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Developing E-Learning Modules of Common-Rail Technology

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Article Info

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Abstract

The purpose of this research is to: (1) produce learning module in the form of Common-Rail technology learning modules in the subject of light vehicle engine maintenance in class XII; and (2) knowing the feasibility of the Common-Rail technology module produced in the light vehicle engine maintenance subject for class XII. The research and development used aims to develop a learning module, namely the Common-Rail technology module in class XII of light vehicle engineering. The method used from the Four-D by Thiagarajan, Semmel, and Semmel has been modified. The process used in the development of the learning module is to define, design, develop, and disseminate. Feasibility data collection media is using a questionnaire. This research involved material experts, media experts, subject teachers, and students as respondents for the feasibility of the module. Descriptive statistical data analysis techniques were used in this study. The feasibility results of the Common-Rail technology module carried out by material experts obtained a feasibility value of 94.56% in the very feasible category. One of the media experts obtained a feasibility score of 77% in the very feasible category. the feasibility level of the subject teacher got a feasibility score of 77.17% very feasible category. While the response from students obtained a value of 79.04% with the very feasible category. Therefore, the Common-Rail technology module is suitable to be used to help the learning process

Keywords: development, learning, e-module, Common-Rail technology

Introduction

Education, in general, is a way or an effort to emphasize character (ethics and morals), thinking power, and human growth. Thus education has an important role in encouraging students to get physical and mental happiness (Ki Hadjar Dewantara, 2013: 14). Every human being has the right to get a good education because education is very important in encouraging humans to become more mature and able to think critically in building the nation and state.

In Indonesia, education can be pursued through formal and non-formal education. Formal education is pursued in schools while non-formal education is pursued through various courses and training.

Vocational high schools as part of formal education, the main objective is to prepare graduates who are ready to work in their vocational fields. Vocational high schools are said to be successful if their graduates are ready to work. Therefore, vocational high schools must equip graduates with work skills.

Government Regulation of 2006 Number 22 states that the aim of vocational high schools is to produce graduates who are smart, have a noble character, have a good personality, master knowledge, and have good skills to work or continue to high education level which further VHS graduates are required to be able to do work efficiently, effectively and have a high work ethic. All of these goals must be implemented in effective learning.

Permendikbud Number 24 of 2016, requires teachers to plan to learn as outlined in the lesson plan. In learning planning, one of the teacher's tasks is to plan learning materials, tools/media to be used according to the learning method and learning model is chosen.

The results of preliminary research indicate that in the implementation of learning the subject of light vehicle engine maintenance in class XII students, several problems are found, including: (1) students' low understanding of Common-Rail technology material, (2) lack of references to learning common-rail technology for students, (3) the unavailability of learning modules used in learning Common-Rail technology, (4) The teacher uses only one

manual book in learning Common-Rail technology. As a result of these problems, students find it difficult to learn again at home independently. Due to a lack of learning, the learning outcomes of some students are also low.

Based on these problems, we need a learning resource about Common-Rail technology that is easily accessible to students. One of the learning resources that are easily accessible to students is the E-Module. Currently, almost all VHS students already have an android which can be used to open various learning resources in various formats. With the availability of the Common-Rail Technology E-Module, students will be able to study the material individually and be able to evaluate their learning outcomes independently.

Learning is a learning process from a lack of understanding to better understand and increase knowledge. Learning is not just memorizing and remembering but a process of change in a person, such as changes in knowledge, personality, abilities, and skills. Learning is carried out deliberately by teachers with the aim of providing knowledge and insight to students so that students can learn effectively and efficiently and have satisfying results (Sugihartono, et al, 2007: 81).

E-learning modules are learning media in the form of printed media with compact packaging, have a good learning planning design so that students can easily master learning materials, and are available electronically in various formats, such as files in PDF, MS-Word, and Webpage formats. (Daryanto, 2013: 9). Learning modules are learning materials that are made to make it easier for students to learn independently, with materials, methods, restrictions, and being able to evaluate the material presented in accordance with basic competencies (Kemendikbud, 2015: 4).

Learning Common-Rail technology used in the 2013 curriculum, there are two basic competencies, namely evaluating Common-Rail technology damage and improving Common-Rail technology.

Method

Research on the development of Common Rail technology modules is carried out with development research. Sugiyono, (2016: 54), research and development, namely basic experimental activities to obtain information on the needs of users (need assessment), and continued development activities with the final product. Development research is a way for researchers to test and develop or create new ones.

This study uses the Four D development model by Thiagarajan, semmel and semmel. The development stage has four stages, namely definition, planning, development, and dissemination. The dissemination process in this study was carried out in a limited class. Endang Mulyatiningsih (2013: 195-199)

According to Sugiyono (2010: 207-208), descriptive statistical techniques are used in analyzing data by describing or describing the collected data as it is.

The collection in this study used a questionnaire, a questionnaire containing a module feasibility assessment from several experts and students of class XII SMK Negeri 2 Yogyakarta as respondents. 5 students had limited product testing activities, and 20 students participated in the next product trial.

The instrument used in this research is a questionnaire. The questionnaire sheet is used to measure the feasibility of the Common Rail technology learning module.

Data were analyzed descriptively qualitatively. Qualitative data is taken from the results of validation by experts, so the data obtained is used as a reference for product revisions. Quantitative data were taken from qualitative data using a Likert scale of 4 categories, namely strongly agree, agree, disagree, and disagree. The following is the percentage eligibility formula:

$$\% = x \frac{\text{the score obtained}}{\text{the ideal number of scores}} 100\%$$

After determining the feasibility percentage, then the eligibility results of the product are determined. The minimum product eligibility results are in the "feasible" category.

Table 1. Module Eligibility Criteria

Percentage eligibility	Criteria
100% - 75%	Very Worthy
75% - 62,5%	Worthy
62,5% - 50%	Less Worthy
50% - 1%	Not Worthy

Table 2. Average Module Eligibility

Average score	Criteria
> 3	Very Worthy
$3 > X \geq 2,5$	Worthy
$2,5 > X \geq 2$	Less Worthy
< 2	Not Worthy

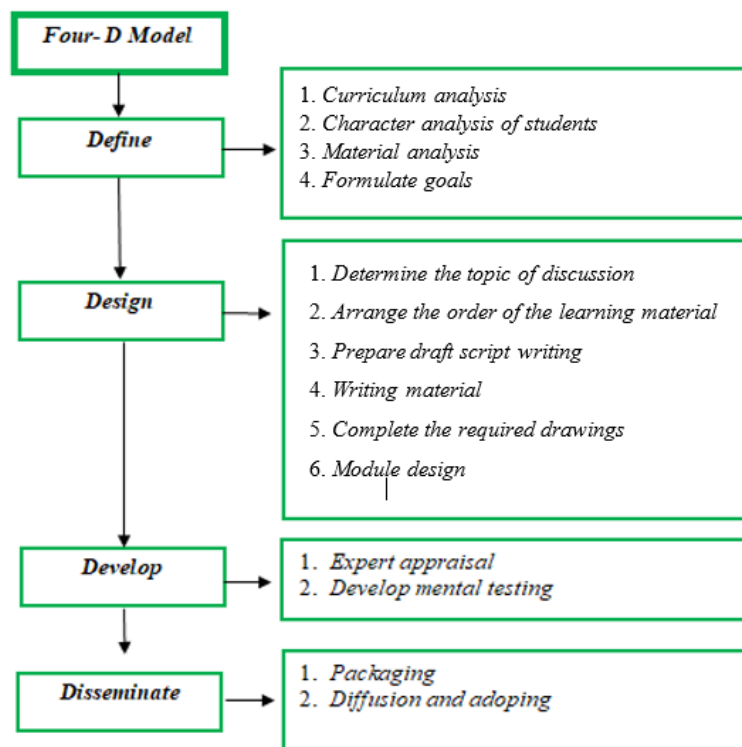


Figure 1. Schematic of The Four-D Model Development Stage

Results and Discussion

The last result of this research is in the form of a module whose feasibility is known to be used in student learning. This development uses the Four-D (definition, design, development, and dissemination). This learning module was developed based on the analysis of student needs data and the material that was included based on the KI and KD used. The stages used in the design are selecting the topic or subject matter to be used, sorting the material according to the learning objectives, preparing the writing agenda. Compiling a draft on the module.

The target to be produced in this research is the Common-Rail technology module that will be used for student learning. Therefore, the module that is made must be designed to be able to attract students' attention, be pleasant to read, the information is easily captured and provide self-evaluation for students. Following is the cover of the Common-Rail technology module.

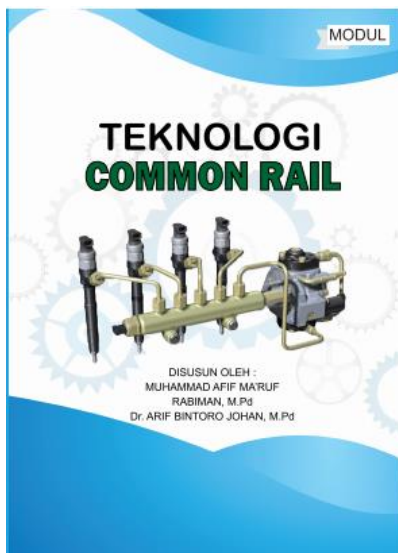


Figure 2. Front Cover of Module



Figure 3. Back Cover of Module

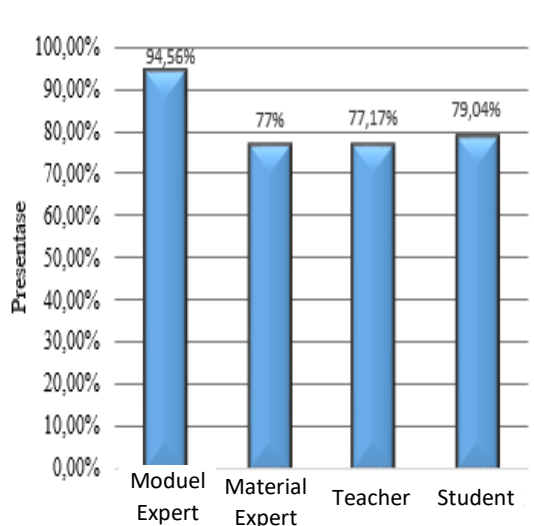


Figure 4. Recapitulation of assessments of experts and students

The feasibility level of the Common Rail technology learning module can be seen from the recapitulation of product assessment results by experts and students on figure 4.

Table 3. The Results of The Material Expert's Assessment

Total score	Total ideal score	percentage (%)
87	92	94,5

The assessment result of the feasibility level of the Common-Rail technology module from material experts was 3.78 or 94.56% with the very Worthy category.

Table 4. The Results of the Media Expert's Assessment

Total score	Total ideal score	percentage (%)
77	100	77

The assessment result of the feasibility level of the Common-Rail technology module from material experts is 3.08 or 77% with the very Worthy category.

Table 5. The results of The Subject Teacher Assessment

Total score	Total ideal score	percentage (%)
71	92	77,17

The assessment result of the feasibility level of the Common-Rail technology module from material experts is 3.08 or 77.17% with the very Worthy category.

Table 6. The Results of the Student Response Assessment

Total score	Total ideal score	percentage (%)
79,04	100	79,04

The assessment result of the feasibility level of the Common-Rail technology module from material experts was 3.16 or 79.04% with the very Worthy category.

The eligibility value of the Common-Rail Technology Learning Module from material experts, media experts, subject teachers and students gets a very decent score. Therefore, learning media in the form of mdoul can be used as a learning resource.

Learning using the Common-Rail technology module can make it easier for students to record the material presented by the educator, so that students focus more on exploring the material presented. Students can also find out the material without having to be accompanied by a teacher because there is already a module as a learning resource. Students can learn independently or in groups to exchange ideas, so the learning module can be said to be effective for learning.

Conclusion

Based on the discussion of the development of the Common-Rail technology learning module, it can be concluded that the Common-Rail technology learning module can be used in learning Common-Rail technology in class XII, because it contains material that has been adjusted to the syllabus set out at automotive VHS.

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