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 student. The results of the research proved that the multimedia diesel engines developed can increase the acquisition of learning outcomes. In addition to contributing to learning techniques, this study also found learning outcome through involving multi sensor. It is better if the results of multimedia development can be developed into facilitate learning. This research is limited to the scope of multimedia diesel engines with power point computer programs.

Keywords: Development, Learning Multimedia, Diesel Engines, Learning Outcomes

1 Introduction

1.1 Background

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

Like what is experienced in fisheries engineering study programs where students have difficulty being able to pass the marine examination, especially in the eyes of a diesel engine exam. Related to this matter, research on learning technology needs to be done in various domains. One of the areas in this research is the media sphere. The media developed in this study is multimedia. Multimedia material incorporates aspects of

motivation into the cognitive theory of multimedia learning.[1] Multimedia also integrates transformation, motivation, and other affective variables. Overall, on multi-media features can improve students' learning by encouraging generative processes. [2-4]

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.[5]

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.[6-8] Multimedia consists of several types of media that are complete in one media package so that it is more interesting 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.

1.2. Problem Formulation

Learning media is actually a lot that can be used in learning, but 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 motorbike and the second is how to improve the learning outcomes obtained after using learning multimedia.

1.3. Development Goals

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.

1. Identification: Perform initial analysis and formulation of learning objectives,
2. Planning: Perform format selection and media selection
3. Development procedure; Arrange learning design, determine the model & prototype of learning media, compose message designs, create story boards, develop media.
4. Spread

Before 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.

3 Results and discussion

3.1 Preliminary analysis

The initial analysis was carried out to determine the graduation rate of the last two years. Graduation rate is 73.1% and 88.3% year. With these conditions, the researchers concluded that there was a need for research and development to find learning methods to increase graduation in order to reach 100%.

3.2 Analysis of characteristics

Data Characteristic analysis is very necessary to determine the increase in student achievement in the learning process. [9] Based on the analysis of student characteristics conducted through observation and interviews, from the knowledge and understanding of diesel engines 15 people have studied diesel engines and 21 people have never studied diesel engines. Learning style analysis shows that audio 22, Visual 26, kinesthetic and learning 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 teaching 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 about the analysis of needs derived from these data can be seen that:
1) Learning of diesel motors already uses learning media
2) Whereas the dominant media used are computer and LCD projectors and teaching aids. While images, films / videos and animations are still very minimal to use
3) The quality of the media is quite good, almost every class of the school is equipped with a LCD projector and a computer that is installed regularly.
4) Most of them want learning media that has been packaged and contains the title, instructions, goals, content framework, material, and contains practice questions.
5) The contents of the show you want besides power point also contain, animation, sound, and film. Based on the results of the analysis above, researchers develop learning media that is interactive multimedia in accordance with the learning needs of students. Multimedia is based on power point, contains instructions for use, content of learning, and evaluation.[10-11]

Fig. 1. Product Development of Multi Media Diesel Engine Learning

3.4 Expert validation

Multimedia drafts before being developed were first validated by several experts, namely design experts, media and material.[12] 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 2 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 majoring in machinery taken 1 person from the top rank, 1 person ranked engagement, and 1 person ranked lower. Everyone is given an interactive multimedia CD operated independently in the audio visual room. The results of individual trials, namely from 14 components in the multimedia assessment conducted by three students 100% thought there was no revision. Then a group trial was conducted

3.5 Group Trials

In the group test 9 students were taken out and shared with an interactive multimedia CD each person 1 piece. The CD is operated independently. The assessment given by 9 students that out of the 14 elements in the assessment instrument all students recommended that multimedia be used for learning diesel engines.

3.6 Field Trials

This trial was carried out of en masse student of the class, which involved all the number of students, namely 36 people. Students are given an interactive multimedia CD each person. Then they operate independently. All students can operate it because the CD has been designed auto run. 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 the interactive multimedia. The number that judges very well reaches 75.99 percent while the rate is good 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.

3.7. Learning outcomes

To ensure there is an increase in learning outcomes, students need to be observed individually at the time of multimedia operations. From the results of observations of cadets, there are 36 people who 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.
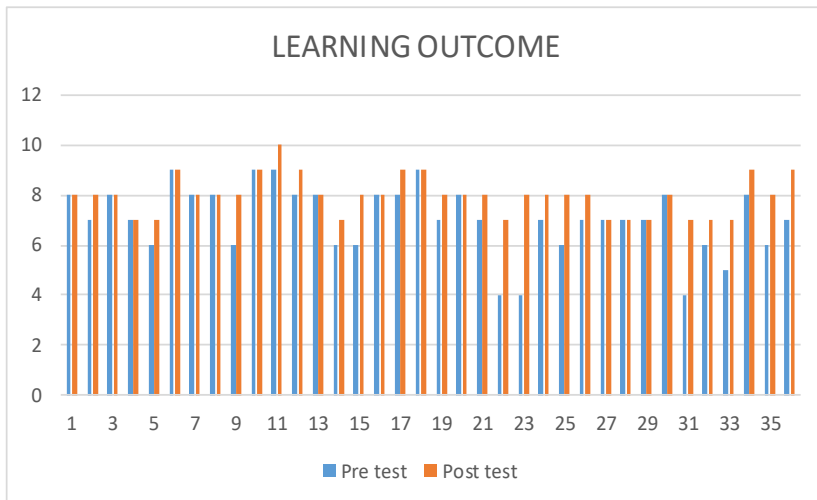
Fig. 2. Acquisition Learning Outcomes of Diesel Engine Learning

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. There were 11 students experiencing a significant increase, from a value of 4.5.6 to a value of 8.

4. Conclusion

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

Some things 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 involved in learning experiences that involve all their senses.

Multimedia learning for diesel engines that is 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 the guard and even though the lecturer is unable to attend, cadets can learn independently to complete their studies.

Acknowledgment

References

[1] Mayer, R. E. and Estrella, G. 'Bene fi ts of emotional design in multimedia instruction', 2014 ;33, 12–18

[2] Park, B., Plass, J. L. and Brünken, R. 'Cognitive and affective processes in multimedia learning', *Learning and Instruction*. Elsevier Ltd, 2014 ;29 :125–127

[3] Heidig, S., Müller, J. and Reichelt, M. 'Computers in Human Behavior Emotional design in multimedia learning : Differentiation on relevant design features and their effects on emotions and learning', *Computers in Human Behavior*. Elsevier Ltd, 2014 ;44 :81–95

[4] Al-hariri, M. T. and Al-hattami, A. A. 'Impact of students ' use of technology on their learning achievements in physiology courses at the University of Dammam', *Journal of Taibah University Medical Sciences*. Elsevier Ltd, 2014 ;12(1) :82–85

[5] Mayer, R. E. 'Incorporating motivation into multimedia learning q', *Learning and Instruction*. Elsevier Ltd, 2014 ;29 :171–173

[6] Zaid, M. *et al.* 'Relationship Between the Multimedia Technology and Education in Improving Learning Quality', *Procedia - Social and Behavioral Sciences*. Elsevier B.V., 90(InCULT 2012), 2012 ; 351–355

[7] Akhondi, A. 'The effective multimedia instruction in remedy spelling disability students specific learning in Iran at year 2009', 2011 ; 15 :1951–1954.

[8] Aloraini, S. (2012) 'The impact of using multimedia on students 'academic achievement in the College of Education at King Saud University', *Journal of King Saud University - Languages and Translation*. King Saud University,2012 ; 24(2):75–82.

[9] Cantabella, M. *et al.* 'Analysis of student behavior in learning management systems through a Big Data framework', *Future Generation Computer Systems*. Elsevier B.V., 2018 ; 90 : 262–272. doi: 10.1016/j.future.2018.

[10] Lee, Y., Hsiao, C. and Ho, C. 'Computers in Human Behavior The effects of various multimedia instructional materials on students ' learning responses and outcomes : A comparative experimental study', *Computers in Human Behavior*. Elsevier Ltd, 2014 ; 40 : 119–132

[11] Lari, F. S. (2014) 'The Impact of Using PowerPoint Presentations on Students ' Learning and Motivation in Secondary Schools', *Procedia - Social and Behavioral Sciences*. Elsevier B.V., 98(2009), pp. 1672–1677. doi: 10.1016/j.sbspro.2014.03.592.

[12] Abdul, R. 'Shared knowledge among instructional multimedia design experts', 2010 ;9 : 353–357