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# LOCAL WISDOM-BASED E-MODULE WITH PROJECT-BASED LEARNING MODEL: ENRICHING ENERGY TOPIC IN PHYSICS LEARNING

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## ABSTRACT

The module is one of the supporting teaching materials that can be developed according to learning needs. The purpose of this research is to develop an e-module based on the local wisdom of Belitang with a project-based learning model. The physics topic used is Energy at the junior high school level. The development design used is a modification of the ADDIE model (analyze, design, development, implementation, evaluation). However, this research only reached the development stage because the focus research was only on developing e-modules. The instrument used for data collection is a questionnaire with a Likert scale and analyzed descriptively quantitatively. Research findings show that e-modules based on Belitang local wisdom with a project-based learning model get media and content validation values in the very good category. The results of this research are expected to be further applied to learning.

# E-MODUL BERBASIS KEARIFAN LOKAL DENGAN MODEL *PROJECT BASED LEARNING*: MEMPERKAYA TOPIK ENERGI DALAM PEMBELAJARAN FISIKA

***Kata Kunci:***

E-modul
Energi
Kearifan lokal
*Project based learning*

## ABSTRAK

Modul adalah salah satu bahan ajar penunjang yang dapat dikembangkan sesuai dengan kebutuhan pembelajaran. Tujuan penelitian ini adalah untuk mengembangkan e-modul berbasis kearifan lokal belitang dengan model project based learning. Topik fisika yang digunakan adalah Energi pada jenjang sekolah menengah pertama. Desain pengembangan yang digunakan adalah modifikasi dari model ADDIE (analyze, design, development, implementation, evaluation). Namun pada penelitian ini hanya mencapai tahap development karena fokus pada penelitian hanya mengembangkan e-modul. Instrumen yang digunakan untuk pengambilan data adalah kuesioner degan skala likert dan dianalisi secara deskriptif kuantitatif. Temuan peneltian menunjukkan bahwa e-modul berbasis kearifan lokal belitang dengan model project based learning mendapatkan nilai validasi media dan materi dalam katgori sangat baik. Telah dihasilkannya penelitian ini diharapkan selanjutnya dapat diterapkan pada pembelajaran.

## 1. INTRODUCTION

Rapid technological developments require teachers to upgrade conventional teaching materials into modern teaching materials [1-2]. Teaching materials include books, worksheets, and modules [3-6]. The module is one of the teaching materials that can be used as a guide for independent learning, because in the module there are instructions for the users. Moreover, module can also be made in print or electronically, according to user requirements [7]. Module that can be accessed electronically is called electronic module (e-module). E-module is more accessible, portable, and students can learn according to their own level of understanding [7]. So that students with slow learning abilities do not feel left behind and students with faster learning abilities are not hampered.

In addition, in making e-modules, it is necessary to pay attention to the level of education [8]. Each level of Education has different cognitive abilities. According to Jean Pieget, the last stage in cognitive development is at the age of 12 years and over [9]. This age is the age of junior high school education level students. At this stage students are able to think abstractly, do mathematical calculations, and think creatively [10-11]. Creative thinking needs to be trained through the stages of learning models, one of which is the project based learning (PjBL) model.

The PjBL model directs students to analyze learning topics and create projects at the end of the activity [12-13]. The product is expected to be a solution in everyday life. One of the topics in physics that is closely related to everyday life is energy [14–16]. Several previous studies have shown the positive impact of implementing the PjBL model, including the implementation of PjBL as a solution for learning in pandemic era [17], a very impressive positive impact on learning outcomes from project learning [12], [18–20], Moodle-based PjBL implementation [21], development of PjBL-based student worksheets [22] and critical thinking analysis through PjBL [23]. In addition, previous researchers have also developed interactive e-modules on social studies learning [24], multi-representation-based e-module [25], chemistry module based on local wisdom of the city of Semarang [26], traditional game integrated module [27], and e-modules to support the 2013 curriculum [28]. The focus of this research is to develop an e-module based on Belitang local wisdom with the PjBL model. Many previous researchers have integrated learning and development through local wisdom [15], [29–32]. However, the local wisdom of Belitang has not been explored in research. It is hoped that the development of an e-module based on Belitang local wisdom with the PjBL model can help students get to know Belitang local wisdom and develop student creativity through projects.

## 2. METHOD

This study uses research and development (R&D) methods with the model developed by Dick and Carry, the ADDIE model. This model consists of five steps including: (1) analyze, (2) design, (3) development, (4) implementation, and (5) evaluation. The ADDIE stages are shown in Figure 1 below.

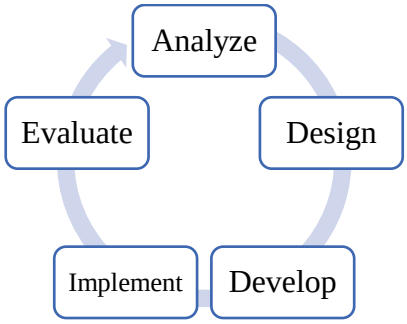


**Figure 1.** ADDIE Stage

This research was completed only in the third stage because the purpose of this research is to find out how to develop the product and determine its validity of the product. The instrument used in this study was a product validation questionnaire using a Likert scale. Likert scale indicators are described in Table 1.

**Table 1.** Validation Criteria [33]

| Average | Criteria |
|---|---|
| $4{,}21 \leq V \leq 5{,}00$ | Very Good |
| $3{,}41 \leq V < 4{,}20$ | Good |
| $2{,}61 \leq V < 3{,}40$ | Acceptable |
| $1{,}80 \leq V < 2{,}60$ | Poor |
| $1{,}00 \leq V < 1{,}80$ | Very Poor |

The data were then presented and analyzed descriptively quantitatively. The results are described in Table 2.

**Table 2.** Interpretation of Validation Questionnaire Score

| Score | Achievement Level (%) | Qualification |
|---|---|---|
| 5 | $80 < V \leq 100$ | Very Good |
| 4 | $60 < V \leq 80$ | Good |
| 3 | $40 < V \leq 60$ | Acceptable |
| 2 | $20 < V \leq 40$ | Poor |
| 1 | $0 \leq V \leq 20$ | Very Poor |

The data generated from the questionnaire analysis is in the form of a mixed method (qualitative and quantitative data).

## 3. RESULTS AND DISCUSSION

The results of developing an interactive e-module based on local wisdom with a project based learning model are described as follows.

### *3.1 Analysis Stage*

In the analysis phase, the researcher analyzed the teaching materials through the relevant journal literature. This is done by using the keywords e-module, project based learning, and local wisdom. Some of the things found in the literature review are described in Table 3 below.

**Table 3.** The Results of the Literature Review Analysis

| Keywords | Analysis |
|---|---|
| E-Modul | - Social studies interactive e-module can be used well in learning |
| | - The application of multi-representation-based E-modules in learning was going very well |
| | - Previously, a chemistry module based on Semarang local wisdom has been developed |
| | - Traditional game integrated module development |
| | - 2013 curriculum support e-module |
| Problem Based Learning (PjBL) | - PjBL as a learning solution in the Covid-19 pandemic era |
| | - the impact of project-based learning is good for learning outcomes |
| | - Moodle-based PjBL in learning |
| | - Development of PjBL-based student worksheets |
| | - Analyze critical thinking through PjBL |
| Local Wisdom | - Development of chemistry module with Semarang local wisdom |
| | - Local wisdom in Toraja folklore |
| | - Local wisdom in Geopark folklore as a learning resource |
| | - Local wisdom of *Kampung Naga* as nature conservation |

Based on Table 3, no one has ever developed Belitang local wisdom as learning. Both on e-modules and other media. On the other hand, other regions have developed many e-modules based on local wisdom. Based on this, it is necessary to develop an e-module based on Belitang local wisdom with a project-based learning model so that students can get to know their local wisdom through learning. Moreover, learning by integrating local wisdom can show regional character [30], [31].

### *3.2 Design Stage*

At this stage, the researcher makes a product validation instrument and a story board module that will be made. The instrument is made based on the indicator of the validity of the module both in terms of content and the media created. The storyboard in the e-module is described in Table 4.

**Table 4.** Storyboard of E-module based on Belitang Local Wisdom with Project-Based Learning Model

| Project-Based Learning | Content | Belitang Local Wisdom | E-Module |
|---|---|---|---|
| Start with the big question | - Understanding energy (identifying types of energy, explaining forms of energy, and analyzing changes in energy forms) | - Agriculture (rice crops)<br>- Plantations (cassava, rubber trees)<br>- Traditional musical instruments (drums, gongs) | Questions related to the use of solar panels in the Belitang area. |
| | - Various energy sources (renewable and non-renewable energy) | - Utilization of Komering Dam Bridge in Belitang electricity supply | Questions regarding the utilization of the Komering bridge in Belitang. |
| | - Food as a source of energy | - Various belitang crops (rice, cassava, corn, fruits, vegetables)<br>- Various livestock in belitang (chicken, duck, goat, cow, goose and buffalo) | |
| | - Photosynthesis (metabolic processes, photosynthesis and respiration) | - Rice and Cassave | Questions about the process of growing rice plants. |
| Design a plan for the project | Project to design some products related to Energy change | Various crops, plantations and farms | Provided directions for making projects related to the use of energy conversion, photosynthesis experiments on rice plants, and sprout respiration experiments |
| Create a schedule | | | Provided a project planning schedule form that has been planned |
| Monitor the students and the progress of the project | | | Provided form monitoring the process of the project |
| Assess the outcome | | | Provided directions and product assessment forms produced |

| | | |
|---|---|---|
| Evaluate the experience | Energy in living systems | An assessment is provided in the form of a cognitive test, questions are provided for project activities that have been carried out and a suggestion column is provided for the next project activity. |

The results of the e-module product in this study are shown in the Figure 2.


**Figure 2.** Some Displays of E-module Products Based on Local Wisdom

### *3.3 Development Stage*

At the development stage, e-module project based learning based on local wisdom was validated. The developed e-module is validated by media validators and content validators. The results of the percentage of media experts and content experts are shown in Figures 3 and 4.

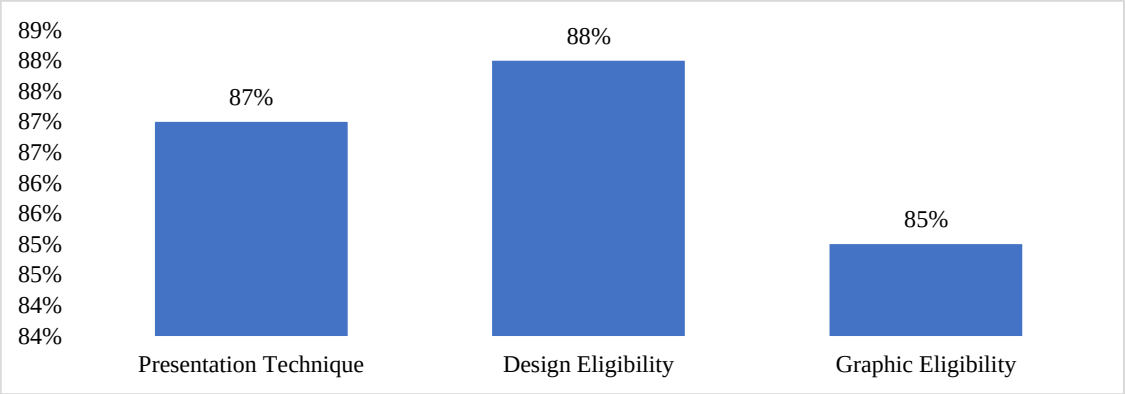


**Figure 3.** Media Expert Validation Results

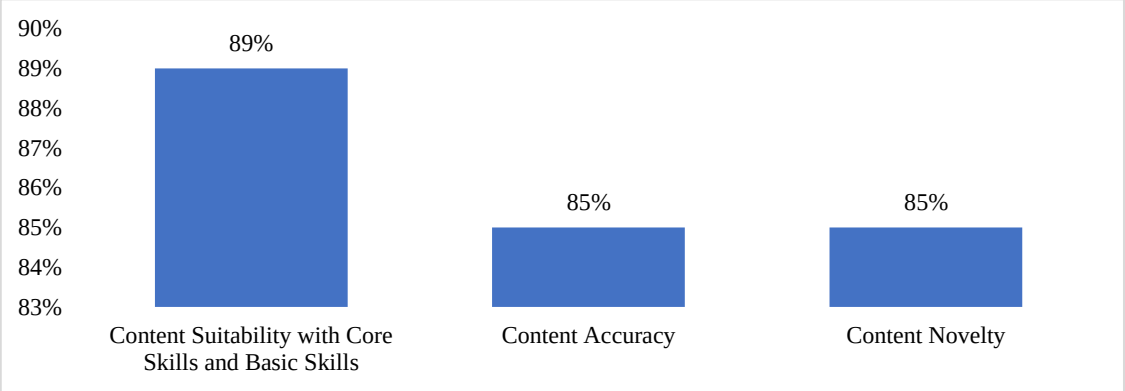


**Figure 4.** Content Expert Validation Results

Based on graph in Figure 3, media experts assess several indicators including presentation technique, media feasibility, and graphic feasibility, Content Novelty managed to get a score with a percentage of more than 80%. This means that media validation has a very good level of validity. This is supported by the ease of use of e-modules that are more effective and have a more attractive appearance. Interesting media will make it easier for students to understand the concept [34], [35], and can increase student motivation in learning [36], [37].

Based on the graph in Figure 4, content experts assess several indicators, including the suitability of content with core and basic abilities, content accuracy, and content updating, where each indicator managed to get a percentage above 80%, meaning that in terms of content, e-module declared very good to use. The superiority of the material discussed in this e-module is related to the local wisdom of Belitang so that students who do not understand local wisdom in their area can get to know it through this e-module. In addition, this e-module was developed with a project based learning step. It is hoped that this e-module can help improve 21st century skills, namely critical thinking, creativity, collaboration and student communication in learning [38], [39]. 21st century skills strongly support character education. Based on Jean Piaget's theory, at the age of 7-12 years, children have entered the Concrete Operational Stage, this requires learning to be based on the development of a project [40]. So this research is here to support this theory.

## 4. CONCLUSION

Based on the research results, an e-module based on local Belitang local wisdom has been developed with a project based learning model. The validation results from media experts and content experts provide a feasibility value of reaching 80% in each indicator.

This means that this e-module is included in the very good category and is ready to be applied in learning.

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