DEVELOPMENT OF AN E-MODUL BASED ON PROBLEM-BASED LEARNING TO GROW CRITICAL THINKING SKILLS OF CLASS V ELEMENTARY SCHOOL STUDENTS

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Abstract

The goal of this study is to generate problem-based learning (PBL) instructional materials for fifth-grade elementary school pupils. The following steps make up the development model that adopts Borg and Gall's theory: 1) Possibilities and issues 2) data gathering Product design, design validation, and three 5) Design modification Product evaluations at steps six and seven. In order to examine the characteristics and feasibility-mode derived from the expert validation results, this research was carried out at SD Negeri 06 Kedungwuni.

Keywords : E-Module, Problem Based Learning, Critical Thinking

1. Introductions

The post-pandemic recovery phase that the globe is currently going through, COVID-19, cannot be divorced from the educational sector. The government is working to develop policies that will use information and communication technology (ICT) to improve learning quality. The usage of ICT in the modern era can benefit the field of education, particularly in the post-pandemic eraCovid-19 where it can be used as a learning tool to improve learning quality. ICT can be used as learning media, learning tools, and learning materials in primary schools. Of course, the instructor must be picky in determining what can be used to facilitate learning.

Critical thinking skills are crucial for everyone in the twenty-first century, particularly for those working in the educational sector, such as teachers and students. The theory of 21st century talents is a brand-new theory that has surfaced in the last few decades. With the help of this theory, people can become better and more competitive in the digital age. People with high-level thinking abilities, such as critical, creative, and inventive thinking, are needed for jobs in the twenty-first

century (Trilling & Fadel, 2009).

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The capacity to think at a higher level is known as High Order Thinking Skills (HOTS), which encompasses the capacity to think critically, rationally, reflectively, metacognitively, and creatively. Critical thinking abilities are one of the talents that pupils need to develop according to the 2013 curriculum. Students can independently learn this skill, and teachers can train them in it. According to (Desty Sugiharti et al., 2019), educators must consider how to foster students' critical thinking abilities. Critical thinking is significant because it can enhance a person's capacity for problem-solving-related analysis, assessment, and evaluation (Richard Paul et al., 2007). Critical thinking abilities help students understand content more thoroughly, assess all of their knowledge, and come to a solution for a problem. (Rahmi, 2018) One of the independent digital teaching tools called E-Module is set up interactively with the intention of enhancing learning. These ideas lead to the conclusion that e-mode are non-printed teaching tools that may be utilized independently to enhance learning through interaction and efficiency.

Characteristics According to (Wulansari et al., 2018), the qualities of a good e-module are 1) self instruction, meaning the instructions are clear, and 2) self contained, meaning it does not rely on other teaching materials. An e-module is a module that is presented using electronic media, so the characteristics of e-mode are the same as the module.3) stand alone, which denotes that the subject matter may be researched alone. 4) User-friendly and adaptable means simple to use.To promote student interest in utilizing the e-module, it should be provided with comprehensive, engaging, and nicely presented content. Cell phones have the added benefit of being more practical and portable. It is envisaged that learning would be more enjoyable and efficient thanks to e-module.

E-modul use in educational activities can benefit both students and teachers. It is important for students to understand the comments so they can gauge their level of mastery of the course material. Because the learning goals are included in the e-mode and it is possible to determine the students' learning outcomes, it benefits the instructor by giving them more time and chances to provide each student individualized support and attention. According to (Suryaningsih., 2010), there are four advantages of incorporating modules into learning activities, including: may assess how well pupils grasp the instructional materials assigned to them. Learning resources are organized systematically, and teaching is more effective since it is organized by academic level.

How to Compose in Ane-Mode, according to Prastowo (2015: 119–120) There are

four steps that must be completed, namely:

1) Curriculum Evaluation

   This step seeks to identify the information required for ate-mode instruction and must be customized to the level of the students' demands.

2) Identify the Title E-Module in

   If the kind of competency is not very extensive, the material can be utilized as a learning competency as a title once it has been decided that it would be combined in one way. There is a 4-MP (basic) competence cap.

3) Coding the E-Module

   Code e-modul numbers have meaning. For instance, the initial digit of the number one (1), number two (2), and so on, all denote IPA. The department's primary set of studies, pursuits, or specialities is indicated by the second number as well.

 4) The E-Module Writing

   When referencing E-Module in writing, among other things, there are five factors to keep in mind: The production of content, the determination of assessment instruments or student workbooks (LKPD), the development of fundamental skills that must be acquired, the sequencing of instruction, and the structuring of teaching materials (e-modul) are all steps in the process.

   According to the characteristics of the 2013 curriculum, which incorporates information and communication technology in the learning process, learning must be conducted in a way that is interactive, inspiring, and enjoyable for students to actively participate, in light of the various issues that have been described above. In order to boost learning after the Covid-19 epidemic, which has the effect of reducing learning, instructors must overcome difficulties. Information and communication technology (ICT) must be used by teachers as media and learning resources, learning innovation by looking at the learning model in the 2013 curriculum, namely one of the PBL models that is in line with the innovation of 21st century skills, namely so that students have the capacity to think critically so they can improve the quality of the participants. educate, evaluate all information, and come to a decision to resolve a situation. A research study named "Development E-Modul based Problem Based Learning (PBL) To Grow Critical Thinking Skills of Class V Elementary School Students" was conducted in response to these issues.

2. Research Methods

   This study uses PBL as its development model to grow critical thinking skills of Class V Elementary School Students. By adopting a modified version of Borg and Gall's product development model, the sort of research utilized is similar to an experiment. The study was carried out in grade 5 at SD Negeri 06 Kedungwuni. A total of 55 pupils in grade 5 made up the population. Purposive sampling is a strategy that uses samples that are selected depending on daily test results for pupils. Techniques for gathering data, include equipment, observations, interviews, and tests.

To assess a product's efficacy, pre- and post-tests are employed.

3. Result and Analysis

Potential and difficulties are included in research and development according to Borg and Gall. Data gathering, product design, design validation, design revision, product trial, and product revision are the following steps. The following is the description:

3.1 Research and Information Collection

Decide what kinds of instructional aids can be created at this point, such as handouts, books, learning modules, student worksheets, and other aids like cassettes, radio, images, and videos (Majid, 2012: 174). Finding the educational resources that best meet the requirements of the pupils is the next stage. Students require instructional tools that may boost knowledge, assist students learn more effectively, and make it simpler for them to grasp the material's fundamental principles. On the basis of this, e-module teaching materials will be created. The ability of e-modules to be used independently by students and innovations from traditional modules that are expected to increase student appeal and interest in comprehending the subject matter concepts contained in e-mode are the driving forces behind the development of these teaching materials, which can be expected to encourage students' critical thinking.

3.2 Planning

Based on an interview with Mrs. Sri Widati, S.Pd.SD, a teacher of grade 5. It was discovered that there was little need for teaching materials in Class 5, that students struggled to understand the concepts covered in the textbooks, that they showed less interest in the learning activities when the teacher used printed book teaching materials, and that there were no creative teaching tools the teacher could use to supplement the main text. The information acquired also comes in the form of instructor recommendations for creating instructional materials that might boost students' enthusiasm in studying. This project will create educational materials e-module that can be accessed via a smartphone or laptop based on recommendations and feedback from teachers. The fifth-grade teacher believes that this is ideal since fifth-graders are accustomed to using computers or cellphones and applying the concept of playing while studying.

3.3 Product Design

At this point, work on the plane-mode PBL-based started, and product design proceeded as follows:

3.3.1 Planning The Implementation Of Learning (RPP)

Theme 8 Environment is Our Friend, Sub-theme I Lesson Content of Natural Sciences was chosen as the primary topic based on PBL. In the 2013 updated 2016 curriculum, it is required to establish fundamental skills and indications of

competence accomplishment. Determine the learning objectives that will be injected into the module after determining basic competencies and indicators. Table 3.1 lists basic competencies, Indicators, and learning objectives as follows:

Table 3.1 Basic Competencies, Indicators and Learning Objectives

Basic Competencies	3.8 Analyzing the water cycle on events on earth 4.8 Analyzing the impact of the water cycle on events on earth for the survival of living things
Indicators of Competence Achievement	3.8.1 Identify the process of the water cycle 3.8.2 Identify the benefits of water for life 4.8.1 Identify ways to save water in everyday life 4.8.2 Analyze human activities that affect the water cycle
Learning Objectives	1. Through observing and discussing activities, students can correctly identify the process of the water cycle. 2. Through observing and discussing activities, students can correctly analyze the benefits of water for everyday life. 3. Through discussion activities, students can properly practice how to save water in everyday life. 4. Through observation activities, students can correctly evaluate human activities that affect the water cycle.

3.3.2 Determine The Evaluation

Evaluations are used to gauge how well pupils comprehend in a classroom environment.Regarding the evaluation included in the form of online word games, multiple choice questions, and LKPD Google Docs, the questions are created based on PBL by using indications High Level Thinking Capabilities.

3.3.3 Create e-modul resources

Gathered a number of sources to back up the information for sub-theme 1 of theme 8 of our closest friend's surroundings. School textbooks, reputable online publications, and YouTube videos served as the sources. The e-module is attractively designed, and the content is created based on previously supplied basic competencies and indicators. The appropriate presentation can increase the appeal of the e-module design, piqueing students' interest in studying it.

3.3.4 E-Modul Structure

Covers, menus, usage instructions, concept maps, profiles, KD and GPA, material descriptions, student worksheets (LKPD), discussion sheets, "did you know?", summaries, practice questions, answer keys, reflections, glossary, and bibliography are all included in the design draft e-module. It also includes a glossary and a bibliography.

3.4 Design Validation

Design validation is a procedure that determines whether or not an e-module's design is practical and reliable enough to be utilized for learning. Several experts and instructors, including learning media specialists, material experts, and qualified teachers, carried out the validation for this study. Mr. Muchamad Fauyan, M.Pd. Lecturer in Educational Technology at Abdurahman Wahid University in Pekalongan, validated media experts; Prof. Dr. Woro Sumarni, M.Sc. Professor at Semarang State University, validated material experts; and Mrs. Sri Widati, S.Pd.SD. class 5A teacher at SD Negeri 06 Kedungwuni, validated professional teachers. The e-module is validated by each expert to identify any flaws so they may be fixed later. The outcomes of the expert validation are described below.

3.4.1 Result of Media Expert Validation

Mr. M. Fauyan, M.Pd. is a Lecturer in the Education Technology course at Abdurrahman Wahid University, Pekalongan, conducted the media expert validation exam.The assembled E-Module are then presented to media professionals working in the technology industry together with a grid and a scale of 1–5 rating sheet. Table 3.2 provides the media validation test findings that are listed below.

Tabel 3.2 Results of Media Expert Validation

No	Aspect	Percentage of Agreement (PA)	Category	V Aiken	Information
1.	Language	9,0%	Very Good	0,88	High
2.	Serving	9,4%	Very Good	0,93	High
3.	Graphics	8,6 %	Good	0,83	High
4.	Fills	8,4 %	Good	0,78	Medium
	Average	8,2%	Good	0,85	High

Based on Table 3.6, the findings of the validation assessment study by media experts discussed above yielded an average V Aiken score in the high category of 0.85. With the appropriate categorization, there is an 8.2% percentage of agreement (PA). Recapitulation findings demonstrate the product's suitability for classroom application in Class V of an elementary school.

3.4.1 Results of Material Expert Validation

The following evaluation is a validation examination of media experts conducted by Prof. Dr. Woro Sumarni,M.Sc. Professor at Semarang State University. The completed E-Modul is then presented to subject matter experts in the area of natural science together with a grid and a rating sheet on a scale of 1 to 5. Table 3.3 presents the outcomes of the material validation test.

Tabel 3.3 Result of Material Expert Validation

No	Aspect	Percentage of Agreement (PA)	Category	V Aiken	Information
1.	Content	7,4%	Good	0,68%	Medium
2.	*Problem based learning*	7,8%	Good	0,73%	Medium
3.	Language	7,8%	Good	0,73%	Medium
4.	Serving	7,6%	Good	0,7%	Medium
5	Graphics	7,8%	Good	0,63%	Medium
	Average	7,7%	Good	0,7%	Medium

The findings of the validation study of the material expert above, based on Table 3.3, yielded an average V Aiken score of 0.7 in the medium category. The percentage of agreement (PA) was a respectable 7.7%. The summary demonstrates how learning may be facilitated by teaching materials in class V elementary school.

3.4.2 Result of Teachers Validation

Mrs. Sri Widati S.Pd.SD is a professional teacher for class V SD Negeri 06 Kedungwuni, conducted the teacher validation test. Professional teachers are then given the completed E-Modul along with a grid and an assessment form with a scale of 1 to 5. Table 3.4 displays the outcomes of the instructor validation exam.

Tabel 3.4 Result of Teachers Validation

No	Aspect	Percentage of Agreement (PA)	Category	V Aiken	Information
1.	Content	8,8%	Good	0,85%	High
2.	*Problem based learning*	8,0%	Good	0,75%	Medium
3.	Language	9,0%	Very Good	0,88%	High
4.	Serving	8,0%	Good	0,75%	Medium
5.	Graphics	8,4%	Good	0,80%	High
	Average	8,36%	Good	0,80%	High

The instructor validation analysis results above had an average V Aiken of 0.80% in the high category according on Table 3.4, 8.36% percent agreement (PA) in a high category. The summary demonstrates how learning in Class V Elementary School may make use of instructional material in product-mode.

3.5 Revision Design

Researchers changed E-Module after they had been revised by specialists based on their comments and feedback. The revision outcomes are used to enhance the quality-mode created so that it is suitable for testing. The expert input findings are then reviewed in order to enhance the e-module. The following are the recommendations, remarks, and correction findings from the validation of experts: 1) The layout and organization for LKPD are still less appealing and aesthetically pleasing. Give an example or introduction before displaying the image to make it more engaging. Use imperative language/sentences directed at students to do something instead of invitation sentences at each level to increase student interaction and communication. may be enhanced with instructions to search a variety of educational materials, including books, the internet, and others. Use guiding statements to illustrate (during the guiding research phase); 2) During the student organization phase, the teacher assigns students to work in groups, gives instructions on what they should do or prepare, and divides the tasks among the students according to which ones are each of their responsibilities. During this phase, the students have not worked to solve the problems that have been given; 3) In phase 3, focus on problem-solving through group discussions, where students collaborate in groups to seek for solutions through reading, viewing YouTube videos, and other means. (Inquiry guiding phase) The instructor provides both individual and group guidance; 4) In the phase of creating outcomes, it may be added, for instance, having students create a powerpoint presentation beforehand; 5) following the final stage, giving students practice questions and questions to work on; 6) As a result of media experts' recommendations that the contents of the e-mode be limited to one learning subject, particularly the content of scientific classes, the design of the e-mode was revised. The information is made clear so that pupils may comprehend it completely.

3.6 Trials of Products

According to Sugiyono, research on the usefulness of an e-module based on PBL for increasing critical thinking in fifth-grade primary school children was conducted at the sixth stage of development research. Class 5A and 5B of SD Negeri 06 Kedungwuni served as the experimental class and the control class, respectively, for the research experiments. conducted during the course of two meetings with the use of online PBL modules. The effectiveness of employing e-mode based on PBL was tested with a total of 30 students in the experimental class. Before receiving care, students practice for the questionspretest. Learning to use e-modul PBL based is the next stage. The experimental class uses an e-module based on PBL, whereas the control class uses an e-module that is not based on PBL and is implemented normally. Students then concentrate on posttest questions. Use Test N-Gain to verify this. By comparing the findings from the pre-test and post-test, it is possible to determine whether or not the product's efficacy has significantly changed for the experimental class.

Table 3.5 Results of the PBL-Based E-Modul N-Gain Test

No	Grade	Analysis Result			Average *N-Gain*	Category
		Average	**Minimum**	**Maximum**		
1	Experiment	51,16	0,00	83,33	0,51	Medium
2	Control	45,13	0,00	83,33	0,45	Medium

Based on Table 3.5, it can be shown that the experimental class average N-Gain score of 0.51 meets the "Medium" category. Minimum value N-Gain score is 0.00, and highest value N-Gain score is 83.33. While the control class of 0.45, on average N-Gain, falls within the "Medium" category, with a value N-Gain a minimum score of 0.00 and a maximum score of 83.33. Thus, it can be said that the adoption of a PBL-based teaching method to encourage critical thinking in grade 5 students at SD Negeri 06 Kedungwuni is extremely successful.

Bibliography

Abdul Majid & Chaerul Rochman. (2014). Pendekatan Ilmiah dalam Implementasi Kurikulum 2013. Bandung: PT Remaja Rosdakarya.

Andi Prastowo 2015. Panduan Kreatif Membuat Bahan Ajar Inovatif. Yogyakarta: Diva Press

Desty Sugiharti, S., Supriadi, N. & Andriani, S. 2019. Efektivitas Model Learning Cycle 7e Berbantuan E-Modul Untuk Meningkatkan Kemampuan Berpikir Kritis Peserta Didik SMP. AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 8(1).

Lewis, A. & Smith, D. 2015. Defining Higher Orer Thinking. Source: Theory into Practice, Avaliable in http://www.jstor.org URL: http://www.jstor.org/stable/1476693

Makmun, Abin Syamsuddin, 2005, Psikologi Kependidikan; Perangkat SistemPengajaran Modul, Bandung: Remaja Rosdakarya.

R. H. Ennis 2011. The Nature Of Critical Thinking: An Outline of Critical Thinking Dispositions and Abilities. University of Illionis, 2–4.

Rahmi, L. (2018). Perancangan E-Module Perakitan Dan Instalasi Personal Komputer Sebagai Media Pembelajaran Siswa SMK. TA'DIB, 21(2), 105–111.

Richard Paul and Linda Elder 2007. Defining Critical Thinking. The Critical Thinking Community: Foundation for Critical Thinking.

Sumaryanta 2018. Penilaian HOTS Dalam Pembelajaran Matematika. Indonesian Digital Journal of Mathematics and Education, 8(8): 500–509.

Suryaningsih. 2010. Pengembangan Media Cetak Modul Sebagai Media Pembelajaran Mandiri. Jakarta: Salemba Empat.

Trilling, B. & Fadel, C. 2009. 21st century skills: Learning for life in our times. John Wiley & Sons.

Wulansari, E.W., Kantun, S. & Suharso, P. 2018. Pengembangan E-Modul Pembelajaran Ekonomi Materi Pasar Modal Untuk Siswa Kelas XI IPS MAN 1 Jember Tahun Ajaran 2016/2017. Jurnal Pendidikan Ekonomi: Jurnal Ilmiah Ilmu Pendidikan, Ilmu Ekonomi dan Ilmu Sosial, 12(1): 1.