

# Development of Diesel Engine Learning Multimedia for Acquisition Learning Outcomes

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**Abstract:** This research paper analyzed the problem related to the level of passing the final examination, especially the subjects of diesel engines, which are still low. In such conditions, a solution is needed to find out how to solve it. The development of multimedia learning for diesel engines is made to increase the acquisition of understanding and skills in diesel engines lessons. This research uses a qualitative method, collecting data in a questionnaire, and in-depth interviews with 36 students. The results of the research proved that multimedia diesel engines developed can increase the acquisition of learning outcomes. In addition to contributing to learning techniques, this study also found learning outcomes involving multi-sensor. It is better if the results of multimedia development can be developed to facilitate learning. This research is limited to the scope of multimedia diesel engines with PowerPoint computer programs.

## 1 INTRODUCTION

The need for labour in the field of machinery is very much needed nowadays, in which the era of the industrial revolution is known to be 4.0 labour, and requires work to meet job needs. The maritime and fisheries sector still needs much labour, one of which is engineering. Energy Preparation for fields needs to be started from strategies, methods, and learning techniques.

According to the students' experiences in the department of fisheries and marine engineering, students have difficulty in passing the maritime examination, especially in the eyes of a diesel engine lesson. Based on this matter, research on learning technology needs to be done in various domains. One of the areas in this research is the media scope.

The media developed in this study is multimedia. Multimedia material incorporates aspects of motivation into the cognitive theory of multimedia learning (Mayer and Estrella, 2014). Multimedia also integrates transformation, motivation, and other affective variables. Overall, on multimedia features can improve students' learning by encouraging generative processes (Park, Plass, and Brünken, 2014;

Heidig, Müller and Reichelt, 2015; Al-hariri and Al-hattami, 2017).

Media is a combination of tools or system tools used for communication or other learning stimuli for students. Multimedia learning that is supported by information technology equipment, laptops, cellphones, and tablets enhances positivity towards the increase in separation results (Mayer, 2014). Multimedia can help make it easier for students to learn certain information so that knowledge can easily be accepted (Najjar, 1996).

As time goes on the media continues to grow, as a medium that enhances significant development compared to multimedia with other media such as types, audio, and visuals. With multimedia, there is an increase in students' interest and understanding of learning material (Zaid *et al.*, 2013; Akhondi, 2011; Aloraini, 2012).

Multimedia consists of several types of media that are complete in one media package so that it is more exciting and easy to make because some are not both audio and visual. In learning to get more senses involved in learning then the learning process against lesser and easier lessons.

## 1.1 Problem Formulation

Learning media is a lot that can be used in learning. However, the problem is what media and how to implement it in learning so that the use of media in learning can help provide meaningful learning experiences.

From the description above, the problem can be damaged, namely the first, how is the relevant media profile to obtain an increase in the learning outcomes of the diesel engine and the second is how to improve the learning outcomes achieved after using learning multimedia.

## 1.2 Research Aims

This study aims to find relevant media profiles to obtain an increase in learning outcomes on diesel engine courses and finds out the improvement in learning outcomes after using multimedia learning.

## 2 METHOD

The research method used is the R & D method (research and development) which includes several stages of activities.

- Identification: Perform initial analysis and formulation of learning objectives,
- Planning: Perform format selection and media selection
- Procedure for development: Arrange learning design, determine the model & prototype of learning media, compose message designs, create storyboards, develop media.
- Before spread disseminating media products, it was first validated by several experts, namely design experts, media experts, and material experts, then tested individually, in groups, and mass in the field. After getting the relevant media, you then disseminate.

Multimedia products were tested on 36 students.

## 3 RESULT AND DISCUSSION

The study was conducted in several stages including Preliminary analysis, Analysis of characteristic, Need analysis, Expert validation, Individual trials, Group trials, and Field trials.

## 3.1 Preliminary Analysis

The initial analysis was carried out to determine the graduation rate for the last two years. The graduation rate is 73.1% and 88.3%. With these conditions, the researchers concluded that there was a need for research and development to find learning methods to increase graduation to achieve more than before.

## 3.2 Analysis of Characteristic

Data Characteristic analysis is essential to determine the increase in student achievement in the learning process (Cantabella *et al.*, 2019). Based on the analysis of student characteristics conducted through observation and interviews, from the knowledge and understanding of diesel engines, 15 students have studied diesel engines, and 21 students have never studied diesel engines.

Learning style analysis shows that auditory style 22, visual style 26, and kinesthetic styles 36. Not all students have sufficient knowledge of diesel engines so that they need to increase understanding of diesel engines. In general, they have multi learning styles, namely visual, auditory, and kinesthetic styles.

## 3.3 Need Analysis

To make the product relevant, the researcher analyzes the students about several components, namely, media usage, media type, media quality, components, and content of the show. The description of the findings of the analysis of needs derived from these data can be seen that:

- The learning of diesel motors already uses learning media.
- The dominant media used are computer and LCD projectors and teaching aids. While images, films/videos, and animations are still very minimal to use.
- The quality of the media is passable. Almost every class of the school is equipped with an LCD projector and a computer that are installed regularly.
- Most of them want learning media that has been packaged and contains the title, instructions, goals, content framework, material, and contains practice questions.
- The contents of the show you want besides PowerPoint also contain animation, sound, and film. Based on the results of the analysis above, researchers develop learning media that is interactive multimedia following the learning needs of students.

Multimedia is based on PowerPoint, contains instructions for use, the content of learning, and evaluation (Lee, Hsiao, and Ho, 2014), (Lari, 2014).

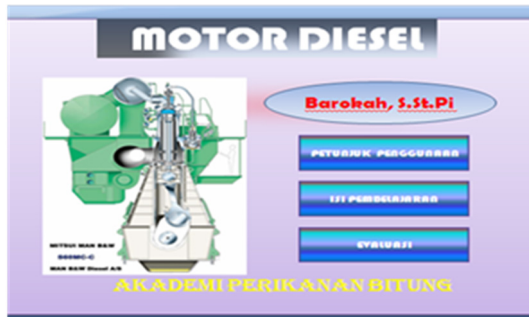


Figure 1: Product Development of Multi-Media Diesel Engine Learning.

### 3.4 Expert Validation

Multimedia drafts, before developed, were first validated by several experts, namely design experts, media, and material (Abdul, 2010). The assessment of experts for each interactive multimedia instrument described that the score for the criteria is very good and good, reaching 66 of the maximum score of 134.

The achievement of the score can be 49.25, very good, 49.25 good, and only two scores with good enough criteria. From the data and description above, the researcher continues to test the product at the next stage.

### 3.5 Individual Trials

This trial was conducted by three representatives from grade 1 students in the Department of Fisheries, and Marine Engineering took one person from the top rank, one person middle rank, and one person lower rank. Everyone is given an interactive multimedia CD operated independently in the audiovisual room.

Three students conducted individual trials. Fourteen components were assessed in multimedia. No revision was made. Then proceed to the next trial that is a group trial conducted.

### 3.6 Group Trials

In the group trials, nine students were taken out and shared with an interactive multimedia CD each person one piece. The CD is operated independently. Nine students give the assessment that out of the 14 elements in the assessment instrument, all students recommended that multimedia be used for learning diesel engines.

### 3.7 Field Trials

All of the 36 students did this trial. Students are given an interactive multimedia CD for each person. Then they operate independently. All students can perform it because the CD has been designed autorun. Students can be interactive, and learn according to the discussion they want to know. Based on the results of the field trial value, most students assessed both interactive multimedia.

The number that judges very well reaches 75.99 percent while the rate is reasonable by 22.81. The rest gave a pretty good rating. From the results of these assessments, interactive multimedia media for learning can be declared feasible to use.

### 3.8 Learning Outcomes

Students need to be observed individually at the time of multimedia operations to ensure an increase in learning outcomes. From the results of observations of students, 36 people can operate multimedia well and smoothly. Then after the trial of multimedia products finished, the students worked on the problem. The results of their answers were compared with the previous test. Learning outcomes can be seen in the following graph.

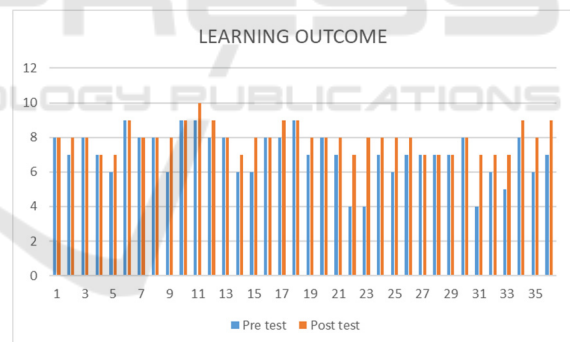


Figure 2: Acquisition Learning Outcomes of Diesel Engine Learning.

From the graph, it can be explained that students who experienced an increase in the value of 55 percent by 20 people while those with a fixed score of 45 percent were 16 people, the total number of pre-tests was 253 and post-tests 287 so that there were 34 points added. Eleven students were experiencing a significant increase, from a value of 4.5.6 to a value of 8.

## 4 CONCLUSIONS

The results of the development of multimedia diesel engine learning were carried out by adopting a 4-D development model. The development results of multimedia learning for diesel engine learning have been thoroughly tested, starting from expert trials or validation, individual trials, group trials, and field trials. The majority of assessments showed to be very good. Thus no revisions were made.

One thing that can be concluded from learning with multimedia is that it can improve the enthusiasm for learning. Students are actively involved in learning events and want to know everything in it. Students want to complete their studies because they are engaged in learning experiences that involve all their senses.

Multimedia learning for diesel engines that are designed interactively can bridge the differences in the level of understanding between students while harmonizing the rhythm of learning from various characteristics of cadets. For those who feel they don't understand, they can repeat it independently, because multimedia can be used anytime, anywhere and in conditions like anything or along with the guard, and even though the lecturer is unable to attend, Students can learn independently to complete their studies.

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