VANOS
JOURNAL OF MECHANICAL ENGINEERING EDUCATION
http://jurnal.untirta.ac.id/index.php/vanos
ISSN 2528-2611, e-ISSN 2528-2700
Volume 10, Number 1, May 2025, Pages 77 - 85

Development of Video-Based Learning Media on the Fuel Systems Subject to Improve Student Learning Outcomes

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Accepted: 04 February 2025. Approved: 08 April 2025. Published: 30 May 2025

ABSTRACT

Development of Video-Based Learning Media on Fuel System Subjects to Improve Learning Outcomes of SMK Muhammadiyah 1 Moyudan Students. Thesis. Vocational Education Study Program in Mechanical Engineering. Faculty of Teacher Training and Education, Sarjanawiyata Tamansiswa University Yogyakarta, 2024. This research aims to: 1. Develop appropriate video-based learning media for students to improve learning outcomes. 2. Test the feasibility of video-based learning media on fuel system subjects for SMK Muhammadiyah Moyudan students. 3. Improve students' learning outcomes in the subjects taught.This research is a research and development (R&D) study using the ADDIE development model: Analyze, Design, Development, Implementation, and Evaluation. The development media is in the form of instructional videos. The data analysis technique uses descriptive quantitative. The research results show that: 1) This research produces EFI Fuel System instructional videos. 2) The EFI Fuel System instructional video is very feasible to use based on the validation results of material experts 1 and 2 with an average score of 82% and the media expert validation score of 91%. 3) Student responses show a very good category for use with a score of 87%. The development of the use of instructional video media was tested during the pretest with an average score of 53% and posttest 87%. The improvement in learning outcomes measured using the N-Gain formula obtained $0.3 \leq 0.57 \leq 0.7$, which can be categorized as moderate, so the EFI Fuel System video-based learning media product is feasible to use for learning media.

Keywords: Development, Learning Media, EFI System, Learning Outcomes

INTRODUCTION

Efforts that have been and will continue to be made by the state are to improve the quality and quality at the education level [1] [2]. The government is obliged to advance the education sector, but it is not only the government's task, but the whole community needs to pay attention and take part [3]. Ki Hajar Dewantara in Tamansiswa who both want education to develop people with character, have a good intellectual level, and have high morality and ultimately bring students into good human beings, in accordance with the nature of humanity [4] [5].

Technological developments are increasingly rapid and must be utilized, however, teachers tend not to be able to maximize existing technology to support more optimal learning [6][7]. In 2020, the unemployment rate for vocational school graduates in Indonesia reached 8.49%, vocational school graduates are still the largest contributor to the Open Unemployment Rate (TPT) in Indonesia. In February 2020, the overall TPT reached 4.99 percent [8]. Practicum is an activity that provides a variety of opportunities to carry out investigations and experiment with skills [9].

Several problems include educators being less creative in varying learning media, so that the teaching and learning process in class is very boring. There is a fact that not all teachers cannot use computer technology and the internet as learning media, because the development of learning media is crucial in the learning process [10]. The facts show that the literacy level in Indonesia is still relatively low [11].

Based on the results of observations that researchers carried out at SMK Muhammadiyah 1 Moyudan on January 27 2024 which is located on Jl. Klangon Tempel Km 4.5, Gedongan, Sumber Agung, Moyudan District, Sleman Regency Prov.D.I. Yogyakarta. Has 4 areas of expertise program, namely Automotive Light Vehicle Engineering (TKRO), Motorcycle Engineering (TSM), Culinary (Culinary) Hospitality, Computer Network Engineering (TKJ). It was found that class because it is hampered by several things, such as tools for making learning videos that are inadequate, such as computer specs that are not capable of editing videos, so that the video material presented is only taken from the internet without considering the quality of the video, and another reason is the teacher's lack of time to create learning video media because there are many tasks that must be carried out by teachers [12][13][14]. Other findings can be seen from the number of students who did not pay attention to the video material presented. When learning was taking place, the class was not conducive, some could not follow the teacher's instructions, students preferred to play on their cell phones [15][16][17]. Therefore, this research focuses on developing video-based

learning media on fuel systems subjects to improve student learning outcomes.

RESEARCH METHOD

The research method that will be used in this research is R&D research and development (research and development) and the model used is ADDIE. Development research has two words, namely Research (research) and Development (development) [18][19]. Meanwhile, according to stated ADDIE is an abbreviation of Analysis, Design, Development, Implementation and Evaluation, model ADDIE using the five steps feature [20][21].

The data collection technique used is mix of methods namely qualitative, namely observation and quantitative in the form of questionnaires. Observational data collection techniques are used to find out and obtain data about learning activities at SMK 1 Muhamadiyah Moyudan [22]. A questionnaire is a technique for collecting data by giving written questions to the respondent object [19]. The questionnaire is intended to determine the feasibility of the learning video being developed.

The data analysis technique used descriptive analysis to determine the percentage of the feasibility of the learning media based on the results of the questionnaire with the following formula:

$$\text{Percentage of eligibility (\%)} = \frac{\text{Score obtained score}}{\text{overall maximum}} \text{x } 100\%$$

The results of the percentage of media eligibility were consulted with table 1 to determine the value of media feasibility. The minimum value for the feasibility of learning media is in the "Good" category.

Table 1. Percentage scale and criteria [23]

Interval	Criteria
81% - 100%	Very Good
61% - 80%	Good
41% - 60%	Enough
21% - 40%	Less
0% - 20%	No Good

RESULT AND DISCUSSION

Analysis Stage

Based on the results of observations carried out in class can be a problem factor, the right learning media for learning needs can create an effective and efficient learning process, so that students can optimally absorb the material taught by the teacher [24]. Therefore, researchers will develop learning media to improve student learning outcomes. Video-based learning media has great potential in increasing concentration and interest in learning [12][13][14] .

Design Stage

This is a stage of extending video-based learning media which includes formulating the objectives of creating video-based learning media on EFI gasoline fuel system subjects that suit student's needs. Formulation of the objectives for creating video-based learning media [15][25][26]. The results of the formulation of objectives for video-based learning media in the fuel system

subject are: 1). After being given video-based learning media on the fuel system subject to improve student learning outcomes at SMK Muhamadiyah 1 Moyudan. Students can understand well. 2) By providing video-based learning media on fuel system subjects to improve learning outcomes, students at SMK Muhamadiya 1 Moyudan can be more active in learning about fuel systems. 3) With video-based learning media on fuel system subjects to improve learning outcomes, students at SMK Muhamadiyah 1 Moyudan can learn more easily anytime and anywhere. As for Flowchart can be seen in the following picture.

Figure 1. Screen video

Figure 2. Screen video training

Product Trial Results

Results of Material Expert Assessment 1 and 2

The assessment of learning media by material expert 1 reached 47 total assessment points out of the expected 60 points, then 78% of the presentation scale which could be stated "Suitable for use according to revision" as for revision notes such as conveying objectives, videos divided by 2.

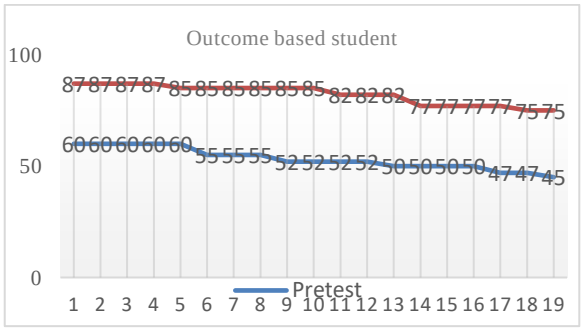

Figure 3. Outcome based student

Assessment of learning media by material experts reached 52 total assessment points from the expected 60 points, then 82% of the presentation scale which can be stated "very worthy can be used according to revision" as for revision notes such as.

The Result of the Media Member's Evaluation

Learning video media products have been validated by media experts in terms of video appearance, material presentation, attractiveness and usefulness aspects, the total assessment is 64 points, 70 points are expected and the product quality percentage is 91% as assessed by media experts, so it can be stated " very suitable for use."

User evaluation results

In this case, the questionnaire used consisted of 15 assessment items with a scale range of 1-5. The assessment aspects of this trial include aspects of video display, presentation of material, aspects of attractiveness and usefulness [27][28]. From the total assessment of the research aspect, it got 1,245 points out of the expected 1,425 points and got a total of 87% on the media

product quality presentation scale so that it can be seen from all aspects that have been assessed by users, namely students of SMK Muhammadiyah 1 Moyudan. This learning video media product is included in the category "very suitable for use in accordance with the revision".

The pre-test results of 19 students before being given learning media only got an average score of 53, while the posttest results that had been given learning media got a score of 82. So the result of an increase of 0.57 refers to the N-Gain criteria. This result is stated as moderate, which can be seen in the graph following.

CONCLUSION

The discussion in this development research will discuss the results of developing learning video media products to answer questions in developing fuel system learning video media for class The results of this research into the development of instructional videos produced 2 instructional video products, the aim of which is to be efficient in implementing learning with a short duration but the material remains complete and also the instructional video media will be easier for students to understand in the learning process.

By showing videos during learning, students will feel as if they are or are participating in the atmosphere depicted [25]. For example, the electrical wiring process can be shown to students via video. It is hoped that it can help students imagine how electric power stations work as well as providing students with visual experience. Who states that video-based learning media is a solution to make it easier for teachers to provide material to students by creating a pleasant atmosphere during the learning process [29]. The existence of learning video media can be utilized in the learning process. As for the results of the feasibility of the instructional video media that has been developed by the researcher as a whole, it can be declared feasible [12][30]. The data from the validation results are as follows. The questionnaire which has been filled in by material experts and media experts shows the results by material experts 1 and 2.

The product is validated and the results obtained are average. achieved 99 total assessment points from the expected 120 points, then 82% of the presentation scale which can be stated as "Very Appropriate can be used according to revision". Then the Learning fuel system video media product was tested on 19 class XI students of TKR Muhammadiyah 1 Moyudan Vocational School with a result of 1,245 points. of the expected 1425 points and got a total of 87% on the media product quality presentation scale. These results are classified as good in the development of video-based learning media, this is because the video media that has been developed has been formulated specifically for Moyudan Vocational School students so as to produce products that are relevant for

learning, according to Defi & Faiza, [31] An effective teaching and learning process is not only focused on the results of the grades obtained by students. but also an effective learning process will provide understanding, perseverance, intelligence, quality and opportunity, and be able to improve student behavior for the better.

REFERENCES

[1] S. Chuenjitwongsa, R. G. Oliver, And ..., "Competence, Competency-Based Education, And Undergraduate Dental Education: A Discussion Paper," ... *Of Dental Education*, 2018, Doi: 10.1111/Eje.12213.

[2] S. Boss and J. Krauss, *Reinventing Project-Based Learning: Your Field Guide To Real-World Projects In The Digital Age*. books.google.com, 2022.

[3] A. D. Samala, M. Giatman, W. Simatupang, And F. Ranuharja, "E-Jobsheet Based on Mobile Pocket Book As Digital Learning Resources (Dlrs)," *Jurnal Teknologi Informasi Dan Pendidikan*, Vol. 14, No. 2, 2021, Doi: 10.24036/Tip.V14i2.488.

[4] A. B. Johan, S. Ph, And Widodo, "Evaluation of Education Implementation of Link And Match Systems of The Industrial And Vocational School In Yogyakarta Province," *Jurnal Taman Vokasi*, Vol. 7, No. 2, Pp. 216–222, 2019.

[5] S. D. S. Sigit Purnomo, Slamet Priyanto, Eko Adi, "Development of Learning Media Using The Sparkol Videoscribe Application on Measuring Tools At Vocational High School," *Journal of Mechanical Engineering Education*, Vol. 7, No. 1, Pp. 11–18, 2022.

[6] D. T. P. Yanto, M. Kabatiah, H. Zaswita, G. Giatman, And H. Effendi, "Development of Virtual Learning Using Problem-Based Learning Models For Vocational Education Students," *Elinvo (Electronics, Informatics, And Vocational Education)*, Vol. 7, No. 2, 2023, doi: 10.21831/Elinvo.V7i2.52473.

[7] M. Johannesen, L. Øgrim, T. H. Giaever, And C. Scient, "Nordic Journal of Digital Literacy Notion in Motion: Teachers' Digital Competence," 2014, [Online]. Available: Https://Www.Idunn.No/File/Pdf/66738487/Notion_in_Motion_Teachersdigital_Competence_.Pdf

[8] I. Wijaya, G. T. Sigmarawan, and I. P. G. Budisanjaya, "Led (Light Emitting Diode) Light Provides Positive Effects On Growth and Productivity Of Pakcoy Mustard (Brassica Rapa L.)," In *Iop Conference Series: Earth And Environmental Science*, 2019. doi: 10.1088/1755-1315/355/1/012082.

[9] S. Purnomo and M. B. Triyono, "Efektifitas Technopreneurship Dengan Model Pembelajaran Cooperative Learning By Technopreneur For Smk Untuk Siswa di SMK," *Taman Vokasi*, 2018, doi: 10.30738/Jtvok.V6i1.2972.

[10] S. Hadi and R. Rabiman, "Partisipasi Industri Otomotif Dalam Menjalin Kerjasama Dengan Sekolah Menengah Kejuruan (SMK) Program Keahlian Teknik Kendaraan Ringan di Daerah Istimewa Yogyakarta," *Taman Vokasi*, Vol. 2, No. 2, 2014, doi: 10.30738/JTVOK.V2i2.80.

[11] A. Khaharsyah, S. Purnomo, S. Hadi, E. Djufri, And A. Sudrajat, "Pengembangan Sistem Keamanan Sepeda Motor Berbasis Android Dan Arduino Sebagai Pendukung Media Belajar," *Wiyata Dharma: Jurnal Penelitian Dan Evaluasi Pendidikan*, Vol. 11, No. 1, 2023, doi: 10.30738/Wd. V11i1.14613.

[12] M. Yoon, J. Lee, And I. H. Jo, "Video Learning Analytics: Investigating Behavioral Patterns and Learner Clusters In Video-Based Online Learning," *Internet And Higher Education*, 2021, doi: 10.1016/J.Iheduc.2021.100806.

[13] S., P. S., P. E. A. S. D. Purnomo, "Development of Learning Media Using The Sparkol Videoscribe Application on Measuring Tools At Vocational High School," *Journal Of Mechanical Engineering Education*, Vol. 7, No. 1, Pp. 11–18, 2022, doi: Http://Dx.Doi.Org/10.30870/Vanos.V7i1.

[14] R. S. Budiarti and D. N. Harlis, "High Order Thinking Skills for Biology Education: Applied Microbiology Learning Videos Based On Jambi Local Wisdom," *Universal Journal Of Educational Research*, 2020, Doi: 10.13189/Ujer.2020.080242.

[15] G. Chicoine, "Impact of A Videoconferencing Educational Programme for The Management of Concurrent Disorders on Nurses' Competency Development And Clinical Practice: Protocol For A Convergent Mixed Methods Study," *Bmj Open*, Vol. 11, No. 3, 2021, Doi: 10.1136/Bmjopen-2020-042875.

[16] D. Ratnawati, W. Mustafa Kusuma, S. Setuju, M. Nurtanto, And W. Widodo, "Development of Job Sheet Lathe Machining Practice Based On Animation Video As Interactive Learning Media," *J Phys Conf Ser*, Vol. 1573, No. 1, 2020, Doi: 10.1088/1742-6596/1573/1/012005.

[17] I. Sonhaji, I. Endrawijaya, S. Lamtiar, And K. Anam, "Workshop Pelatihan Video Pembelajaran Menggunakan Aplikasi Open Broadcast Software (Obs) Studio Bagi Guru-Guru Sma/Smk Di Wilayah Tangerang Raya," *Jurnal Abdi Masyarakat Indonesia*, 2022, Doi: 10.54082/Jamsi.189.

[18] Sugiyono, "Sugiyono. (2014). Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, Dan R&D. Bandung: Alfabeta.," *Repository*, 2013.

[19] Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif, Dan R&D*, 23rd Ed. Bandung: Alfabeta, Bandung, 2016.

[20] S. Mcgrath And S. Yamada, "International Journal Of Educational Development Skills For Development

And Vocational Education And Training : Current And Emergent Trends," *Int J Educ Dev*, Vol. 102, No. July, P. 102853, 2023, Doi: 10.1016/J.Ijedudev.2023.102853.

[21] J. Edeigba, "The International Journal Of Management Education Employers ' Expectations Of Accounting Skills From Vocational Education Providers : The Expectation Gap Between Employers And Itps," Vol. 20, No. June, 2022.

[22] Sugiyono, *Metode Penelitian Dan Pengembangan Reasearch And Developement*. Bandung: Alfabeta, 2015.

[23] Sugiyono, *Statistika Untuk Penelitian*. Bandung: Alfabeta, 2007.

[24] Y. A. S. Anwar And E. Junaidi, "Implementasi Model Pembelajaran Berbasis Kasus Ditinjau Dari Self-Regulated Learning Mahasiswa," *Jurnal Ilmiah Profesi Pendidikan*, Vol. 7, No. 2c, Pp. 987–994, 2022, Doi: 10.29303/Jipp.V7i2c.575.

[25] L. Ridha And I. R. Jasril, "Pengembangan Modul Perencanaan Dan Instalasi Sistem Audio Video Berbasis Inquiry Dengan Metode Pictorial Riddle," *Voteteknika (Vocational Teknik Elektronika Dan Informatika)*, Vol. 9, No. 1, P. 143, 2021, Doi: 10.24036/Voteteknika.V9i1.111289.

[26] A. A. Anggraeni, "Developing Video For Agriculture Product Processing Course In The Subject Of Garlic Snack Production," 2020. Doi: 10.1088/1742-6596/1446/1/012065.

[27] Gamizar Naufal Rafif, Hamidillah Ajie, And Yuliatri Sastrawijaya, "Pengembangan Video Pembelajaran Berbasis Motion Graphic Pada Mata Pelajaran Ddg Untuk Peserta Didik Di Smk Program Keahlian Multimedia," *Pinter : Jurnal Pendidikan Teknik Informatika Dan Komputer*, 2021, Doi: 10.21009/Pinter.5.2.6.

[28] C. M. Ho, C. C. Yeh, J. Y. Wang, R. H. Hu, And P. H. Lee, "Pre-Class Online Video Learning And Class Style Expectation: Patterns, Association, And Precision Medical Education," *Ann Med*, 2021, Doi: 10.1080/07853890.2021.1967441.

[29] H. Lestari, R. Siskandar, And I. Rahmawati, "Digital Literacy Skills Of Teachers In Elementary School In The Revolution 4.0," *The 2ndinternational Conference On Elementary Education*, Vol. 2, No. 1, Pp. 302–311, 2020, [Online]. Available: Http://Proceedings.Upi.Edu/Index.Php/Icee/Article/View/631

[30] R. Rabiman, P. Sudira, H. Sofyan, And M. Nurtanto, "Practical Learning Media In Subject Maintenance Of Chassis And Power (Mcp) Based Online: Simple Learning Using Videos On Youtube," *International Journal Of Interactive Mobile Technologies*, 2021, Doi: 10.3991/Ijim.V15i03.14943.

[31] H. B. Lund And A. Karlsen, "The Importance Of Vocational Education Institutions In Manufacturing Regions:

Adding Content To A Broad Definition Of Regional Innovation Systems," *Ind Innov*, 2020, Doi: 10.1080/13662716.2019.1616534.