School Students	Validator Previous researcher
Objective	Testing validity, effectiveness and practicality	Know thoroughly and deeply
Results	Hypothesis proof value	Assessment and recommendations

To obtain quantitative data, calculations are carried out using quantitative descriptive analysis, where the answers from respondents are given a certain score based on the score weight. Determination of the scoring method using a Likert scale that will provide a degree of 1-4 numbers indicating the level of answers towards positive or negative. In this study, the Likert scale is used to produce scores on the validity and practicality aspects. Where in the validity aspect the score is given to the validation results from the validators (materials, media and evaluation). The answers from the validators are ranked from very good to very poor according to the assessment results. The scoring formula for the validity aspect is as follows:

$$V = \frac{TSEV}{S\ max} \times 100\%$$

Information:

V : Validity

TSEV : Total Validator Empirical Score

S max : Maximum expected score

Table 2. Revision Decision Making

Achievement Level	Qualification	Description
81% – 100%	Very good Good	No revision needed
61% – 80%	Quite good	Needs some revision
41% – 60%	Good	Revised quite a bit
21% – 40%	Not good	Not usable
0% – 20%	Very bad	Not usable

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For the practical aspect, the questionnaire responses of educators and students were conducted to determine the practicality of the E-Module assessment product that was developed. The results of this educator response questionnaire were conducted with a descriptive percentage analysis with the formula:

$$P = \frac{n}{N} \times 100\%$$

Information:

P = Percentage level of aspect

n = The total score of the aspects obtained

N = Maximum amount

The results of the data calculation are then converted based on the assessment criteria for educator responses. The developed learning e-module is declared practical if it obtains a percentage level of aspects >62%. The criteria for the practicality of the educator's response can be seen as follows:

Table 3. Practicality Criteria for Educator and Student Responses

Percentage Level Aspect	Criteria
82% - 100%	Very Practical
63% - 81%	Practical
44% - 62%	Less Practical
25% - 43%	Not Practical

In the last aspect, namely the effectiveness aspect, where the effectiveness test goes through 2 stages, namely small group tests and extensive tests. Small group tests were conducted on 10 students and extensive tests were conducted on 30 students. The quantitative analysis technique used to calculate the effectiveness of the E-Module (cognitive value) is the t-test. Before the data was analyzed, prerequisite tests were carried out, namely the normality test and the data homogeneity test. The normality test is used to determine whether the data obtained is normally distributed or not. The test used is the Kolmogorov Smirnof test with the correction test being the Liliefors test. The one-sample Kolmogorov-Smirnov test is a goodness-of-fit test. This means that what is considered is the level of conformity between certain theoretical distributions. This test determines whether the scores in the sample can be reasonably considered to come from a population with a certain distribution. Meanwhile, the Liliefors test or normality test is a procedure used to determine whether the data comes from a normally distributed population or is in

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a normal distribution. A normal distribution is a symmetrical distribution with the mode, mean and median in the center. In terms of uniformity, the homogeneity test is conducted to determine whether there is a difference in variance between the groups being tested. The test used is the Independent Sample Test on the class post-test score. The test criteria used are if t count < t table or t count > t table then H0 is rejected. In conclusion, it means that there is a difference in the average post-test value between the module class and the existing class.

RESULTS

In the validation test from the analysis of the validators, it was shown that the E-Module based on Discovery Learning on temperature and heat material to improve the communication skills of 5th grade elementary school students was very valid based on the following table:

Table 4. Validation Results by Validators

No	Validator	Nilai
1	Linguist	91,67
2	Material Expert	90,00
3	Evaluation Expert	97,50
Average		**93,50**
Criteria		**Very Worth**

With an average value of 93.50, it shows that the E-Module design in the analysis of the validators is very valid in terms of material, media and evaluation. In the trial applied to teachers in large groups, results were obtained that showed that the E-Module was very positive and accepted.

Table 5. Results of Educator Responses to Large Group Trial

No	Aspects assessed	Educator 1	Educator 2
1	Attractiveness	12	11
2	Convenience	15	15
3	Usefulness	4	4
Total Score		31	30
Maximum Score		32	32
Percentage Score		96,87%	93,75%
Average Percentage		95,31%	
Criteria		**Very Practical**	

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The results of the large group educator response test for the practicality test from educators, obtained an average value with a percentage of 95.31%. According to the provisions of the practicality instrument analysis, the percentage of 82% - 100% is included in the very practical criteria, therefore the field data shows that 95.31% is included in the very practical criteria. For the practicality test on grade 5 elementary school students in large groups, positive results were found for the use of Discovery Learning-based E-Modules in temperature and heat materials. The results of the trial on the practicality aspect are as follows:

Table 6. Results of Student Responses to Large Group Trial

No	Aspects assessed	Educator 1	Educator 2
1	Attractiveness	95,96%	Very interesting
2	Convenience	93,37%	Very easy
3	Usefulness	97,73%	Very useful
Average Percentage		**95,69%**	
Criteria		**Very Practical**	

Based on Table 5, it shows that the results of the student response test of the large group trial for the practicality test of the students, obtained an average value of 33 students with a percentage of 95.69% of the criteria very practical. In the third aspect and at the same time a significant aspect to produce a conclusion that the Discovery Learning-Based E-Module of Temperature and Heat Material to improve the Communication Skills of Grade 5 Elementary School Students, the effectiveness test showed the following results:

Table 7. Results of the Communication Skills Effectiveness Test

NO.	ASPEC/ INDIKATOR	LEARNING ACTIVITIES						TOTAL SCORE	AVERAGE
		PB 1	PB2	PB3	PB4	PB5	PB6		
1	Expressing information and ideas	89,40	91,70	93,20	93,90	95,50	96,20	559,90	93,32
2	Paying attention when others are talking	87,90	91,70	93,20	94,70	95,50	97,00	560,00	93,33
3	Asking and answering questions	90,90	92,40	93,90	95,50	93,90	96,20	562,80	93,80
4	Writing the results of understanding	89,40	90,90	95,50	94,70	95,50	95,50	561,50	93,58
5	Visual representation	90,20	93,20	91,70	96,20	94,70	94,70	560,70	93,45
6	Courage	89,40	91,70	93,20	95,50	94,70	96,20	560,70	93,45
7	Flexibility	89,40	90,90	93,20	97,70	96,20	97,00	564,40	94,07
	TOTAL SCORES	**626,6**	**642,5**	**653,9**	**668,2**	**666,00**	**672,8**		
	PERCENTAGE OF SCORES (%)	**89,51 %**	**91,79 %**	**93,41 %**	**95,46 %**	**95,14 %**	**96,11 %**		
	AVERAGE PERCENTAGE	**93,57%**							
	CRITERIA	**VERY HIGH**							

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The achievement of communication skills from 30 students received an average score of 93.57% with high criteria. Thus, it shows that the Discovery Learning-Based E-Module on Temperature and Heat Material is Able to Improve the Communication Skills of Grade 5 Elementary School Students with quite high potential abilities.

DISCUSSION

Based on the indicators of the communication skills dimension, it is then formulated in the form of items consisting of 28 statement items. The instrument items developed have been tested for validity and reliability on the data obtained during the study, as well as a practicality test which includes ease, attractiveness and usefulness by practitioners. According to Bambang (2018:13) said that a measuring instrument will be doubted if it does not meet the elements of validity and reliability. The results of the validity test show that the instrument items developed meet the KMO value of 0.505> 0.5 with a chi-square of 10.945> df 33 and a significance of 0.012, it can be concluded that the instrument developed is valid. The reliability test shows the consistency of the instrument items as seen from the Cronbach alpha value of 0.601> 0.6, it can be concluded that this instrument is consistent in measuring students' self-confidence. The practicality test meets the elements of attractiveness, ease, and usefulness. This is in line with the opinion According to Noviana (2019) in her research explaining that the E-learning Module is said to be practical by looking at three aspects. First, the aspect of attractiveness, namely the quality of the E-learning Module that causes interest, desire, or attraction to use the instrument from the appeal of color, images, letters, and content of the material on the instrument. Second, the aspect of ease, namely the implementation or use of simple instruments that do not complicate educators and students. The effectiveness test of the E-Module based on Discovery Learning which was developed to measure students' communication skills was carried out in an experimental class called the Module Class (a class that uses the E-Module of students based on Discovery Learning with a sample size of 30 students).

The sampling technique used is the Cluster Random Sampling technique. The quantitative analysis technique used to calculate the effectiveness of the e-module (cognitive value) is the t-test. Before the data was analyzed, a prerequisite test was carried out, namely the normality test and the data homogeneity test. The normality test is used

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to determine whether the data obtained is normally distributed or not. The test used is the Kolmogorov Smirnof test with the correction test being the Liliefors test. Homogeneity test is conducted to determine whether there is a difference in variance between the groups tested. The test used is Levene's test. The test is continued with the Independent Sample Test on the post-test scores of the experimental classes. The test criteria used are if t count < t table or t count > t table then H0 is rejected. In conclusion, it means that there is a difference in the average post-test value between the module class and the existing class.

The results of the practicality test on educators showed that the developed instrument met the practical criteria in the initial field test. This is indicated by an average value of 72.44. According to Sudijono (Noviana, 2019) said that the developed learning E-Module is declared practical if it obtains a percentage level of aspects > 62%. The average results of the percentage of the effectiveness test of communication skills from learning 1 81.51%, learning 2 91.79%, learning 3 93.41%, learning 4 95.46%, learning 5 95.14%, learning 6 96.11%. It can be concluded that the results of the effectiveness test of communication skills have proven to be effective, because the percentage is more than the average of 80% success.

CONCLUSION

Based on the results of the research and discussion, the following conclusions can be obtained: The discovery learning-based learning E-Module to measure students' communication skills that was developed is theoretically feasible. This is evidenced by the assessment of three experts, namely evaluation experts, material experts, and language experts who stated that the assessment of the E-Module learning to measure students' communication skills based on discovery learning was developed in very valid criteria. The E-Module learning to measure students' communication skills based on discovery learning that was developed is practical. This is evidenced by small and large group trials through practical responses to the aspects of attractiveness, ease, and usefulness for educators and students in very practical criteria. The attractiveness aspect can be seen from the appearance of the instrument page, in terms of design, color, and font selection. Then, the ease aspect where there are clear instructions for use, flow, and scoring guidelines on the instrument. In addition, the usefulness aspect of the instrument that can be used to work on assignments in groups and measure students' communication

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skills. The E-Module learning to measure students' communication skills based on discovery learning was developed effectively. This is proven through an effectiveness test using the percentage of communication skill achievement according to indicators with high achievement criteria results, with the results of individual achievement levels dominated by very good, good, and quite good. This means that the E-learning Module in the E-learning Module to measure students' communication skills based on discovery learning can be used well and effectively, so that instrument users can easily understand the flow of each learning.

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