JMEL 14 (1) (2025)
Journal of Mechanical Engineering Learning
https://journal.unnes.ac.id/journals/jmel
doi: https://doi.org/10.15294/jmel.v14.i1.21333

Development of honda supra manual transmission system demo made in acrylic to improve students' learning outcomes at muhammadiyah 04 vocational school sukorejo

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How to cite (APA Style 7th) : Kurniawan, Y., Naryanto, R. F., & Angga, S. (2025). Design Development of honda supra manual transmission system demo made in acrylic to improve students' learning outcomes at muhammadiyah 04 vocational school sukorejo. *Journal of Mechanical Engineering Learning*, *14*(1), 1-9. https://doi.org/10.15294/jmel.v14.i1.21333

ARTICLE INFO

Article History:
Received: February 13, 2025
Revised: April 28, 2025
Accepted: April 28, 2025

Keywords:
Learning Media; Learning Outcomes; Manual Transmission; Teaching Aids

Abstract

Based on observations conducted at SMK Muhammadiyah 04 Sukorejo, it was found that the school still lacks a Honda manual transmission demonstration tool, making it difficult for students to understand and comprehend the material presented by the teacher, particularly in the basic competency of repairing and maintaining motorcycle manual transmission systems. This study aims to develop a motorcycle manual transmission demonstration learning medium that is both feasible and capable of improving student learning outcomes. The research method employed is Research and Development (R&D) using the ADDIE model. The subjects of this study were eleventh-grade students of TBSM 1 at SMK Muhammadiyah 04 Sukorejo. Product trials were conducted during the implementation stage using the One-Group Pretest-Posttest Design model. The results of the media expert evaluation yielded a percentage score of 82.5%, while the material expert evaluation resulted in a score of 86.45%. In the pretest, students achieved an average score of 64.11, whereas in the posttest, the average score increased to 79.00. The motorcycle manual transmission system demonstration tool was categorized as "very satisfactory" based on student perceptions, with a satisfaction rate of 82.5%. Based on the N-gain test results, the teaching aid was shown to improve students' competency mastery to a moderate level (a gain value of 0.414, which falls within the range of $0.7 > \text{N-gain} \geq 0.3$). Furthermore, the t-test results indicated that the average student competency mastery exceeded the minimum passing criterion of 75 (Sig. value = $0.40 > 0.05$).

1. INTRODUCTION

Currently, the world of education is increasingly sophisticated and developing, and various reforms continue to be carried out to improve the quality of education. In order to improve the quality of education, various breakthroughs are needed, including innovations in curriculum development and learning media as learning tools. Learning is important because it is the right place to support and create quality human resources. Learning is a process to help students gain knowledge in

real life (Ima et al., 2023). Education has a very important role important in to form quality source Power human (Silalahi, 2020). Learning outcomes are the results of individual or group activities that are carried out, obtained and created with hard work after experiencing the learning process (Komariyah & Laili, 2018). Learning outcomes are the abilities that students have after receiving their learning experiences (Sulfemi & Supriyadi, 2018). Learning outcomes are something that students obtain, master, or have after following the learning process (Hapnita et al., 2018).

One of the indicator system modern learning in the millennium era moment This is with do innovations that emphasize change (Wiana et al., 2018). To improve student learning outcomes, teachers need to foster more innovative learning so that students can learn optimally both independently and in class. According to Dewi & Primayana (2019) education is a process of humanizing humans to be able to actualize themselves in life, where good education is education that not only prepares students for a profession or position, but to solve problems they face in everyday life.

Vocational High School (SMK) is an educational institution that aims to develop human resources who have skills, abilities, and expertise so that its graduates can enter the workforce and show results. Vocational school education aims to improve students' skills so that they can develop along with the development of science, technology, and art, and prepare them to enter the workforce and acquire a professional attitude. Based on the results of observations at SMK Muhammadiyah 04 Sukorejo, the results of students' learning achievement in the subject of motorcycle engine maintenance, especially transmission systems, there are no transmission demonstration tools and there are still many students whose results are below the KKM, because to meet the standards students are required to be above 75. Of the 2 classes totaling 52 students, only 20 students achieved scores above the KKM and the rest were still below the KKM. This is because during the learning process there was no Honda Supra manual transmission system demonstration so that the lecture method was still used which resulted in students difficult For understand and comprehend material delivered by the teacher. In practice , many students who speak Alone when the teacher explains , even they asleep and not pay attention to the teacher.

designing a demonstration media is necessary to pay attention to several important points so that the media can be said to be good for application in the world of education (Fransisca et al., 2019). Media can stimulate students' thinking power, attention and interest, and the teaching and learning process can attract students' attention and increase students' curiosity, so that the right learning media makes the content conveyed by the teacher clear. Hamalik (2019) states that the use of learning media can arouse new desires and interests, arouse motivation, and stimulate learning activities and will bring psychological influences to students and help students improve their understanding. Sudjana (2013) states that demonstrations also determine the level of results achieved. Demonstration media can be used to support the learning process or activities in higher education, in improving the quality of learning and students (Istiqlal, 2024). Demonstration media is an important part of the teaching and learning process because it can clearly demonstrate the steps required to identify, repair damage, and perform routine maintenance on a motorcycle manual transmission system.

Based on the background above, the research with "Development of Acrylic Honda Supra Manual Transmission System Demonstration to Improve Student Learning Outcomes at SMK Muhammadiyah 04 Sukorejo" needs to be conducted on students at SMK Muhammadiyah 04 Sukorejo.

Saputra (2016) developed an AC system teaching aid using acrylic, however the teaching aid was not flexible. Huda (2013) developed an AC system teaching aid to improve learning outcomes, but the material used was not acrylic. From previous studies, this study has the

novelty of developing an AC system teaching aid from acrylic that can be moved anywhere.

2. RESEARCH METHOD

The development model that will be used in this study is research and development. Development method is a research method used to produce new products and then test the effectiveness of the product. This research model focuses on product development or learning processes (Sugiyono, 2019). This approach provides a clear focus on how to improve the quality of learning and produce better products. R&D model can help learning developers to create more relevant and more effective products. The results of the development of learning media for motorcycle manual transmission system demonstration tools produce learning media containing manual transmission system maintenance materials, component names and how the manual transmission system works, both skills and knowledge. This learning media demonstration tool aims to make the material easier for students to understand so that it can improve students' mastery of competencies in the motorcycle manual transmission system material so students can learn independently.

This research design model used the ADDIE design. This model helps ensure that each step is carefully considered and the process runs according to plan. The ADDIE research model is a trainer development research on aspects of learning and learning improvement outcomes. This model is developed systematically and is based on the theoretical foundation of learning design. This study focuses on the development of a demonstration with a Honda Supra manual transmission system in class XI TBSM 1 SMK Muhammadiyah 04 Sukorejo.

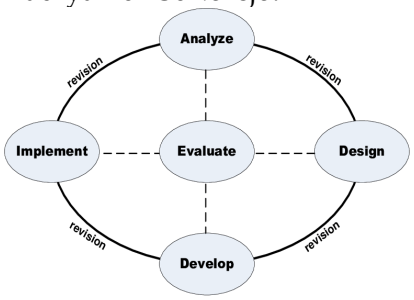

Figure 1. ADDIE Development Model Steps

The development of the Honda Supra manual transmission system model uses the ADDIE development model, which includes 5 steps, namely Analysis, Design, Development, Implementation, and Evaluation (Hamzah, 2019; Malik et al., 2024). Stage Analysis The stage is a step to identify the cause of the problem in the field (Khoiruddin & Iskandar, 2024). The initial process of all stages when conducting research is to analyze and develop teaching materials in accordance with the learning process. Analyzing students aims to determine the extent to which students are able to follow teaching and learning activities in class and the extent of the feedback from these teaching and learning activities. These results will be used as a reference in developing demonstrations in this learning. Meanwhile, concept analysis aims to combine several existing concepts so that they are interrelated in the development of this demonstration, so that it is expected to help improve and facilitate students in understanding the material on the Honda Supra manual transmission system. The results of the needs analysis according to researchers show that the teaching and learning process activities in terms of the media used by teachers are still lacking, because of the limitations of teaching aids. The methods given are still in the wild, so they are still difficult for students to understand. Through this analysis, researchers will develop teaching aids so that they can be effective, so that they are easy to understand and can improve students' ability to understand the material given.

Design stage is also known as the product planning stage (Faza et al., 2024). This stage aims to prove the material that the user wants to master through appropriate media and testing methods. This design aims to create a display that will be developed according to the predetermined concept. This design is made using Autodesk Inventor software. There are several stages in preparing a display design: Preparing tools and materials for making a Honda Supra manual transmission system demonstration. Preparing the components of the Honda Supra manual transmission system in

making the model. Create a design that will be used in the development of a Honda Supra manual transmission system demonstration.

The development stage is the process of realizing the design into reality, as well as validating the product that has been developed (Musyono et al., 2024). One of them is by looking for other references to develop a neater design, easy to understand and different from before. The model that will be developed is in accordance with the current condition of the manual transmission system motorcycle trainer and makes the learning atmosphere more interesting with the latest design. The developed model will be tested by the validator to then assess the feasibility of the developed model until the product is declared feasible and ready to be implemented.

Stage Implementation focuses on testing the effectiveness of the Honda Supra manual transmission system demonstration media. Implementation is a step in implementing the design of teaching materials that have been developed when the situation is real in the classroom (Iskandar et al., 2023). Demonstrators that have been validated by media experts and material experts and have undergone several revisions will later be implemented in field trials (Dewi & Primayana, 2019).

According to Cahyadi (2019) evaluation is a process carried out to provide value to the development of teaching materials in learning. Evaluation is to carry out assessments of products and learning outcomes that have been achieved either before or after learning and the learning program as a whole (Branch, 2009). This research stage evaluates each step of development for students in knowing the names and functions of the components of the motorcycle manual transmission system and inspections of the motorcycle manual transmission system. The results of the evaluation will later be used as a benchmark whether the motorcycle manual transmission system demonstration media in the Motorcycle Engine Maintenance subject does not need to be revised again, is feasible to implement, and is effective in learning chassis and power transfer. This activity is the final process regarding the statement that the product is suitable for use or not in the teaching and learning process.

A feasible product is a product that passes the test so that it is ready to be used in teaching and learning activities. To produce a feasible product, expert validation is carried out, while to test the effectiveness of the product, a field trial is carried out, and a student satisfaction trial is carried out by filling out a student response questionnaire about the Honda Supra manual transmission system display. This product trial is conducted at the implementation stage. This will determine the effectiveness of the developed model using a one-group research design with pretest and posttest trials . Pretest and posttest are methods by conducting a pretest before the model is given and ending with a posttest after the model is applied. The results of the application can be known more accurately because they compare the conditions before and after the application. This pre-post test design model allows researchers to measure changes or effects produced by a particular program or intervention. In this model, data is collected before and after the program is implemented to see the changes that occur in the variables being measured. This model allows researchers to identify individual differences in response to programs or interventions. In this model, differences in pre-post test responses can indicate individuals who respond well to the intervention or who need more support or assistance .

Pre-test is a test conducted before the learning process begins. The goal is to obtain initial competency indicators, how much knowledge students have about the learning material. The results of the pre-test will be one of the considerations for teachers in determining the appropriate learning method to be applied to their students. Post Test instrument containing a set of questions or similar things used to understand students' mastery of knowledge, skills, and talents after undergoing the learning process. The test used in this research and development is an achievement test , which is a test used to evaluate students' abilities after

studying the manual transmission system maintenance material. Questionnaire is a data collection technique by providing several questions addressed to research subjects related to the product to be developed. The questionnaire in this research and development is addressed to media experts, material experts, and students to assess the development product.

The subjects of this trial study were students of grade XI TBSM 1 SMK Muhammadiyah 04 Sukorejo with the subject of motorcycle engine maintenance. The number of students was 34 students. (Hamzah, 2019) stated that the field trial was conducted with subjects of 30-100 students. The type of data used in this study is quantitative data. Quantitative data is data presented in the form of numbers that can be calculated and measured. The way to obtain quantitative data can be through mathematical formulas or analysis with a statistical system. In this study, quantitative data includes expert validation questionnaires, student response data, student satisfaction questionnaire data, research instrument analysis data, and pretest-posttest results.

3. RESULTS AND DISCUSSION

Results

Following is the test result data evaluation media experts and experts material . The data done analysis For know level eligibility props manual transmission of Honda motorcycles that have developed .

Table 1. Media Expert Assessment Results

Media Experts	Total Score
Adhetya Kurniawan	31
Budi Setiawan	35
Total Score Amount	66
Maximum Score Amount	80
Category	Very Worthy

Based on the data presented table results evaluation media experts can known feasibility test results props system motorcycle manual transmission by both media experts get amount total score 66 out of amount score maximum 80 and enter in "very worthy " category.

Table 2. Results of Material Expert Assessment

Media Experts	Total Score
Febrian Arif Budiman	47
Nanang Ernawan	36
Total Score Amount	83
Maximum Score Amount	96
Category	Very Worthy

Based on the data presented table results evaluation expert material can known feasibility test results props system motorcycle manual transmission by both expert material get amount total score 83 out of amount score maximum 96 or "very feasible". Based on the results of the expert assessment calculations above, the results are in the very feasible category. It was concluded that the manual transmission system model on the Honda Supra manual transmission system material is feasible to use in the learning process.

measuring improvement results study students, instruments test the conducted a trial moreover formerly For know validity and reliability the question that has been made . Based on results from the data collection process to 34 students class XI TBSM 1 at Muhammadiyah 04 Sukorejo Vocational School obtained results the average pretest score was 64.11 and the results mark posttest of 79.77.

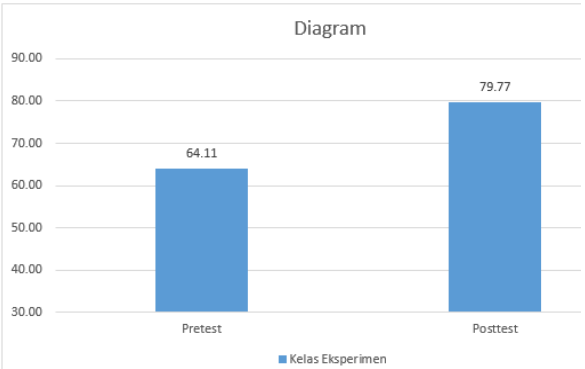

Figure 2. Average of Pretest and Posttest

After the process of collecting data on the results obtained is carried out continued to the next research process that is perform normality test , T-test, N-Gain test and analysis response students. Based on the data that has been obtained from calculation normality , the results of the data normality test using help IBM SPSS

Statistics v29 software is available results sig. pretest value 0.057 and sig. posttest 0.070. Significance level > 0.05 so that can withdrawn pretest data conclusion and posttest in class the distributed normally . The T-test is used to compare the average posttest value with the Minimum Completion Criteria (KKM) value of 75. The test was carried out using the One Sample t Test , with the help of IBM SPSS Statistic 29 Software . Basis for Decision Making based on level of significance: If the Sig. value > 0.05 then normal data distribution. If the Sig. value < 0.05 then non- normal data distribution.

Based on the data above, there are two Sig. values in the table. Data samples with large numbers > 50, the Kolmogorov-Smirnov value is used , for small sample data < 50, the Shapiro Wilk value is used . Thus it can be seen that the Sig. value is 0.70 > 0.05, thus the data distribution is normal. Parametric test requirements one sample t-test is fulfilled . Based on the t value (t count) is 2,140. The DF (Degree of Freedom) value or degree of freedom is 34. The sig. value (2-tailed) or significance value with a two-tailed test is 0.40.

Research hypothesis:

H_0 : The average value of student learning outcomes is equal to or more than 75

Ha : The average value of student learning outcomes is not equal to or less than 75

The basis for decision making is based on the level of significance (Sig.) If the Sig. (2-tailed) value ≤ 0.05 then H_0 is rejected and Ha is accepted. If the Sig. (2-tailed) value > 0.05 then H_0 is accepted and Ha is rejected.

The Sig. value is 0.40 > 0.05, so H0 is accepted and Ha is rejected, thus the average value of student learning outcomes is equal to or more than 75. Based on From these results, it can be concluded that the average student score has achieved complete mastery of competency in the motorcycle manual transmission system competency with an average score of more than the KKM of 75.

Based on the Gain value obtained from the pretest and posttest scores above, it is known that the result is 0.414. The number 0.414 is at a value of 0.7> N-gain ≥ 0.03 with moderate criteria. So from the test it can be concluded that there is an increase in student competency mastery after the application of the Honda Supra motorcycle manual transmission demonstration with moderate criteria. Student response analysis was conducted to determine satisfaction with the Honda Supra Manual Transmission System Demonstration product that had undergone the development process.

Based on the results of the calculation of the analysis of student responses above, the results were 82.5%. It was concluded that the manual transmission system model on the Honda Supra manual transmission system material was suitable for use in the learning process because it was more than the specified percentage of 50%.

Discussion

The Honda motorcycle manual transmission system material display is the final product of this study which displays the Honda motorcycle manual transmission system material on the basic competency of understanding the working principles and components of a motorcycle manual transmission. The basic competency of understanding the working principles and components of a motorcycle manual transmission has an indicator of competency achievement, namely being able to understand and mention the names of components and the working principles of a motorcycle manual transmission system. In the basic competency of understanding the working principles and mentioning the names of components of the developed display system contains the names of components and physical conditions that are in accordance with the original. The form of the developed product can be used easily both independently and with the help of a teacher. The components in the display have been distinguished by color from their original state, this is intended to make it easier to use and students can understand it well. This product has been tested on 35 students majoring in Motorcycle Engineering at SMK

Muhammadiyah 04 Sukorejo. This display is stated to be able to improve student learning outcomes, especially in the Honda manual transmission system material. This is based on pretest and posttest testing , there is a difference between the results of the pretest and posttest scores so that this display is stated to have an effect on student learning outcomes.

Based on the explanation above, it can be concluded that the Honda Supra manual transmission system model is suitable for use and there is a significant increase in student learning outcomes. The results of this study are in line with previous studies such as research conducted by (Hidayat et al., 2021) entitled Cutting engine learning media for manual motorcycle transmission systems, cup type, proving that the use of a manual transmission system model can improve learning completion. It can be seen from the assessment results obtained an average of 87.20% from users of the learning media tested. This media is easier to understand the material on the cup type manual transmission system which is made referring to the original form of the motorcycle transmission system. Research conducted by (Kurniawan, 2017) entitled Application of transmission system models in teaching problem based learning to support the effectiveness of teaching periodic maintenance of motorcycle transmission systems, proves that manual transmission system models can improve learning completion. This can be seen from the results of the pretest and posttest showing an increase in the control class of 10.11% and the experimental class of 24.22%. The use of this media is easier to understand and students are more active in teaching and learning activities. Research conducted by Ginanjar (2017) entitled Development of learning media for planetary gear units for automatic transmission in the subject of chassis maintenance and power transmission (PSPT) for class XII students of light vehicle engineering expertise at SMK Negeri 3 Yogyakarta, proved that transmission system demonstrations can improve learning outcomes. This can be seen from the results of the pretest and posttest which increased by 5.8%. This demonstration media is easier to understand and refers to the original form of the transmission. Research conducted (Candra et al., 2022) entitled Development of learning media for Continuously Variable Transmission (CVT) motorcycle demonstration tools in the motorcycle technology course, is proven by the percentage results from media expert validators of 98.67% and from material expert validators of 90.67%. This demonstration is very suitable for use in the learning process. Research conducted by Yulanto et al. (2023) with the title development of learning media for manual motorcycle transmission trainers, proven by the results of the questionnaire of 70%. So it states that this manual motorcycle transmission trainer is very feasible in the learning process.

4. CONCLUSION AND SUGGESTIONS

Based on the results of the analysis and discussion, it can be concluded that the development of the Honda Supra motorcycle manual transmission system demonstration model using an acrylic cover is feasible and effective for use in the learning process. The model received a "very feasible" rating from both media experts and material experts. Additionally, the model showed a positive impact on student learning outcomes. This demonstrates that the developed model can effectively enhance students' understanding of the manual transmission system material.

Based on the results of this study, several suggestions can be made to support the continued development and application of the Honda Supra motorcycle manual transmission demonstration model. For automotive teachers, particularly those teaching Motorcycle Engineering subjects, it is recommended to utilize the developed model as a teaching aid to help students better understand the concepts of manual transmission systems. The model can serve as an effective visual and practical tool during classroom instruction. Future research and development efforts should consider allocating more time, resources, and funding in order to produce a more refined and

comprehensive version of the model that can better support vocational learning needs.

5. DECLARATION/STATEMENT

5.1. Acknowledgment

Thank you to all parties who have helped with this research.

5.2. Author Contribution

Yogi Kurniawan wrote the article. Rizqi Fitri Naryanto was involved in planning and supervised the work. Angga Septiyanto contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript.

5.3. Conflict of Interest

We have no conflicts of interest to disclose.

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