Development of Motorcycle Brake System Tutorial Media for Vocational High School

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Keywords	**Abstract**
Development Learning Media Video Tutorials Brake Systems	*This research aims to develop learning media and determine the feasibility of video tutorials for learning brake systems in class XI motorbike chassis maintenance subjects. This research uses a development research approach. The research subjects were students of class XI Motorcycle Business Engineering at Vocational High School. The procedure developed in this research consists of 4 stages, namely (1) the concept creation stage which includes initial analysis, final analysis, collection of materials and supporting materials, (2) the product creation stage which includes design and assembly, (3) trial stage (testing) validation by media experts, material experts, then continued with evaluation or assessment of teachers in the field of study, peer evaluation or assessment, and trials on students (4) distribution, namely by uploading (upload) on YouTube. The data analysis technique used is the quantitative descriptive analysis technique. The results of assessing the feasibility of video tutorial learning media are (1) material expert assessment of 89.58%. (2) media expert assessment of 94.04%. (3) teacher assessment of 94.04%. (4) peer reviewer response assessment of 95.4%. (5) student responses were 81.06%. Based on the results of the assessment and responses obtained, it can be concluded that this learning media based on brake system learning video tutorials is very suitable for use and development.*

Introduction

Education is an effort made consciously and deliberately to change human behavior both individually and in groups to mature humans through teaching and training efforts (Rothfuß et al., 2020) (Kurniawati et al., 2022). Vocational High Schools (SMK) are educational institutions whose graduates are prepared to face the world of work. Strengthened by government regulation Number 19 of 2017 concerning teachers, it is stated that SMK is also a form of formal education unit that provides vocational education at the secondary education level as a continuation of SMP, MTs, or other forms of equivalent or continuation of learning outcomes that are recognized as the same or as SMP or MTs. In Vocational High Schools (SMK) the learning process is more focused on practicing skills, which aim to be used after graduation (Reimers & Chung, 2019) (Sari & Noor, 2022). Vocational education is education at the secondary level which leads to the development of students' abilities to carry out certain types of work (Klaeijsen et al., 2018). In achieving these goals, students interact with the

learning environment that has been arranged by the teacher through the learning process. In learning methods, there are two most prominent aspects, namely learning methods and learning media which act as teaching aids for students to understand the content more easily (Sahlberg, 2021) (Sigit Purnomo, Slamet Priyanto, Eko Adi, 2022). Improving student learning outcomes can be done in various ways, one of which is by paying attention to the learning process carried out (Solehudin et al., 2022). Students must have motivation and interest in learning, especially learning brake systems, which can be fun. According to (Clarke & Winch, 2006) (Purnomo & Triyono, 2018) the result of learning is a change in overall behavior, not just one aspect of human potential. The role of a teacher is very important in the process of learning activities, the teacher must be able to make the learning process feel peaceful and comfortable (Haryana et al., 2018). Based on the results of observations made at Vocational High Schools, vocational school students often experience problems in learning. In facing learning, students lack motivation so that learning outcomes are not optimal. On average, the learning model applied still uses conventional methods, where students just sit and listen, be quiet and take notes, so that the resulting learning is only one-way communication. Students become less active and bored in participating in learning activities.

In 2020 there was a Covid-19 pandemic, this had an impact on various sectors of people's lives. One of them has an impact on the education sector. During the pandemic, teaching and learning activities no longer use face-to-face learning. Teaching and learning activities have shifted to online learning or what is usually called online. This adjustment is intended to suppress the spread of the Covid 19 virus, but the delivery of learning materials or messages to students is still being implemented. This is in accordance with the opinion (Purnomo et al., 2020) (Syah, 2020) that the messages conveyed can be implemented directly (face to face) between teaching staff and their students or virtually. The learning implemented in Vocational High Schools during the pandemic is learning online. The teacher provides material to students only in the form offline or module then do the assignment. Most teachers have not utilized learning media that prioritizes technology. So learning online implemented becomes less effective (Abizar, 2016) (Somantri, 2021). To overcome this problem, IT-based learning media is needed which can combine visualization, sound (Eglash et al., 2021), and images to support the process of teaching and learning activities so that it is easier for students to understand the material presented (Reddy, 2008) (Otchia & Yamada, 2021). The learning media that you want to develop or create is expected to be able to influence the process of teaching and learning activities to become more effective and motivating so that motivation and learning outcomes increase (Rima Wati, 2016)(Ratnawati et al., 2020).

Learning media is as useful as possible and can be applied in all subjects, including motorbike chassis subjects, especially brake system learning (Widayana et al., 2020). So that students enjoy learning, learning media materials must be packaged more attractively (Bambang Sudarsono et al., 2021) (Sigit Purnomo, Slamet Priyanto, Eko Adi, 2022). One learning media that can be used to overcome the problem of low interest and motivation of students is by developing video tutorial-based learning media (Kemmis et al., 2014)(Yan et al., 2019), by using video tutorials as a learning media it is hoped that it will be able to improve the learning process, so that it is easier for teachers to explain the material and not always use conventional methods but can use this video tutorial based learning media. The content of the material and videos contained in the learning media can be played repeatedly. The author tries to create and develop a learning media that aims to help teachers and students when carrying out teaching and learning activities.

Method

The research method used is research and development or*Research and Development* (R&D). This research refers to research and development according to (Sugiyono, 2008) (Sugiyono, 2015) (Sugiyono, 2013) which states that there are 10 steps in carrying out research, namely: (1) potential and problems (2) data collection (3) product design (4) design validation (5) design revision (6) product testing (7) product revision (8) use testing (9) product revision (10) mass production. Researchers looked at the feasibility of the product based on the assessments of validators, motorcycle chassis maintenance teachers, peers and student responses. To find out the stages of this research, look at the following picture:

Subject, Location and Time of Research

The research was conducted on class XI students majoring in Motorcycle Business Engineering (TBSM) at Vocational High Schools in Semester 2 of the 2020/2021 academic year.

Research Techniques and Instruments

The instruments used in data collection techniques are interviews, questionnaires and documentation.

Data Analysis Technique

The rating scale for this assessment is a Likert scale. The Likert scale is used to measure people's attitudes, opinions and perceptions. Researchers give several statements or questions to respondents, then respondents are asked to provide answer choices on the questionnaire and are given a score on the measuring scale provided (Sugiyono, 2015). The following are the criteria for Likert scale assessment.

Table 1. Questionnaire Scale

No	Alternative Answers	Number
1	Very Worth It	4
2	Worth it	3
3	Decent Enough	2
4	Not feasible	1

Once the required data has been collected, the next step is to process the questionnaire data obtained from questionnaires from material experts, media experts, colleagues and analyze it using the following formula:

$$p = \frac{x}{xi} x 100\%$$

Information:
P   : Presentase
X   : Respondent's answer in one item
Xi   : Ideal value in one item
100% : Constant

Formula for processing data for all items

$$p = \frac{jumlah\ keseluruhan\ jawaban\ responden}{jumlah\ seluruh\ skor\ ideal} x\ 100\%$$

The feasibility criteria which state that the product being developed is suitable for use are presented in the following table.

Table 2. Percentage scale of eligibility according to

Percentage of Achievement	Interpretation	Weight
76-100%	Very Worth It	4
56-75%	Worth it	3
40-55%	Enough	2
0-39%	Not feasible	1

Results and Discussion

This research was carried out with the aim of creating a product in the form of developing brake system tutorial video media. The development was carried out using 4 stages (Sugiyono, 2015). The first stage is the concept creation stage*(concept),* The second stage is the product design stage*(design),* The third stage is the product testing stage, and the fourth stage is the distribution stage. The following is an explanation of the stages of developing brake system video tutorial learning media.

Description of Concept Creation Stages

The development of video tutorial learning media for motorbike maintenance system subjects that more specifically leads to brake system learning which is based on initial analysis carried out by studying basic competencies, core competencies, textbooks and supporting books. Based on the initial analysis it can be seen that brake system learning is done online*(online)* The problem is that students lack interest and understanding of the material presented by the teacher because the teacher has not maximized learning media that is more interesting and easier for students to understand. Information gathering is carried out by analysing problems and materials through field surveys, then continuing with collecting materials and supporting materials. Field observations were carried out during internship III at the Vocational High School, Yogyakarta.

Description of Making Video Tutorials

Planning *design* Learning development begins with determining core competencies, basic competencies, and indicators of learning achievement. The basic competency presented is understanding the working principles of mechanical and hydraulic brake systems This material is in the form of a video. Then the video is edited using the application *Adobe Prime repro* 2020. The learning applied is communicative learning between teachers and students using IT-based learning media which can be accessed via *youtube. Assembly* is the stage of combining all the videos that have been recorded into one complete video and becomes a learning medium. The videos are arranged according to the order of the brake system learning material. Combining videos using the application*Adobe Prime repro* 2020. The following is the Application display*Adobe Prime repro* 2020.

The Results

The results of the development of video tutorial learning media for brake system learning obtained data, namely material expert validation data consisting of data from validation results, analysis results, input or revisions, and conclusions. Media expert validation data consisting of validation data, analysis results, input or revisions and conclusions. Teacher evaluation data consists of analysis results and input. Peer evaluation data is data resulting from analysis and input. Data evaluating the results of trials on students is the results of analysis and input.

In the validation questionnaire, the assessment by material experts covers two aspects, namely the material quality aspect and the material usefulness aspect. Material validation was carried out by Mr X, who is a lecturer from the Department of Mechanical Engineering Vocational Education, Bachelorwiyata Tamansiswa University. The results of this material expert assessment were reviewed from the aspects of (1) quality of the material, getting a score of 22 (91.66%) and (2) usefulness of the material getting a score of 14 (87.5%). Overall the level of validation of video tutorial learning materials obtained a score of 36 (89.58%). The score of 36 obtained from the material expert test with an achievement percentage of 89.58% is on a scale of 1. So this learning media, seen from the material, is categorized as very suitable for use with revision. In terms of material, things that must be revised are adding an introduction to tools and materials as well as K3 that must be considered, adding a check on the ovality of drum brakes in accordance with the SOP, and the sequence of scenarios in the video in accordance with the SOP.

Figure 1. Adding the introduction of tools and materials as well as K3
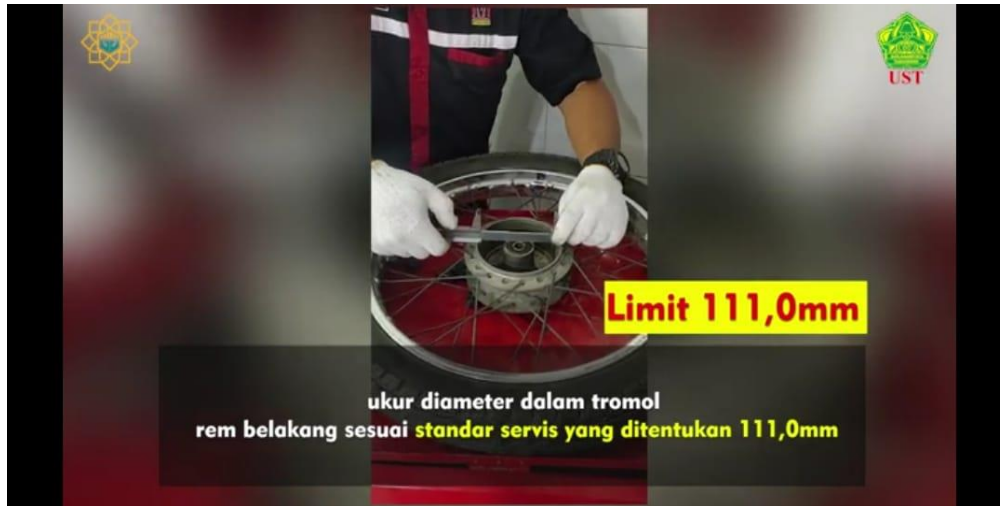
Figure 2. Additional ovality check on the brake drum

 The assessment validation questionnaire by media experts covers three aspects, namely media quality aspects, consistency aspects, and*layout* media Media validation was carried out by Mr. S, who is a lecturer from the Department of Mechanical Engineering Vocational Education, Bachelorwiyata Tamansiswa University. The results of the media expert's assessment were reviewed from the aspects: (1) Media quality, getting a score of 18 (94.64%), (2) consistency, getting a score of 10 (91). .66%),*layout* media obtained a score of 8 (95.83%). Overall, the validation level of video tutorial learning media obtained a score of 36 (94.04%). Thus, a score of 36 was obtained from the total number of media expert tests, with an achievement percentage of 94.04% on a scale of 1. Thus, this learning media is seen from its media and is categorized as very suitable for use. In terms of media, things that need to be revised are adding the identity of the composer and the placement of the writing of the vocational agency, making the video bigger so that it doesn't lose out to the background of the back screen, writing adjusted to contrast with the screen, if you emphasize using a box, the box is outlined in yellow, adding speech. thanks, at the end of the video.
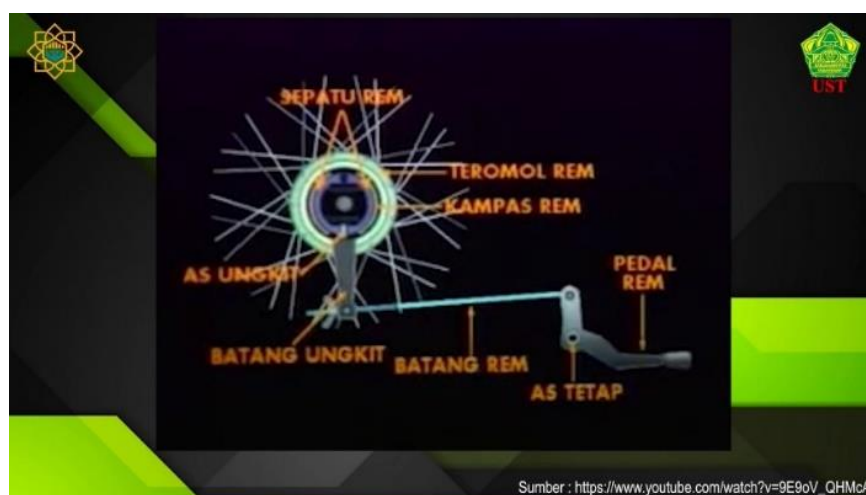

Figure 3. How drum brakes work after revision
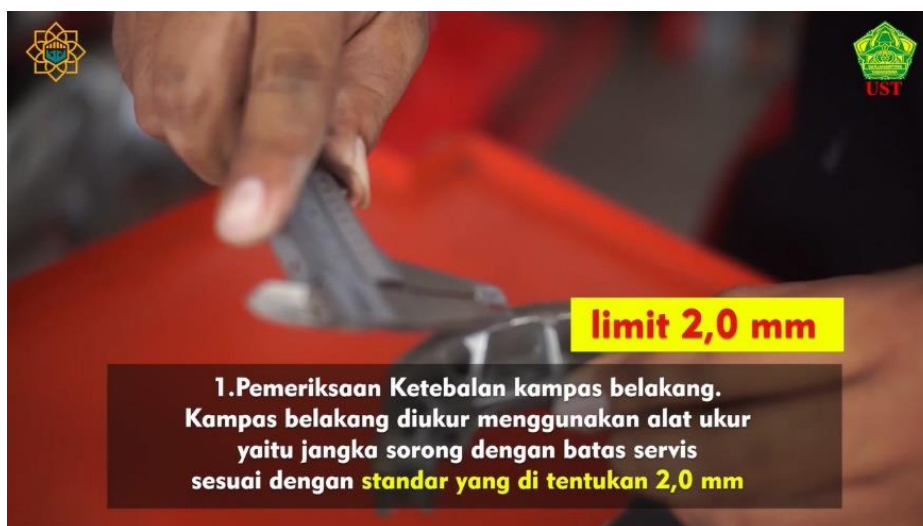
Figure 4. Writing colour after revision

Figure 8. Added writing in the box after revision

 The evaluation questionnaire from the teacher covers three aspects, namely media quality, material usefulness, and media operation. The results of the learning video media at school were assessed by two teachers as an evaluation. The results of the teacher's assessment were reviewed from aspects (Wirawan et al., 2017) (Musthofa & Murdani, 2018): (1) Media quality, obtained a score of 53 (94.64%), (2) usefulness of the material obtained a score of 22 (91.66%), media operation obtained a score of 23 (95.83%). Overall, the evaluation of video tutorial learning media obtained a score of 98 (94.04%). Thus, a score of 98 was obtained from a total of two teachers, with an achievement percentage of 94.04% on a scale of 1. Thus, this learning media is seen from its media and is categorized as very suitable for use. The peer evaluation questionnaire covers two aspects, namely the quality of the material and the quality of the video

The results of the peer review were reviewed from the following aspects: (1) Material quality, getting a score of 117 (97.5%), (2) video quality getting a score of 112 (93.33%). Overall, the validation level of video tutorial learning media obtained a score of 229 (95.4%). Thus, a score of 229 was obtained from a total of six colleagues, with an achievement percentage of 95.4% on a scale of 1. Thus, this learning media is seen from its media and is categorized as very suitable for use. The student respondent evaluation questionnaire includes four aspects, namely

aspects of video display, material, operation and usefulness (Utomo & Ratnawati, 2018) (Sigit Purnomo, Slamet Priyanto, Eko Adi, 2022).The student respondents' assessment results were reviewed from the aspects: (1) Video display, obtained a score of 1230 (81.35%), (2) material obtained a score of 1652 (81.94%), (3) operation 399 (79.17%), (4) usefulness obtained a score of 619 (81.77%). Overall, the validation level of video tutorial learning media obtained a score of 3,900 (81.06%). Thus, a score of 3.824 was obtained from a total of 63 students, with an achievement percentage of 81.06% on a scale of 1. Thus, this learning media is seen from its media and is categorized as very suitable for use.

Once the video is suitable for use, the next stage is distribution of the learning video. Distribution of the first learning video by uploading it on*youtube*. The goal is for the wider public to easily access the video. The second distribution is by providing links*youtube* the learning video (https://www.youtube.com/watch?v=IzzbQEExQyI) to students and teachers at Vocational High School class XI Motorcycle Business Engineering. The aim is that when studying the brake system students can access the video to make it easier for students to understand the brake system material.

Conclusion

The development of video tutorial learning media is carried out through several stages, namely the concept creation stage, product creation stage, testing stage and *distribution* (Musthofa & Murdani, 2018) (Kusuma et al., 2019) (Adiputra, 2021). The results of the assessment of the feasibility of the video tutorial learning media for brake system learning are: (1) the percentage score for the material expert's assessment is 89.58%. (2) the percentage of media expert assessment scores is 94.04%. (3) the percentage of teacher assessment was 94.04%. (4) percentage of response assessment scores *reviewer* colleagues by 95.4%. (5) the percentage of student response scores was 81.06%. Based on the results of the assessment and responses obtained, it can be concluded that this learning media based on brake system learning video tutorials is very suitable for use and development. The implication of the results of this research is that the development of this learning video can add learning resource references for students so that it can help students in the learning process, besides that it can facilitate students' understanding of learning.

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