The Development of Learning Media’s “Tutorial Video for Setting the Front Wheel Alignment With a 3D Spooring Tools” at SMK N 1 Magelang

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Abstract. This study aims to: (1) Produce a learning media’s tutorial video for setting the Front Wheel Alignment with a 3D Spooring tool; (2) find out the feasibility of developing a tutorial video for setting the Front Wheel Alignment with a 3D Spooring tool for learning media on Light Vehicle Engineering Department in Vocational High School 1 Magelang. The type of this research is Research and Development (R&D) using the 4D model (define, design, develop, disseminate) because more clearly the steps in each stage of this model. Data collected by observation, interviews, and questionnaires. The video feasibility assessment in this study was conducted by one material expert, one media expert, and 30 students of XII OA class in Vocational High School 1 Magelang and then converted to qualitative data with five eligibility categories. The results of this study are tutorial video for setting the front wheel alignment with a 3D spooring tool which gets a score of 3.94 (feasible) from material experts, from media experts get a score of 4.11 (feasible), and student opinions get a score of 4.41 or 88.11% (very feasible) so that learning media’s tutorial video for setting the front wheel alignment with a 3D spooring tool is very suitable for use in learning.

1. Introduction

Education is a conscious and planned effort to create an atmosphere of teaching and learning so that students actively develop their potential to have religious-spiritual strength, self-control, personality, intelligence, noble character, and skills needed by themselves, society, the nation, and the state (Education System Law National, 2003). Education is held as a lifelong process of cultivating and empowering students. The implementation of this process requires educators who can provide an example, build the will, and develop the potential and creativity of students.

Efforts to develop science and technology in the 21st century have led to the development of the implementation of education in Indonesia. Education plays an important role in creating quality human beings who can develop themselves and can face all the challenges and obstacles a nation faces to achieve progress. The implementation of 16 Education in Indonesia always brings changes in the framework of improvement so that it is in line with the development needs of a nation.

Prosser and Quekly (Suyitno, 2016) suggest that vocational education is a concept of a comprehensive experience for every individual who wants to learn for the success of the world of work. Vocational high schools should be able to produce graduates who are ready to work who have competencies following the needs of the business world / industrial world. In view of what has been stipulated in Law Number 20 of 2003 concerning the National Education System Article 15 explains that vocational education is secondary education that prepares students primarily to work in certain
fields so that the competencies obtained by students while carrying out education at SMK must meet the needs of the industry.

However, the reality of the views of the community, especially experts, states that the capabilities or competencies produced by SMK have not been able to meet the demands of the world of work or are not relevant between SMK products and industrial needs. The compatibility of the competence of SMK graduates with industrial needs has not yet been created. The views of the community, especially experts, reveal that the competence of graduates produced by SMK is not yet following the qualifications of industrial needs. Therefore, the competence of graduates must be adjusted according to the needs of the world of work or the world of the industry so that SMK graduates can prepare graduates who are ready to work and following the competencies required by the industry.

Producing graduate competencies in accordance with the needs of the industrial world is something that must be done by SMK. So SMK as a vocational education must-have resources that always follow the development of industrial technology. Several principles of the implementation of vocational education put forward by Prosser (Sudira, 2012: 32) state that education will be less effective if competency mastery in the form of training tasks is carried out using the same tools and machines like those in the workplace.

SMK N 1 Magelang is one of the vocational schools in Magelang City. The Light Vehicle Engineering Department is one of the departments at SMK Negeri 1 Magelang. This department provides several simulators to support the learning process. The results of interviews with the Chassis workshop coordinator, majoring in Light Vehicle Engineering at SMK Negeri 1 Magelang, so far, the teachers who teach Chassis Maintenance and Light Vehicle Power Transfer subjects for practical classes use wallcharts, simulators, and job sheets. The media used is less attractive for an introduction to the practice.

The results of interviews with 30 students of class XII OA of Light Vehicle Engineering who are currently taking Chassis Maintenance and Light Vehicle Power Transfer subjects obtained student data totaling 17 students or 56.67% who stated that they did not understand the Front Wheel Alignment material. The lack of understanding for most students is due to the FWA setup with the 3D Spooring tool that is different from the conventional spooring system which is simpler as taught in XI grade.

Industrial demands in the future, students must be able to adjust the FWA and use a more sophisticated spooring tool, namely 3D spooring. The spooring tools that are currently available to support mastery of the Front Wheel Alignment material are the 3D Spooring tool with the Roadbuck brand and the Toyota Kijang Innova 2.0G M / T. However, because this tool is still new, and not many people can operate this tool, it is necessary to be careful in its use so that the components work normally and do not get damaged quickly.

The fact that occurs in learning activities is that students often experience errors in the use of simulators used during practice. As a result, there is often damage or errors in practical tools. Damage occurs in electronic parts that are vulnerable to overcurrent, error prone when the current is unstable and errors in usage procedures.

The problems above require solutions to overcome the problems and lack of understanding experienced by students in understanding and carrying out in detail the practice of Front Wheel Alignment or Spooring 3D so that no more damage occurs to the practical tools. The solution to quickly increase students' understanding of understanding FWA settings and using 3D spooring tools is a learning media that is specific, interesting, in accordance with the material, and can be used by students anytime, anywhere. The learning media chosen is a video tutorial because the video can be seen and owned by all students, and also the video can be studied by students before carrying out the learning process and also because of technological advances and all students can and have smartphones.

In connection with this problem and the situation analysis that has been carried out, in learning the spooring material on the subject of Chassis Maintenance and Vehicle Power Transfer it is necessary to use video tutorial learning media. The video tutorial was chosen because the manufacturing process is relatively easy and the show can provide a real picture of how to use the 3D spooring tool and how to adjust the front wheel alignment.
Pramudito (2013: 4) states that a video tutorial is a series of live pictures displayed by a teacher containing learning messages to help understand learning material as guidance or additional teaching material for a small group of students. In line with that Utomo (2018: 70) states that video tutorials are a series of live images that can present information provided by a tutor to a group of people so that they can understand the process or increase their knowledge just by watching the video. Based on some of the above definitions, it can be concluded that video tutorials are learning media in the form of a series of live pictures that contain information or guidance that is broadcast from the teacher (tutor) to students in class and outside the classroom so that students can understand the process of knowledge just by watching the video.

Sudjana (2003: 137-138) and Dwiyogo (2013: 215-216) suggest the advantages obtained from the use of interactive video learning media, namely (1) How work will motivate students to be enthusiastic in learning. (2) Able to combine text, images, sound, music, and moving images (animation and video) in one unit that supports each other. (3) Able to visualize material that is difficult to explain by conventional teaching aids or from the instructor's statement. (3) allows the appearance of students 'memories that occurred in the past (4) Can train students' ability to learn independently. and (5) Can be repeated if necessary on difficult material to increase clarity.

In an effort to overcome the problem where many students do not understand the Front Wheel Alignment adjustment material with the 3D Spooring tool, the development of learning media in the subject of Chassis Maintenance and Light Vehicle Power Transfer using video tutorials includes teaching material as an explanation accompanied by animation and images. as well as learning evaluation.

The objectives of this study were (1) to produce instructional media products for video tutorials on front wheel alignment adjustment with 3D spooring tools in the Light Vehicle Engineering Department at SMK Negeri 1 Magelang and (2) determine the feasibility of the resulting product in the form of instructional video tutorials for front wheel alignment with tools. 3D spooring for learning at the Light Vehicle Engineering Department at SMK Negeri 1 Magelang.

2. Method

The method to be used in this research is Research and Development (R&D), the Research and Development research method is a research method used to produce certain products and validate these products (Sugiyono 2015: 11). The development model used in this development research was adapted from the Four-D development model proposed by Thiagarajan (1974) in Mulyatiningsih (2011: 194-195) which consists of four stages, namely defining, designing, developing (develop), and dissemination. This research was conducted in the Light Vehicle Engineering Department at SMK Negeri 1 Magelang. This research was conducted in the even semester of the 2019/2020 academic year, namely May 11, 2020, to June 19, 2020. The research subjects were one material expert, one media expert, and 30 students majoring in Light Vehicle Engineering at SMK Negeri 1 Magelang.

Collecting data in this study using observation and interviews which function to obtain initial data about problems that occur in the place and research subjects. Furthermore, a questionnaire is used which functions to collect data in the form of material expert assessments, media experts, and student opinions regarding the feasibility of the learning media that has been developed.

Data analysis in this study was carried out descriptively and the results of the analysis were used to determine the feasibility of learning media products that had been developed. The results of observations and interviews with respondents were analyzed descriptively. The results of the analysis can then be used as a material for developing learning media.

The testing instruments in this study were validity and reliability. validity used is construct validity (construct validity). Construct validity relates to the structure and psychological characteristics of the aspects or aspects to be measured by the instrument (Syoadih, 2009: 228). Testing the validity of constructs can use expert opinion (expert judgment).

According to Arikunto (2006: 178), reliability refers to an understanding that an instrument can be trusted enough to be used as a data collection tool because the instrument is quite good. A good instrument will not be tendentious or lead respondents to certain answers. As for the reliability test using the Alpha Cronbach formula. According to Suharsaputra (2012: 112), the alpha formula is a procedure for finding a reliability value that does not require splitting items into two groups (although it can also be applied to the split technique in half), so that it can be applied to instruments where the number of items is not even. Cronbach's alpha formula is as follows:
\[ \alpha = \left( \frac{k}{k-1} \right) \left( \frac{\Sigma b^2}{\sigma^2_t} \right) \]

Description:
- \(r_{11}\) = instrument reliability
- \(\Sigma b^2\) = the number of grain variances
- \(\sigma^2_t\) = total variance
- \(k\) = group or number of items (Arikunto, 2006)

Guidelines for providing interpretations of the \(r\) price according to Sugiyono (2012) can be explained in the following table.

| Coefficient interval \((r)\) | Relationship level       |
|-----------------------------|--------------------------|
| 0.80 - 1.000               | Very strong              |
| 0.60 - 0.799               | Strong                   |
| 0.40 - 0.599               | Moderate                 |
| 0.20 - 0.399               | Weak                     |
| 0.00 - 0.199               | Very weak                |

The analysis of the assessments carried out by media experts was carried out by calculating the average score contained in each aspect and the average score of the overall answer. Validation of valid and reliable data from material experts and media experts, then the analysis process is carried out with the following steps. Calculate the average score of each aspect and overall using the formula:

\[ \bar{X} = \frac{\Sigma X}{N} \]

Description:
- \(\bar{X}\) = Average score
- \(\Sigma X\) = Total score of aspect items
- \(N\) = Number of items on an aspect

The average score was converted into a qualitative feasibility level and was consulted with the classification table 2 (Widoyoko, 2012)

| Average Score | Value Classification       |
|---------------|---------------------------|
| >4.2 - 5.0    | Very Worth it             |
| >3.4 - 4.2    | Well worth it             |
| >2.6 - 3.4    | Decent enough             |
| >1.8 - 2.6    | Less feasible             |
| 1.0 - 1.8     | Very Inadequate/ Not feasible |

The data in the student opinion questionnaire are tabulated and analyzed. Data in the student opinion questionnaire that has been declared valid and reliable is tabulated and analyzed by the following steps:

Calculate the average score of each aspect and overall using the formula:

\[ \bar{X} = \frac{\Sigma X}{N} \]

Description:
- \(\bar{X}\) = Average score
- \(\Sigma X\) = Total score of aspect items
- \(N\) = Number of items on an aspect

After calculating the average, the quantitative data results can be added and the percentage of eligibility is calculated. To obtain these results, you can use the following formula:

\[ \text{Result} \left(\%\right) = \frac{\Sigma \text{Average score obtained}}{\Sigma \text{average maximum score}} \times 100\% \]
After the eligibility percentage has been calculated, the results can be determined into several eligibility categories as in the following table:

| Score in percent | Eligibility Category |
|------------------|----------------------|
| 0 – 20%          | Not feasible         |
| 21 – 40%         | Not worth it         |
| 41 – 60%         | Decent enough        |
| 61 – 80%         | Well worth it        |
| 81 – 100%        | Very Worth it        |

3. Result and Discussion

At the defining stage, the requirements or needs needed in the development of learning media are determined. Data at this stage were obtained through observation and interviews which were analyzed descriptively based on relevant theoretical studies. In the define stage, an initial analysis of 30 students was carried out to answer questions, interviews with teachers, and observations in automotive electrical workshops. In addition, student analysis was carried out with the result that most of them had difficulty understanding the spooning practice learning material. Another analysis carried out was a task analysis related to the main tasks that must be mastered by students to achieve the minimum competency limit of performing spooning adjustments. In addition, an analysis of the concept of teaching materials and the formulation of learning objectives was also carried out.

The design stage functions to prepare the initial design of the learning media being developed. This stage consists of several steps, namely: testing the criteria, selecting learning media, and selecting the form of presentation of instructional media. At this stage a learning media product is produced, a video tutorial on adjusting the front wheel alignment with the 3D spooning tool.

Before conducting field trials, the product in the form of this learning video needs to be assessed and validated by experts, namely material experts and media experts. This activity is carried out to assess the initial product, the experts provide suggestions and input for product improvement materials before conducting field trials both on a small and large scale. After that, a small-scale trial was carried out on 12 students as subjects in a small-scale trial. After a small-scale trial was carried out and improvements were made according to the suggestions, then a large-scale trial was carried out involving 30 students as subjects. The results of the students' opinions were then analyzed by researchers to determine the feasibility of the media products that had been developed.

In this last stage, learning media that have been recognized for their feasibility are carried out by the packaging process into a Digital Versatile Disk (DVD) and followed by a limited distribution to the Light Vehicle Engineering Department of SMK Negeri 1 Magelang to be used in the learning process both in the classroom and in independent learning carried out by students.

The feasibility of learning media video tutorials for adjusting front wheel alignment with 3D spooning tools is done through validation by material experts and media experts, small-scale trials, and large-scale trials.

The assessment carried out by material experts on video tutorial learning media includes two aspects, namely aspects of the quality of content and objectives and quality of learning. The results of the material expert's assessment got a score of 3.88 for the aspects of the quality of content and objectives and 4.00 for the aspects of the quality of learning and got an average rating of 3.94 which is categorized as feasible. The results of the material expert's assessment can be seen in the following figure:
Figure 1. Graph of the results of the material expert's assessment.

The assessment carried out by media experts includes three aspects, namely visual communication, video presentation, and management. Each aspect received an assessment result of 4.33 on the visual communication aspect and was categorized as very feasible and in the aspect of video presentation and management, the assessment results were 4.00 and categorized as feasible. The average value of all aspects is 4.11 and is categorized as feasible. The results of the media expert's assessment can be seen in the following figure:

Figure 2. Graph of the results of the media expert's assessment.

The last assessment is media trials on class XII students at SMK Negeri 1 Magelang, there are two trials, namely small-scale trials and large-scale trials. This is to obtain student opinions as users or the target application of video instructional media for front wheel alignment adjustment with 3D spooring tools in terms of four aspects, namely: aspects of content quality and objectives, aspects of learning quality, aspects of communication, and aspects of media use.

The small scale trial was taken by 12 students as respondents. According to Susila and Riyana (2008: 173), at the stage of small group evaluation, trials are needed for 10-20 respondents. If less than 10 people the data obtained is less representative and describes the target population. In the small-scale trial, the assessment results quality of the content and goal aspectobtained were 4.44 with an eligibility percentage of 88.83%, the quality of learning aspects obtained a mean value of 4.36, the percentage of eligibility was 87.22%, in the communication aspect the average value was 4.30 with the percentage of feasibility. 86.00% and the aspect of using the media obtained a mean score of 4.39 with an eligibility percentage of 87.78%. These four aspects obtained an average value of 4.37 with an eligibility percentage of 87.46%, which means that the quality of learning media based on student opinion on these four aspects is categorized as very feasible. to clarify the results of the assessment can be seen in the following picture:
The last assessment was an assessment on a large-scale trial conducted by 30 students from class XII OA, majoring in light vehicle engineering at SMK Negeri 1 Magelang who gave their responses (in the form of opinions) on learning media. The large-scale trial stage obtained the results of the assessment of the quality of the content and the goal of obtaining a value of 4.38 with a percentage of eligibility of 87.53% and the quality of learning aspects of obtaining a mean score of 4.39 with a percentage of the feasibility of 87.72%, communication skills obtained a value amounted to 4.38 with the percentage of the feasibility is 87.53%, and the aspect of use obtained an average value of 4.48 with the percentage of the feasibility is 89.67%. The total average of the four aspects is 4.41 and the percentage of feasibility is 88.11% so that both the value per aspect and the total are categorized as very feasible. The results of student opinions can be seen in Figure 4.

This video tutorial learning media was created to overcome some of the problems that exist in learning in the subject of chassis maintenance and light vehicle power. The instructional video tutorial media made are expected to be able to help solve problems and assist students in understanding the material and to achieve the specified learning objectives.

With this video tutorial learning media, students can learn about spooring material anywhere and anytime. This is because this tutorial video learning media is very easy to use and can be used on computers or smartphones, which in the present era every student has and can operate it even during practical waiting times and during practice, students can still use this learning media to better
understand step by step in setting the front wheel alignment with the 3D spooring tool so that students can understand each process, the results of the adjustment are correct and do not damage the tools used. From the results of the assessment of the large-scale trial, the video tutorial for adjusting the front wheel alignment with the 3D spooring tool is very suitable for use in the learning process, in delivering material in class or learning independently.

4. Conclusion

Based on the results of the research and development that has been carried out, the following conclusions can be obtained: (a) the product results from the development of learning media for front wheel alignment adjustment with 3D spooring tools in the Light Vehicle Engineering Department at SMK Negeri 1 Magelang in the form of video tutorial-based learning media that is stored using the "MP4" format with the file size of the video is 294MB, in video part 1, 398MB in video part 2, and video part 3 is 283MB in size. which can be played on a computer or smartphone with the five materials in the video, namely (1) initial material or basic material, (2) Preparation step, (3) Measurement step, (4) Setup step, and (5) steps after setup and (b) the results of the assessment of the material expert on the media for front wheel alignment with the 3D spooring tool get a cumulative value of 3.94 out of a scale of 5 in the feasible category, the media expert's assessment got a cumulative score of 4.11 out of a scale of 5 in the feasible category. The opinion of the XII OA class students majoring in Light Vehicle Engineering in the small-scale field test got a cumulative value of 4.31 from a scale of 5 with an eligibility percentage of 87.46% which is categorized as very feasible and large-scale trials get a cumulative value of 4.41 from the scale 5 with an eligibility percentage of 88.11% which is categorized as very feasible. Based on these data, the front wheel alignment tutorial video learning media with 3D spooring tools are very suitable for use in learning.

5. References

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