



# Practicality Project-Based Light Vehicle Engine Maintenance Module

Muslim<sup>(✉)</sup>, Ambiyar, Nurhasan Syah, Nuzul Hidayat, and Dedi Setiawan

Universitas Negeri Padang, Padang, Indonesia  
muslim@ft.unp.ac.id

**Abstract.** This study aims to analyze the level of practicality of developing teaching materials in the form of project-based light vehicle engine maintenance modules. This development was carried out due to the unavailability of teaching materials that are in accordance with the characteristics of students in the light vehicle engine maintenance subject at Vocational High School 1 Lahat and are not student-oriented. Therefore, a product in the form of a project-based learning module was developed to solve these problems. This study uses a Research and Development (R&D) approach with the development model being the ADDIE model. The subjects in this study were students of Vocational High School 1 Lahat majoring in light vehicle engineering class II. The instruments used in this study were interview sheets, questionnaire validation sheets, and response questionnaires. The module is validated by 5 experts from expert lecturers and productive teachers. In the practical process, teacher response questionnaires were distributed to 5 teachers who were users of the teaching materials that had been developed. The data were analyzed using percentage analysis and then interpreted using a data interpretation table. The results showed that the level of practicality of teaching materials in the form of a light vehicle engine maintenance module on average based on the teacher's response was 88.75%. The percentage results after being interpreted showed that the product was in the very practical category. It can be concluded that the modules developed are very practical to use and useful as teaching materials to support the learning process, especially the subject of light vehicle engine maintenance optimally.

**Keywords:** Project Based Learning · ADDIE Model · Light Vehicle Engine Maintenance

## 1 Introduction

In the world of education, there are several kinds of teaching materials that are used to assist the learning process. All materials or guidelines used in the learning process have a clear point of view regarding the principles, approaches used and teaching techniques used. Teaching materials can facilitate students in the learning process because learning will be more interesting and fun if packaged in an innovative way that attracts students' attention. As educators and teachers, teachers must design and develop interesting and fun teaching materials for students so that it is hoped that national education goals will

be achieved. One of the teaching materials that are often used in the learning process is the module.

A module is a unit of material that has been equipped with a clear material that can be studied by students independently [1]. The module has clear components so that students can follow the steps that have been packaged in the module without any intervention from the teacher. The content in the module covers the substance needed by students to be able to master competencies by utilizing free and efficient study time [2]. A module must describe the basic competencies that students want to achieve and be presented in an interesting language and equipped with illustrations.

The results of interviews at Vocational High School 1 Lahat with the head of the automotive engineering department, obtained information that productive teachers, especially in the light vehicle engine maintenance subject, had never developed teaching materials such as modules. The teacher only used existing books, even though the learning strategies in the printed books used before did not match the characteristics of the students. The school only has a few reading textbooks in the library, and even then it is in the process of borrowing a limited number of terms. These textbooks are general and are not necessarily fully related to learning materials, especially the subject of light vehicle engine maintenance. The light vehicle engine maintenance subject is one of the compulsory subjects which is equipped with theoretical and practical learning. The level of understanding in this subject is quite difficult and you must have a good learning strategy so that the understanding of the material provided is fully acceptable to students. This subject discusses problems regarding cooling, lubrication, ignition, and fuel systems. Teachers as instructors have not been able to facilitate related learning resources such as the use of modules in the learning process.

On the other hand, during learning, it was found that learning activities were still less varied, less creative, and still found delivering learning material using conventional methods such as lectures delivered in class regarding material, especially the subject of light vehicle engine maintenance. The consequence obtained was that students were found to be less active, less focused, and not motivated in learning. Learning that is still centered on the teacher results in the material being delivered is not optimal and is not optimally received by students [3]. Active learning should be, learning conditions are no longer centered on the teacher but on students or Student Center Learning (CTL) [4, 5].

Based on the facts found in the field, it is necessary to develop learning modules that can train students' thinking skills and make students more active in learning. The developed module needs to use an approach that is appropriate to the characteristics of the students [6]. Designing innovative teaching materials will affect student motivation in the learning process [7]. The development of a project-based light vehicle engine maintenance module that is compiled is used to complement the learning needs of students majoring in light vehicle engineering class XI. It is called a project-based module because it is associated with real-life activities so that students are encouraged to be more active and motivated in learning [8].

Project-based learning is one of the methods used in learning by applying the constructivism paradigm which views learning as a process of building students' knowledge

[9]. This learning method is one of the learning strategies for implementing active learning with student-centered classroom learning. Besides making students active, using project-based learning methods will increase students' high-level thinking in solving the problems given [10, 11]. The end result of this project-based learning is in the form of project assignments that have a quality that can be accounted for [12]. The development of a project-based light vehicle engine maintenance module will assist students in acquiring knowledge and skills so that they can solve problems with the results of the projects that have been given.

Before it can be applied and used in the learning process, the developed module needs to pass through the stages of validity, practicality, and effectiveness [13]. At this stage, we will examine to find the level of product practicality in the form of modules developed previously [14]. Practicality is the ease of using the product that has been developed [15]. Practicality is the level of usability of the product by conducting direct trials by applying the product [16, 17]. It is hoped that this analysis will get clearer results regarding the level of practicality of the products developed. Therefore, the researchers examined the level of practicality of the project-based light vehicle engine maintenance module. The light vehicle engine maintenance module has been said to be feasible by material experts and media experts because it has advantages in the completeness of learning materials, attractive module designs, and layouts that are easy to understand and easy to understand in use.

The purpose of this research is to reveal the level of practicality of project-based module development. The module developed is a module on the subject of light vehicle engine maintenance. The results of this study will be used as information about the level of practicality of the products developed, namely in the form of modules used in the subject of light vehicle engine maintenance or the like.

## 2 Research Method

The research was carried out according to the development procedure using the ADDIE Model [18, 19]. The research and development carried out are used to develop the product so that the product is valid, practical, and effective. At the analysis stage, the module is structured based on the principles of the development of a module itself which includes needs analysis by determining the learning strategy and the media used. The design phase is carried out by designing teaching materials in the form of a project-based light vehicle engine maintenance module. In addition, the author also designs the cover of teaching materials, concept maps, table of contents, assessment formats, and delivery of material.

Furthermore, the teaching materials will be developed and validated by the validator on the material and media aspects. The validators are 5 experts, each of whom has a role in the process of validating the instrument used. The validators came from a lecturer in automotive engineering majoring in automotive engineering at the Faculty of Engineering, Universitas Negeri Padang, and 3 productive teachers in the light vehicle engineering department at Vocational High School 1 Lahat. After the teaching materials are declared valid, then the next stage is to apply the practical aspect to the teacher. This practicality test is a testing phase in the development aspect [20].

The technique used in this study is a descriptive analysis technique that has been referred to in the practical assessment steps. The data resulting from this practical value analysis will then be interpreted to get practical values [21]. The practical aspect is the response given to the user in using the product that has been developed, at this stage 5 productive teachers majoring in light vehicle engineering will respond to the practicality of using the module.

### 3 Result and Discussion

#### 3.1 Result

The design stage is by designing the module, collecting some references, and pictures relevant to the learning material, and compiling product assessment instruments. The practical part of the instrument used is in the form of a practical questionnaire based on responses from teachers, especially productive teachers majoring in light vehicle engineering. At the development stage, namely the development of teaching materials, editing, validation, and revision. The module development is carried out using a project-based learning approach. After successfully compiled, the module will go through the validation stage carried out by the validator. Validation was carried out by 2 expert lecturers and 3 light vehicle engineering teachers. The following is a recapitulation of the results of filling out the teacher's response questionnaire in Table 1.

From the results of the teacher's response in Table 1 to the development of project-based modules, the percentage for the presentation aspect of the material was 87.5% and the display aspect was 90.00% so the average was 88.75% so the category after being interpreted was very practical. For more details, it can be seen in Fig. 1.

Based on Fig. 1 regarding the percentage of practicality based on the teacher's response, it can be concluded that the product developed is in the very practical category. The modules that have been developed do not need to do heavy revisions, although they do need to be revised, only changing what is suggested by expert lecturers such as adding colors to the module, and the answer key at the end of each module to answer format tests and feedback for students. After the teaching materials were revised, then a limited trial was carried out with 30 students for the implementation stage to get the value of effectiveness.

The following shows the modules developed with a project-based approach to the subject of light vehicle engine maintenance (Figs. 2, 3 and 4).

**Table 1.** Response Questionnaire Filling Results

No.	Rated aspect	Percentage
1	Appearance	90.00
2	Material Presentation	87.50
	Average	88.75

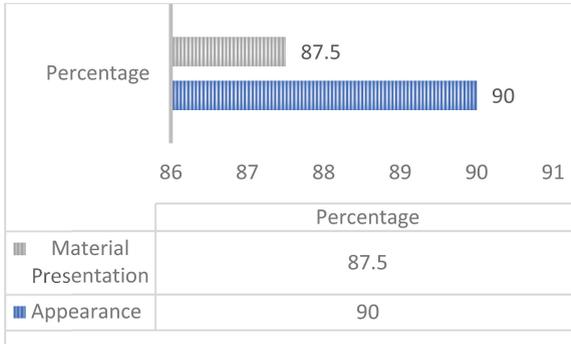


Fig. 1. Percentage of Practicality based on Teacher Response



Fig. 2. Module Cover

**Kegiatan Belajar 1**

**DASAR PEMELIHARAAN KENDARAAN**

**A. Tujuan Pembelajaran**

Dalam kegiatan belajar pertama ini, kita akan belajar mengenai dasar pemeliharaan kendaraan secara berkala (servis berkala). Untuk meningkatkan sikap kerjasama dan tanggung jawab, pada kegiatan belajar ini diberikan tugas proyek secara berkelompok.

Setelah menyelesaikan materi dasar pemeliharaan kendaraan secara berkala (servis berkala), siswa mampu:

1. Bertambahnya rasa ayular terhadap lingkungan ciptaan tuhan.
2. Menunjukkan sikap bertanggungjawab dalam mengikuti pembelajaran.
3. Menunjukkan sikap bervejasama dalam mengerjakan tugas.
4. Menjelaskan pengertian, tujuan dan persyaratan pemeliharaan berkala atau servis kendaraan bermotor.
5. Menyajikan, menggunakan dan merawat tempat kerja dan peralatan perawatan berkala sesuai dengan prosedur yang benar.
6. Mengagiasi berbagai jenis kendaraan dengan aman dan sesuai dengan prosedur yang benar.

Fig. 3. Learning Activities

**(II. Tugas Proyek Bagian 2)**

Cariilah buku manual untuk minimal 3 jenis kendaraan dengan merk yang berbeda. Kemudian kerjakan tugas berikut:

1. Berdasarkan jobsheet yang telah dibagikan untuk kegiatan praktik, carilah permasalahan dan bagaimana cara penyelesaian masalah yang terjadi pada saat penyetelan sabuk pengaman!
2. Catat semua spesifikasi pengukuran (bila ada) dan hasil kegiatan setelah melakukan praktik sesuai langkah-langkah pada jobsheet!
3. Buatlah laporan proyek kelompokmu diurut berdasarkan soal di atas dan kerjakan dalam waktu 1 minggu!
4. Usulkan buku manual yang ditemukan, boleh menggunakan informasi dari internet atau perpustakaan yang ada disekolah guna untuk menyelesaikan permasalahan tersebut!
5. Persentahkan laporan proyek tersebut bersama kelompok masing-masing!



**Fig. 4.** Project Task View

## 4 Discussion

The product developed in the form of a module is a teaching material that is developed referring to the need for learning resources during the learning process in the subject of maintenance of light vehicle engines. This product was developed with the hope that it will become a choice of learning resources that are following the characteristics of the material in these subjects [22]. Before being implemented, the product development process went through several stages of testing [23] to ensure that the product developed can function as it functions as a learning resource or material for learning activities [24]. Several researchers have previously researched the development of learning media in the form of modules including practicality tests to ensure that the products developed are practically used in the learning process [25].

The results of the analysis on the practicality test of the product developed in the form of a learning module show that the module developed is very practical to use in the learning process from the perspective of the teacher who uses it. This is in line with research conducted by Ko et al. and Xu et al. [26, 27], that the practical results for products with clear steps, the results will also be even better. According to Meika et al. [28], product development with due regard to product practicality will produce products that are recognized for their practical value in a good implementation process. The teaching materials developed are following the applicable aspects. The advantage of this product is that students can learn independently without being directly guided by the teacher, even though the condition of teacher remains a facilitator.

Practical project-based light vehicle engine maintenance module to use. In line with research conducted by Abadi [29] mentioned that one of the strategies for developing character and increasing students' creativity in learning is by developing innovative modules. Research conducted by Alfi and Anita [30, 31] regarding the development of learning frameworks in the practical category. That the purpose of practicality is to ensure that the product developed can function according to its function as a learning media [32]. This is per the expected development objectives, especially in the practical aspect of the product [33]. These results are in line with previous research, which shows that the development of project-based modules when carried out with the correct steps and procedures will produce modules with a very high level of practicality [34]. Based on this, research can be followed up to the level of effectiveness testing to find out how effective the products developed in the learning process are on student learning outcomes.

The teacher's response to the development of light vehicle engine maintenance modules in the category was very practical. The teacher gave a response in terms of the grammar used following the level of understanding of class XI students. The language used in this module is very easy to understand and is following good and correct Indonesian spelling. This is in line with the opinion of Fonna and Murni [13, 35] that the language used in the developed module needs to be following the characteristics of the students. The observation sheet of the implementation of learning using the module is carried out every time the learning process takes place. Student response sheet. It can be concluded that the products developed in the category are very practical.

## 5 Conclusion

Based on the results of the teacher's response regarding the level of practicality of module development, the project-based light vehicle engine maintenance module is in a very practical category. This is obtained from the results of practice analysis based on the responses from teachers who use the module. It can be interpreted that the project-based light vehicle engine maintenance module is very practical to use as a new learning resource for students, especially class XI students at Vocational High School 1 Lahat majoring in light vehicle engineering. The results of the research show that the level of practicality of the product being developed has a very high level of practicality and is very practical for teachers and students to use in the learning process in subjects using light vehicle engines.

The advantage of this product is that students can learn independently without being directly guided by the teacher, even though the condition of the teacher remains a facilitator. The results of this study contribute to providing knowledge to educators, teachers, lecturers, students, and researchers in developing project-based learning resources and how to carry out practical tests of the products developed. It is hoped that it will become a reference for further research in the process of developing learning devices with the same characteristics.

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