



Developing Tutorial Video Chassis Maintenance for Automotive Students at SMK Negeri 1 Seyegan

Dimas Kurniawan¹, Ibnu Siswanto²

¹SMK Negeri 6 Samarinda, Kalimantan Timur, Indonesia
Batu Cermin Street, Sempaja Utara, Kec. Samarinda Utara, Kota Samarinda, Kalimantan Timur,
Indonesia

²Automotive Engineering Education, Universitas Negeri Yogyakarta, Indonesia
Colombo No.1 Street, Karangmalang, Yogyakarta 55281, Indonesia

Corresponding author: ibnusiswanto@uny.ac.id

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ABSTRACT

The primary objective of this study is to develop tutorial videos addressing periodic maintenance procedures for light vehicle chassis at intervals of 5000, 10,000, 20,000, and 40,000 kilometers, while also assessing their suitability for educational purposes. The Research and Development (R&D) methodology, utilizing the ADDIE model, was employed for this purpose. The R&D process encompasses analysis, design, development, implementation, and evaluation stages. The study was conducted at SMK Negeri 1 Seyegan, where content and media experts served as respondents to evaluate the appropriateness of the tutorial videos. Additionally, 96 students from Class XI of the Automotive Light Vehicle Engineering department participated in trial sessions to assess the videos' usefulness. Data were gathered through interviews and questionnaires, followed by thorough analysis to elucidate the study's findings. The results revealed that the tutorial videos received very high ratings from content experts (96.5%) and favorable ratings from media experts (79.8%). Moreover, students, as potential users, gave the videos a high score of 80.43%. These findings indicate that the tutorial videos are well-suited for implementation in practical classroom activities.

Keywords: Learning Media, Tutorial Video, Light Vehicle, Chassis, Maintenance Work

INTRODUCTION

Education is one of the most important parts of human life because its crucial roles in enhancing quality human resources [1]. Daryanto [2] states that education is a form of process in making better changes in individuals so that they could continuously develop their talents, knowledge, and skills to live life. The educational process can be obtained from various sources and media that can attract students' interest in learning. Subsequently, teachers are required to have a professional and pedagogical competency to deliver the latest both theoretical and technological developments [3].

Vocational High Schools (SMK) is one type of secondary schools in Indonesia. Its objective is facilitating students to be ready to work in a certain field relevant to their program. In the SISDIKNAS Law Article 15 Number 20 of 2003 [4], it explains that SMK is secondary level education which prepares students to be productive students, competent in certain fields, and independent so that they can compete in the industries after graduation. Therefore, to achieve this goal, students are directed to go through some activities including classroom and workshop activities, internship, and project-based learning.

SMK N 1 Seyegan is one of vocational high school institution that provides various skills competencies such as Light Vehicle Engineering (TKR), Stone and Concrete Construction Engineering (TKBB), Building

Drawing Engineering (TGB), Automotive Technology (TO), Metal Fabrication Technology (TFL), Motorcycle Technology (TSM), and Computer and Network Technology (TKJ). The TKR program at SMK N 1 Seyegan purports to train students' competencies on light vehicle engine, chassis, body, and its electrical system. It is starting from history, functions, how it works, how to repair, and how to maintain it in a systematic and structured manner.

From the results of interviews with one of the teachers at SMK Negeri 1 Seyegan, there were several problems experienced by the teacher when he wanted to deliver content related to periodic maintenance work on light vehicle chassis at 5.000, 10.000, 20.000, and 40.000 kilometers. The first problem lies in the difficulty of a teacher when delivering content on those topics during classroom learning. The second problem lies in the fact that only a few machines are available for demonstration during the workshop activities. Subsequently, the knowledge received is not optimal for some students. The third problem lies in the learning media used for these topics which is not yet available. According to Yuswono, Martubi, and Sukaswanto [5], there were evidence of an educator's teaching method and media do not meet the suitability of the syllabi, affecting the learning process is not optimal. Additionally, there are several tutorial video on YouTube which have created content related to chassis

maintenance [6]–[8]. However, the knowledge conveyed and the basic content on chassis maintenance is not included and compiled in its entirety.

Learning media is one of the tools used by an educator as an intermediary to make it easier to deliver teaching content. Elpira and Ghufroon [9] said that learning media is anything that can be used to provide content, stimulating student’s thoughts, feelings, attention, and interest in learning in such a way that the learning process (inside and outside the classroom) can be more effective. Meanwhile, according to Tafonao [10], learning media is anything that can be used as a mediator for conveying messages by the sender to the recipient during the learning process. According to Sanjaya [11] there are several functions of learning media, namely: communicative, motivational, meaningful, perception equalization, and individuality function.

Based on the introduction above, it is necessary to conduct research related to the development of learning media in periodic maintenance work on light vehicles chassis in the form of tutorial video. This tutorial video, according to Irawan and Widjanarko [12], is positively affect student’s learning outcomes. It is supported by Anshor, Sugiyanta, and Utami [13] who concluded that video-based learning media have a appropriate influence on the learning process because it can stimulate students' interest in studying the content.

RESEARCH METHOD

The method used in this study is the research and development method with the ADDIE development model. According to Dick, Carey, and Carey [14] the ADDIE model consists of five development stages including: analysis, design, development, implementation, and evaluations. However, the procedures implemented in this study only until the third stage (development) (Figure 1). It can not do the implementation and evaluation stage because of the time limitation.

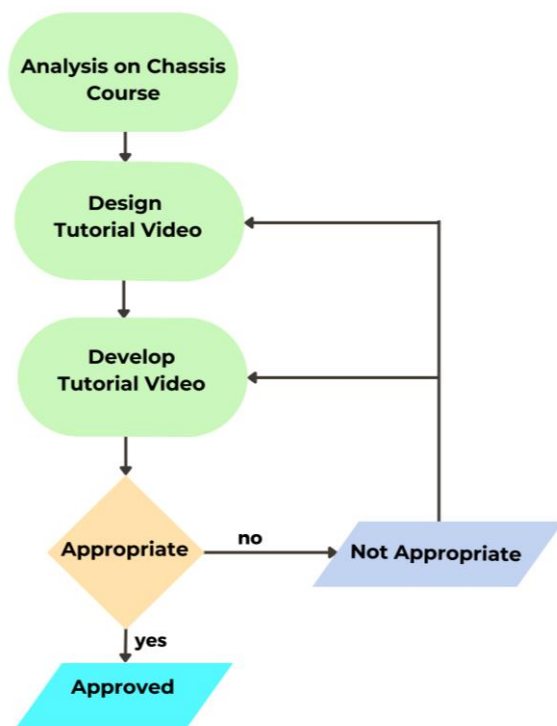


Figure 1. Research design

The subjects of this study were content experts who came from SMK Negeri 1 Seyegan (1 Teacher), learning media experts from the automotive engineering department of FT UNY (1 Lecturer), and users who came from XI TKRO students at SMK Negeri 1

Seyegan (96 students). The media expert in this study is an expert who has taught learning media for at least 2 years. While the content expert in this research is an educator who taught chassis maintenance and light vehicle power transfer for at least 2 years. The user in this research is a student who has taken chassis maintenance subject.

The data collection method used was interviews and questionnaires. These two methods used to obtain the data needed which then analyzed. There are 2 types of data obtained in this research, qualitative and quantitative data. The qualitative data came from interviews with teachers who teach chassis course. The data consists of problems occurred especially during the learning process on light vehicle chassis maintenance. Based on the data, researchers then further determine a research topic that could become a solution to solve the problems.

Furthermore, quantitative data showed the media appropriateness based on the content and media experts, and potential users. This data includes comments and suggestions obtained from the media and content experts who validated the learning media and user trials. The data analyzed descriptively and utilized as a consideration in developing and improving the tutorial video learning media.

The quantitative data about the appropriateness of the tutorial video were analyzed based on the total number converted from Likert Scale. The data

consists of four answer choices, namely very appropriate, appropriate, quite appropriate, and not appropriate. The conversion of the 4 scales using the assessment criteria by Djatmiko [15] which consists of four assessment criteria (Table 1).

Table 1. Assessment criteria

Score	Category
$(X + 1,5*SB)$ s.d. Max	very appropriate
X s.d. $(X + 1,5*SB)$	appropriate
$(X - 1,5*SB)$ s.d. X	quite appropriate
Min s.d. $(X - 1,5*SB)$	not appropriate

RESULT AND DISCUSSION

The development of tutorial video for periodic maintenance work on light vehicle chassis at 5.000, 10.000, 20.000, and 40.000 kilometers uses the R&D research method with the ADDIE model. The stages of development are as follows.

Analysis

At this stage, several problems were discovered at SMK N 1 Seyegan through an interview with one of the teachers who taught the subjects Chassis Maintenance and Light Vehicle Power Transfer Systems such as students have difficulties on mastering how to maintenance chassis works and there is no learning media on this subject. Based on the interview with the teacher, it can be concluded that a learning media is needed to facilitate students learn about chassis content.

According to Sukiyasa and Sukoco [16], the use of audio-visual learning media provides a better effect when compared to

the other media. The use of interactive media in vocational high schools is more effective when compared to the use of conventional media [17]. Hence, after evaluating the potential and problems that exist at SMK Negeri 1 Seyegan, it is necessary to create an audio-visual learning media that supports the delivery of content on periodic maintenance of light vehicle chassis.

Design

The design phase begins with determining several main tasks in periodic maintenance of light vehicle chassis. Then, the story board were made to design the tutorial video plot. The tutorial video consisted of opening, introduction, content, and closing (Figure 2). There were also text, picture, and voice over on each section. Tools for taking the video using a cellphone because it was easier and affordable.

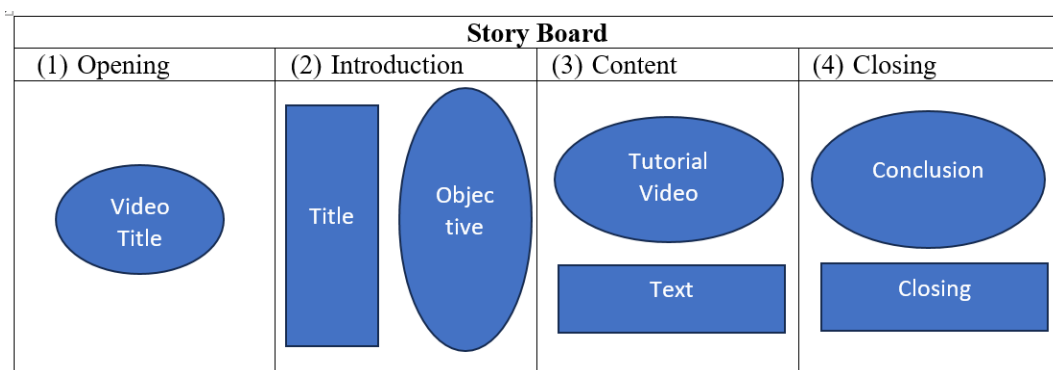


Figure 2. Story board of the tutorial video

Development

Development stage refers to the implementation of tutorial video design through taking videos, combining them, editing, and adding visuals or sound. After all the activities were finished, a tutorial video was created (Figure 3).

Then, to make it easier to use, the videos are arranged based on the order of the

learning content and uploaded to Google Drive. The purpose of uploading it to Google Drive is so that the tutorial video learning media that has been created can be easily accessed by the content and media experts. The two experts further assessed the tutorial video.



Figure 3. Tutorial video brake system maintenance

1. Content Expert Validation

Content validation was carried out by filling in the instrument items consisting of 26 items. The instrument could be able to validate the quality of the content and its usefulness. There are 18 items for validating the content quality and 8 items for verifying the content usefulness. The result shows that its content quality receive score 208 (96.30%) out of total score 216 and its usefulness obtain score 93 (96.90%) our of total score 96 (Figure 4). Hence, the result

indicates that the content of the tutorial video is very appropriate.

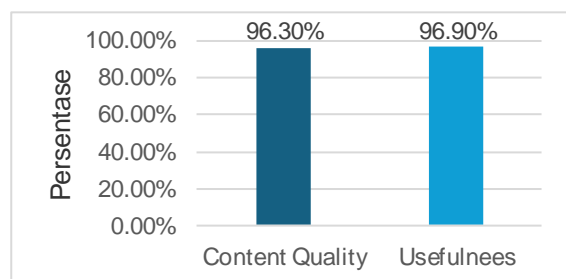


Figure 4. Content expert validation

2. Media Expert Validation

There were 26 items for assessing the tutorial video based on its appearance, lay out, and voices. The instrument assessed the quality of the video, language aspect of the video, and its lay out. There are 12, 7, and 7 items respectfully. The result reveals that the media quality aspect received a total score of 40 (83.3%) out of the maximum score that could be obtained of 48. Then, the aspect of language got scores 22 (78.6%) out of the maximum score 28. While the video layout aspect gets a total score of 21 (75%) out of the maximum score that can be obtained 28. Therefore, the data showed that the tutorial video Chassis Maintenance is appropriate (Figure 5).

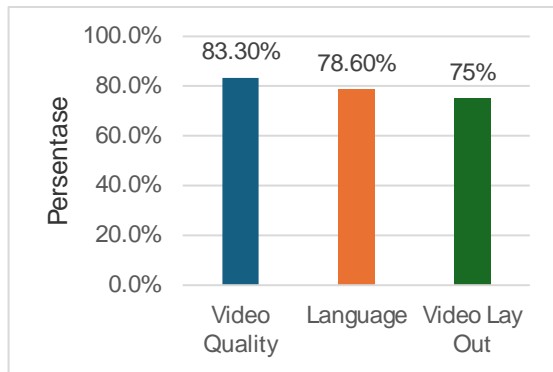


Figure 5. Media expert validation

3. User Validation

The video of chassis maintenance is very appropriate and appropriate based on its expert's validation (content and media quality, respectfully). Then, the video was further gone for trial through potential user verification. There were 96 students of class XI at SMKN Negeri 1 Seyegan participated as

respondents. A total 15 items were utilized to gather the tutorial video's user-friendly score. It consisted of three indicators including appearance, operation, and usefulness (8, 3, and 4 items respectfully).

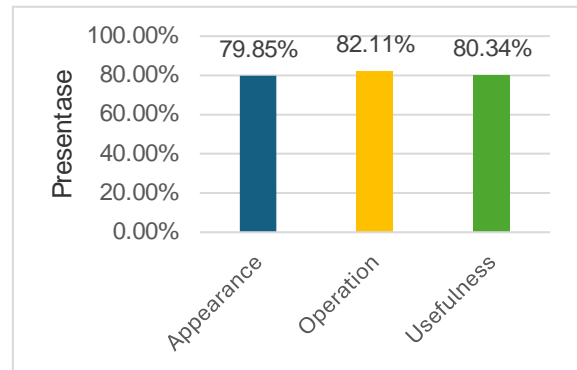


Figure 6. User validation

The user trials show that the tutorial video of chassis maintenance receive a total 2453 (79.85%) out of the maximum score 3072 on its appearance. Then, the media operation aspect got a total score 946 (82.11%) out of the maximum score 1152. Furthermore, media usefulness obtains a total score 1234 (80.34%) from the maximum score that can be obtained 1536 (Figure 6). Based on the user validation score, it can be concluded that the tutorial video of chassis maintenance is appropriate.

The tutorial video on chassis maintenance stands out for its good quality, making it an invaluable resource for learning process at vocational high school. There are several key points highlighting its strengths including content quality and usefulness; video quality and language; and appearance, operation, and usefulness. The results of the content of the tutorial video reveals that its

content is easy for students to understand. The tutorial video of chassis maintenance follows a logical sequence, starting from the objectives of the video, maintenance preparation, step by step hands on work, and conclusion [13][18]. This structured approach helps build the viewer's knowledge progressively, making the learning process smooth and intuitive. The tutorial video also shows detailed picture and text, making this tutorial video more invaluable for viewers who want to delve deeper into specific procedures on chassis maintenance. Therefore, this learning media is suitable to be implemented for facilitating students learn the related topics [19]. Additionally, a good learning media also have a positive effect on student's learning motivation [20].

Additionally, the assessment from the media expert shows that the chassis maintenance tutorial video is easy to use and has good visual clarity. An easy-to-use media, as one of requirement of a learning media [21][22], have several benefits such as enhance accessibility, increase engagement and motivation, improve retention and understanding, and provide more flexibility and adaptability. A tutorial video with high-definition visuals ensures that viewers can see every detail clearly. This is particularly important for tutorial involving intricate tasks, such as technical repairs, where visual clarity is paramount. HD quality helps to highlight specific components or steps, making the learning process more intuitive

and effective. Furthermore, seamless editing enhances the flow of the tutorial video, keeping the viewer engaged. Transitions between scenes is smooth, and unnecessary pauses or long-winded segments are trimmed to maintain a steady pace. The language and voice used in the tutorial video also clear and straightforward, making learners could follow it without any confusion [23].

The user validation of the chassis maintenance tutorial video in this study reveals that it has good appearance, operation, and usefulness. A well-crafted tutorial video can significantly enhance the student's learning experience by ensuring that the content is not only engaging but also easy to follow and highly beneficial [24]. Therefore, the video overall appearance should be appealing, providing a professional layout, consistent color schemes, and effective on-screen text [25]. Titles, annotation, and text could clarify complex procedures for the viewers.

Incorporating the high-quality tutorial video into learning activities can significantly enhance educational outcomes by leveraging its visual and auditory strengths [26]. The tutorial's clear, step-by-step demonstrations and engaging visual aids cater to diverse learning styles, making complex tasks easier to be followed. This multimodal approach ensures that students can see and hear how processes unfold, providing a richer understanding than text-based instructions alone. Additionally, the ability to pause,

rewind, and rewatch the video empowers students to learn at their own pace, accommodating different learning speeds and preferences [27]. This flexibility is particularly beneficial for reinforcing difficult sections and ensuring no student is left behind. The tutorial also brings real-world applications into the classroom, showing practical uses of theoretical concepts, which can enhance student engagement and motivation. Hence, it can be suggested to use the chassis maintenance tutorial video in the learning activities in the vocational schools. By integrating this tutorial video into the curriculum, educators can create a more dynamic, inclusive, and effective learning environment that supports and enriches student learning.

CONCLUSION

The development of learning media for tutorial video on chassis maintenance employs the ADDIE research method, which involves five stages. The first is the Analysis stage, the initial step, involves identifying and defining the problem to be addressed as the research theme. Second, the Design stage entails designing the media concept and determining and collecting the necessary content for creating the media. Third, the Development stage is where the designed concept is brought to life and assembled into a learning medium. Fourth, the Implementation stage involves testing the created learning media to assess the

feasibility and effectiveness of the developed product. Fifth, the Evaluation stage involves reviewing all activities conducted during each development phase to ensure the quality and effectiveness of the learning media. The assessment of the chassis maintenance tutorial video involved media and content experts, and users, specifically Class XI students in Light Vehicle Engineering at SMKN 1 Seyegan. Based on their assessment, it can be concluded that the chassis maintenance tutorial video is appropriate because it has a good content and video quality, clear and straightforward language, and easy to use. The tutorial video is appropriate to be used in the learning process. A further study is suggested to identify its effectiveness.

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