



Development of Learning Videos on Computer Hardware Materials

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Abstract: This study aimed to develop a learning video on computer hardware material at SMP Negeri 8 Jangkang using the ADDIE development method. This study involved 32 grade VII students as test subjects and six validators consisting of material, design, and media experts. Qualitative and quantitative data analysis showed that the developed learning video had a very high feasibility level, with an average percentage of 96% in the material, design, and media aspects. Empirical tests on 32 students showed similar results, with a feasibility level reaching 98% and positive responses from students to the learning media. Statistical tests using the Mann-Whitney method showed a significant difference between the experimental and control groups, with a substantial effect value of 5.44. These findings indicate that learning videos have a very considerable influence on student learning outcomes. Based on the study results, learning videos are categorized as very effective media and positively impact student learning outcomes on computer hardware material. In addition, student responses to the use of this media were very positive, which confirmed its effectiveness and usefulness in supporting a more interactive and enjoyable learning process.

Abstrak: Tujuan penelitian ini adalah untuk mengembangkan video pembelajaran pada materi perangkat keras komputer di SMP Negeri 8 Jangkang dengan menggunakan metode pengembangan ADDIE. Penelitian ini melibatkan 32 siswa kelas VII sebagai subjek uji coba dan 6 validator yang terdiri atas ahli materi, desain, dan media. Analisis data kualitatif dan kuantitatif menunjukkan bahwa video pembelajaran yang dikembangkan memiliki tingkat kelayakan yang sangat tinggi, dengan persentase rata-rata 96% pada aspek materi, desain, dan media. Uji empiris terhadap 32 siswa menunjukkan hasil yang serupa, dengan tingkat kelayakan mencapai 98%, serta respons positif dari siswa terhadap media pembelajaran. Hasil uji statistik menggunakan metode Mann-Whitney menunjukkan adanya perbedaan signifikan antara kelompok eksperimen dan kelompok kontrol, dengan nilai efek besar sebesar 5,44. Temuan ini menunjukkan bahwa video pembelajaran memiliki pengaruh yang sangat signifikan terhadap hasil belajar siswa. Berdasarkan hasil penelitian, video pembelajaran dikategorikan sebagai media yang sangat efektif dan memberikan dampak positif dalam meningkatkan hasil belajar siswa pada materi perangkat keras komputer. Selain itu, respons siswa terhadap penggunaan media ini sangat positif, yang menegaskan efektivitas dan kebermanfaatannya dalam mendukung proses pembelajaran yang lebih interaktif dan menyenangkan.

A. Introduction

The rapid development of technology in recent decades has significantly impacted various aspects of life, including in the field of education. Technology now plays a vital role in increasing the effectiveness and efficiency of the learning process (Isharyadi & Juandi, 2023; Taningrum et al., 2024). Along with the rapid development of the digital world, education has also transformed with the adoption of technology in various forms, ranging from learning software and educational applications to video-based learning media. This allows for innovation in the method of delivering material, which is not only text-based but also visual and audio-based, providing a deeper understanding for students. One of the main benefits of technology in education is the ability to provide more engaging and interactive learning, which can increase student motivation and involvement in the learning process (Priyana et al., 2020). According to Al Oraini (2018), using technology in learning can increase student motivation, participation in learning, and overall learning outcomes. This opinion is in line with the findings of Sudarsana et al (2020), who stated that technology-based learning media can facilitate the understanding of complex concepts through more interactive and engaging presentations. Thus, the application of technology is becoming increasingly relevant to ensure quality education in this digital era.

However, despite the many benefits of technology, the implementation of technology in learning in the field still faces various challenges, especially in remote areas. The main challenge faced is the limited facilities and access to adequate technology. In these areas, many schools still do not have sufficient technological facilities to support technology-based learning, such as adequate computer laboratories, stable internet access, or sufficient computer hardware. One example that reflects this challenge is SMP Negeri 8 Jangkang, a school located in a remote area, where the limited facilities are very much felt in the learning process. For example, Informatics teachers in grade VII at SMPN 8 Jangkang face difficulties in teaching computer hardware material due to limited facilities and infrastructure that support practical learning, such as inadequate computer laboratories. These limited facilities make it difficult for teachers to provide in-depth understanding to students, especially regarding technical materials that require direct practice. This condition is exacerbated by the still dominant use of text-based learning media, which tends to be monotonous and is less able to attract student interest.

According to Mayer et al (2020), learning media that integrates visual, audio, and kinesthetic elements can significantly increase student retention of learning materials. This is especially relevant in computer hardware learning materials, which require theoretical and practical understanding. However, at SMPN 8 Jangkang, computer hardware learning still relies heavily on textbooks that are often difficult for students to understand. In this case, the use of more varied and innovative learning media is needed to support student understanding. In short, although many studies have developed technology-based learning media, especially videos, the challenges in implementing learning technology in remote areas still need more serious attention. In addition to learning media problems, schools in remote areas face another challenge: the limited infrastructure that supports technology-

based learning processes. One of the main obstacles is the geographical conditions that are difficult to reach and the lack of access to electricity and the Internet. At SMPN 8 Jangkang, for example, challenging road conditions, limited access to electricity, and the lack of adequate internet have further worsened the condition of education. Research by [Koç et al \(2021\)](#) shows that limited technological infrastructure can hinder implementing technology-based learning, especially in areas far from the city center. This makes adopting technology in learning more challenging, and special efforts are needed to create solutions to overcome these problems.

One solution that can be taken to overcome these infrastructure limitations is to develop learning media that can be accessed offline. Video-based learning media, for example, is a very useful alternative in areas with limited internet access. With learning videos, students can access learning materials anytime and anywhere without relying on a stable internet connection. The COVID-19 pandemic has accelerated the adoption of video-based learning media as an alternative solution when face-to-face learning is impossible. According to [Adedoyin & Soykan \(2023\)](#), video-based learning media is an effective alternative during the pandemic because students can access materials flexibly and re-understand concepts through video repetition. Using learning videos also allows students to learn more independently, even under the supervision of teachers remotely. However, in the context of SMPN 8 Jangkang, developing video-based learning media requires a more contextual approach to local conditions. Therefore, developing video learning media for computer hardware materials at SMPN 8 Jangkang is very relevant. This learning media innovation not only provides a solution to the limitations of existing media but is also expected to improve students' understanding of the material being taught. In this case, learning videos can integrate visual elements, easy-to-understand narratives, and practical simulations so that students not only understand the theory. Still, they can also see and feel how computer hardware works. This will create a synergy between theoretical and practical learning, which is crucial in understanding technical material.

One crucial aspect that needs to be considered in developing video-based learning media is the involvement of teachers and students in the development process. Research by [Khalil et al \(2020\)](#) shows that designing learning videos specifically designed to address local needs and provide an immersive learning experience is essential. Therefore, in this study, teachers and students developed learning videos to ensure that the media produced truly suits the local needs and conditions at SMPN 8 Jangkang. This will ensure that the learning media developed can be well received by students and help them understand computer hardware material better.

This study has gaps (which are evident compared to previous studies. For example, research at SMP Nurul Huda Peleyan has successfully developed video-based learning media using the Kinemaster application for ICT subjects and has received positive student responses. However, the study did not specifically discuss learning media development for computer hardware materials, which requires theoretical and practical understanding. In addition, previous studies have not paid attention to the unique challenges schools face in

remote areas, such as limited laboratory facilities, internet access, computer hardware, and geographical conditions that affect students' learning processes. Video-based learning media in previous studies often only highlight the visual aspect or the use of modern technology without considering local conditions, such as limited access to electricity and the internet (Ningrum et al., 2024). In this context, this study offers a different contribution by developing offline video learning media that are not only easily accessible without the internet but are also specifically designed to address the local needs and challenges of students in remote areas such as SMPN 8 Jangkang.

This research contributes novelty in several aspects. First, this research focuses explicitly on developing video learning media for computer hardware material, which has not been a significant concern in previous research. Second, this research offers real solutions to overcome the challenges faced by schools in remote areas, such as limited facilities, internet access, and geographical conditions, by providing offline video-based learning media. Third, this research combines visual elements, easy-to-understand narratives, and practical simulations in learning videos to support students' comprehensive understanding, thus creating a synergy between theoretical and practical learning. Fourth, the approach used in this research is local and contextual, where teachers and students are involved in the development process to ensure that the resulting learning media is based on local needs and conditions.

This research is essential in improving the quality of education, especially in remote areas. By providing innovative solutions relevant to local needs, this research is expected to improve access and quality of learning at SMPN 8 Jangkang. The main objective of this research is to develop offline video-based learning media that can be used in computer hardware materials so that students can gain a better and more comprehensive understanding of the topic despite being limited by existing facilities. In addition, this research aims to overcome learning challenges in remote areas, such as limited internet access, laboratory facilities, and adequate computer hardware. This research also aims to provide concrete solutions to increase student engagement and motivation using more varied and interactive learning media. By integrating visual elements, easy-to-understand narratives, and practical simulations in learning videos, this research aims to facilitate students' understanding of theoretical and valuable materials. In addition, this research can be a model or inspiration for developing similar learning media in other schools facing similar challenges (Abdullah et al., 2020; Isnani et al., 2025). This research also encourages the use of technology creatively and effectively despite limited facilities, thus positively impacting teachers and students. In this digital era, the development of contextual technology-based learning media is significant in supporting the implementation of a technology-based curriculum according to the demands of the 21st century. Thus, this study not only directly impacts learning at SMPN 8 Jangkang but can also be an essential reference in developing future inclusive, contextual, and innovative learning media.

B. Method

This study adopts the research and development (R&D) method to create more effective and relevant learning videos in computer hardware material. The R&D method involves a series of systematic steps developed by various experts. Borg and Gall (in [Gustiani, 2019](#)) stated that R&D consists of data collection, analysis, and iteration to improve a product or process. Dick and Carey (in [Richey & Klein, 2014](#)) emphasized the importance of design and development, including prototyping and product testing. [McKenney & Reeves \(2016\)](#) highlighted technology integration in education, while [Kemmis et al \(2014\)](#) emphasized the participatory aspect of the development process. Therefore, R&D is an appropriate method to produce innovative learning videos involving evaluation and continuous improvement.

The development model used is ADDIE, which consists of the analysis, Design, Development, Implementation, and Evaluation stages ([Cahyadi, 2019](#)). A curriculum review is carried out at the Analyze stage to ensure the video suits the expected competency standards. Discussions with teachers and interviews with the Vice Principal of Curriculum provided practical insights and relevant school policies, while observations helped understand student characteristics and the learning process. In the Design stage, the structure of the learning video content was designed, including format, duration, and storyline. The Development stage involved the creation of video content and validation by media, design, and material experts, followed by product trials on groups of students with varying abilities. Implementation included the preparation and implementation of learning videos in class, as well as testing the validity and reliability of post-test instruments. The Evaluation stage involved continuous assessment of the entire product development process. Addie stages or research flow using the Addie model can be seen in the image below:

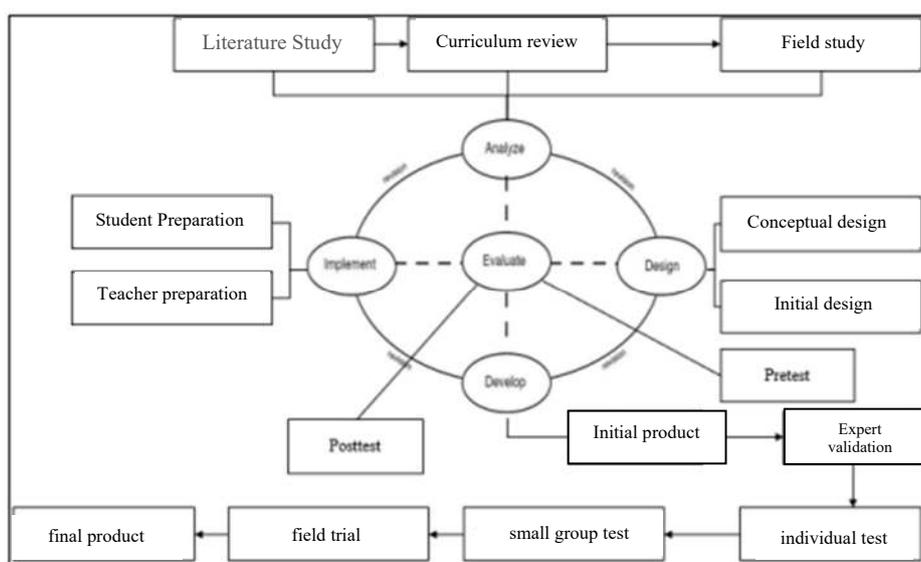


Figure 1. Research Flow

The study subjects were seventh-grade students at SMP Negeri 8 Jangkang and SMP Negeri 9 Jangkang, who were selected using random sampling techniques. The study was conducted at SMP Negeri 8 Jangkang, chosen because of the school's support and adequate learning facilities. Data collection techniques included observation, interviews, questionnaires, document analysis, content analysis, and tests. Data collection tools included observation sheets, interview guidelines, validation questionnaire sheets, and student response questionnaire instruments. Data analysis techniques involved qualitative analysis for descriptive data and quantitative analysis using statistical tests to evaluate the effectiveness of the learning videos.

C. Result and Discussion

Result

The Analysis stage is a crucial first step in utilizing the ADDIE approach to create an educational movie on computer hardware. Studying the Independent Learning Curriculum at SMPN 8 Jangkang, which emphasizes student-based, flexible, and contextual learning, is the first step in this process. This study was followed by interviews with the vice-chairpersons, instructors, and principals to understand better the unique demands and difficulties encountered throughout the learning process. Additionally, classroom observations were made to pinpoint areas for development, instructor teaching philosophies, and student traits. Additionally, to get knowledge and strategies that have worked, the study was done on pertinent learning films, such as creating video media for ICT materials and welding procedures.

Selecting the format and kind of video to be made is the primary goal of the design stage. Determining learning objectives, such as introducing and comprehending various computer hardware components, is part of the video design process. The material is organized into significant elements, such as input, processing, storage, and output units, to create the video content structure. Every video unit has visual components to aid comprehension, and a storyboard is made to provide a detailed description of the film's flow. A quick overview of computer hardware, a full explanation of parts including the mouse, keyboard, motherboard, CPU, RAM, ROM, HDD, SSD, monitor, speaker, and printer, and an introduction to the SMPN 8 Jangkang logo are all included in this storyboard. This video's design attempts to make sure that the information is presented in a way that is clear, engaging, and compliant with the relevant curriculum and student learning needs.

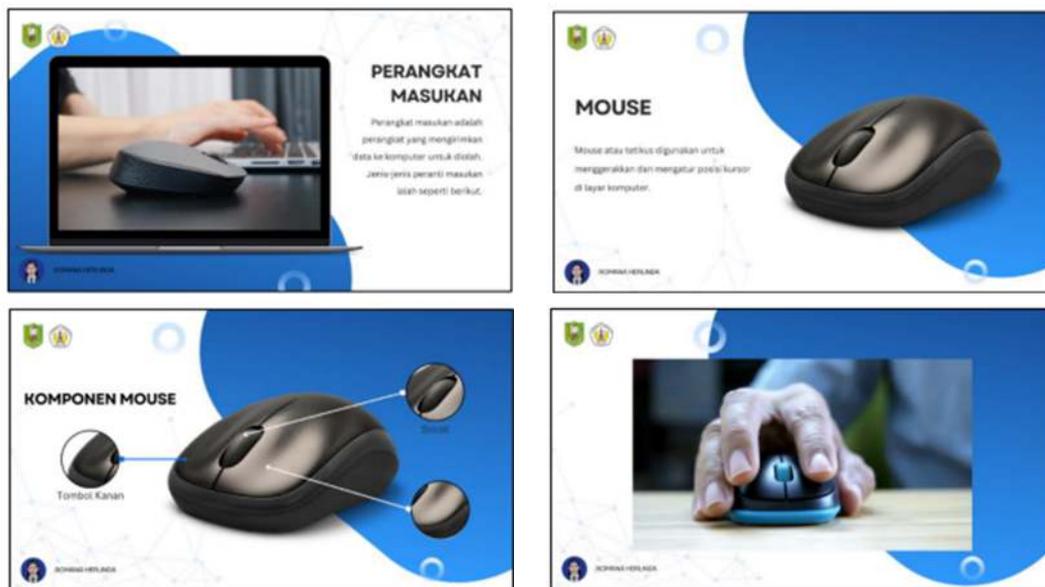


Figure 2. Input Device Discussion View

The learning media development stage begins by determining the content to be presented and developing a learning video product. The initial content includes material about computer hardware, which is then realized as a learning video. The results of this initial product, which includes understanding, functions, and 3D images of input units, storage units, processing units, and output units, can be accessed via the link YouTube (https://www.youtube.com/channel/UCasBVi7M_JOR3DB_XrjIFxw).

After initial development, the next stage is validation by experts, including media, design, and material experts. The purpose of this validation is to evaluate the feasibility of the product in terms of material, media, and design before being tested in the field. The validation process was carried out from March 5, 2024, to April 15, 2024. The six experts involved in this process included two material experts, two design experts, and two media experts. Each assessment aspect was measured using a Likert scale with 4, 3, 2, and 1 assessment categories. Validation of the material involved two validators who gave a total score of 64 and 97, with a percentage of eligibility of 80% and 82%, respectively, indicating that the material was declared feasible and very feasible. More explanations in line with the Merdeka curriculum module were one of the desired improvements, and the insertion of more book references further enhanced it.

In the validation of the learning design, two validators gave a total score of 54 each, with a percentage of eligibility of 96%, stating that the learning design was feasible. Revisions based on validator suggestions included improvements illustrated in the images of changes before and after revision. For media validation, two validators scored 83 and 89, with a percentage of eligibility of 90% and 96%, respectively, indicating that the learning media was very feasible. Revisions based on validator suggestions included the addition of quizzes to each video to increase interactivity.

Product trials were carried out in several stages. Individual trials involved three students with different abilities, which gave total scores of 54, 56, and 56, indicating that the learning video was feasible with a feasibility percentage of 96% to 100%.



Figure 3. Individual Trials

Small group trials involved six students, with total scores ranging from 53 to 55, indicating excellent feasibility with a percentage of 94% to 98%.



Figure 4. Small Group Trials

Finally, large group trials were conducted on 32 SMPN 8 Jangkang Class VII students, with total scores varying from 51 to 56, indicating excellent feasibility with a percentage of 91% to 100%.



Figure 5. Large Group Trial

With the results of validation and trials that support, learning media in the form of videos about computer hardware has proven feasible and effective in improving students' understanding of the material being taught.

This study evaluates the effectiveness of learning videos in an educational context, focusing on implementing offline learning videos designed for areas with limited internet access and online videos for broader distribution of information. Implementation involves thorough preparation from teachers and students. For teachers, preparation includes using laptops, whiteboards, markers, and teaching modules to ensure they understand and can apply the learning videos well. Meanwhile, student preparation includes a learning implementation plan detailed in the study appendix. At the implementation stage, a post-test was conducted in the experimental and control classes using test instruments tested for validity and reliability. The post-test results were analyzed through prerequisite tests such as normality and homogeneity tests. The Shapiro-Wilk test was used for data with samples of less than 50, and the Mann-Whitney U test was used if the data was not normally distributed. The data from the normality test results can be seen in Table 1

Table 1. Normality Test Results

	Class	Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Student learning outcomes	Pretest Experiment video learning	.136	32	.137	.928	32	.035
	Posttest Experiment video learning	.173	32	.016	.897	32	.005
	Pretest Control	.146	32	.082	.940	32	.077
	Posttest Control	.118	32	.200*	.963	32	.329
*. This is a lower bound of the true significance.							
a. Lilliefors Significance Correction							

The data is regularly distributed if the significance value is higher than, equal to, or above 0.05. The sig value of 0.005 is less than 0.05, indicating that the data is not regularly distributed, according to the results of the data analysis above. The Mann-Whitney test is the following since the data is not regularly distributed. A non-parametric statistical test called the Mann-Whitney U test is used to compare two independent groups and determine whether there is a statistically significant difference in their distributions. When the normalcy assumption is not satisfied, this test is frequently utilized as an alternative to the Independent T-test. Table 2 displays the results of the Mann-Whitney U test.

Table 2. Mann-Whitney U Test Results

Learning Outcomes of Learning Videos	
Mann-Whitney U	143.000
Wilcoxon W	671.000
Z	-4.983
Asymp. Sig. (2-tailed)	.001

The test results showed that the learning video significantly impacted the teaching and learning process, with the experimental group experiencing a more significant increase in scores than the control group.

Table 3. Descriptive Statistics Test Results

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Pretest Experiment	32	55	10	65	30.47	16.479
Posttest Experiment	32	40	50	90	74.84	11.534
Prettiest Control	32	65	10	75	39.06	19.362
Posttest Control	32	70	15	85	54.06	15.473
Valid N (listwise)	32					

According to descriptive analysis, the experimental group's average value went from 30.47 in the pre-test to 74.84 in the post-test, but the control group's only saw a rise from 39.06 to 54.06. The Mann-Whitney U test verified a substantial difference between the two groups, and a p-value of 0.001 suggested that this difference was not the result of chance. The estimated effect size indicates that using instructional films has a significant impact. The effect size test is used to assess significant variations that exist between the implementation and the pre-implementation period. The effect size test was used to quantify the influence of the created medium, namely learning videos with traditional learning, or, to put it more simply, to assess how much the experimental class differs from the control class. The Cohen impact test was used in the testing process, and the following formula was used:

$$ES = \frac{\bar{x}_2 - \bar{x}_1}{S_{gab}}$$

$$S_{gab} = \sqrt{\frac{(N_1 - 1)SD_1^2 + (N_2 - 1)SD_2^2}{N_1 + N_2 - 2}}$$

Explanation:

\bar{x}_2 = Experimental posttest mean

\bar{x}_1 = Control posttest mean

N_1 = Number of posttest samples Experiment

N_2 = Number of posttest samples Control

SD_1^2 = Standard deviation of post-test samples Experiment

SD_2^2 = Standard deviation of post-test samples Control

$$\bar{x}_2 = 74, \bar{x}_1 = 54, N_1 = 32, N_2 = 32, SD_1^2 = 11,53, SD_2^2 = 15,47$$

$$S_{gab} = \sqrt{\frac{(32 - 1)11,53 + (32 - 1)15,47}{32 + 32 - 2}}$$

$$S_{gab} = \sqrt{\frac{357,43 + 479,57}{62}}$$

$$S_{gab} = \sqrt{\frac{837}{62}}$$

$$S_{gab} = \sqrt{13,5}$$

$$S_{gab} = \sqrt{3,67}$$

After that, calculations are carried out to find the ES value using the following formula:

$$ES = \frac{\bar{x}_2 - \bar{x}_1}{S_{gab}}$$

$$ES = \frac{74 - 54}{3,67} = \frac{20}{3,67} = 5,44$$

Next, we measure the big difference between the experimental and control classes. The size used for one test group can be seen in Table 4.

Table 4. Interpretation of Effect Size

Size	Interpretation
>1,00	Strong effect
0,51 - 1,00	Moderate effect
0,21 - 0,50	Modest effect
0 - 0,20	Weak effect

Source: Hobri, 2010

In addition, the results of the student response questionnaire showed that all students gave an upbeat assessment of the applied learning video media, with an average score in the high category. This questionnaire includes aspects of ease of use and usefulness of learning videos. The results of the questionnaire indicate that learning videos are beneficial in the learning process, making learning more engaging and making it easier for students to understand the material. Thus, learning videos have proven effective in getting positive responses from students.

Discussion

The ADDIE (Analysis, Design, Development, Implementation, and Evaluation) paradigm creates the computer hardware learning video content. Examining the Merdeka Belajar curriculum, which gives instructors and schools latitude in creating curricula based on local requirements, is the first step in the analytical process. Learning films are made with context in mind, instructor adaptability and creativity, accessibility and self-directed learning, learning differentiation, cooperation, open educational resources, and direct assessment and feedback. This analysis is supported by observations of classroom learning environments and interviews with administrators and teachers to comprehend the requirements and difficulties in learning computer hardware. The results indicate that the

Merdeka Belajar curriculum at SMPN 8 Jangkang was first introduced in the even semester 2022. As informatics topics lack the facilities and infrastructure, studying video media development is required.

At the design stage, the first step is to determine the product type, plan, and design the product. Learning objectives include students' ability to identify hardware based on shape and characteristics, know hardware specifications, and identify hardware components. Planning involves preparing content structures and video duration, dividing materials, and arranging storylines. The design of the learning video is placed in several meetings with specific duration and material to ensure a logical and practical flow in conveying information. The final step in the design stage is designing the product, which involves script development, video production, and arranging visual elements. Product design includes choosing a visual style that suits the target audience and using supporting technology. Storyboarding is done to organize the landscape of the learning video with detailed descriptions, images or displays, captions, and duration. For example, the storyboard for the input unit learning video includes an opening with the SMPN 8 Jangkang and UNTAN logos, an introduction to the computer system, an introduction to computer hardware, and a specific discussion of input devices such as mice, keyboards, touchpads, and others, with detailed durations and descriptions. The same is done for the processing, storage, and output units, ensuring that each learning unit is delivered clearly and in detail, allowing students to access better and understand the material online and offline.

In order to complete the product development stage, video material is created in accordance with the planned design. The design of the instructional video for four sessions covering content on the input, processing, storage, and output components of a computer is shown in Table 4. Each meeting has a different video duration, ranging from 7 to 10 minutes, focusing on material explanations, learning activities, and feedback from the teacher. At each meeting, the learning video begins with a warm-up session where the teacher explains the material using the lecture method based on material from the book (Veronika et al., 2023). This aims to prepare students mentally and introduce them to the material studied during the meeting. The development of video-based learning products begins with determining content that focuses on computer hardware material. This initial stage produces a learning video that can be accessed via this link (https://www.youtube.com/channel/UCasBVi7MJOR3DB_XrjIFxw).

Moreover, six specialists—three from media, design, and materials—perform validation; two qualified experts evaluate each component. The validation of the material showed that the computer hardware material obtained a total score of 64 and 66, with a feasibility percentage of 80% and 82% respectively, which were included in the feasible and very feasible categories. Based on suggestions from the validators, references from other books were added to enrich the material. The validation of the learning design obtained a total score of 54 from both validators, with a feasibility percentage of 96%, which was stated as very feasible, with several improvements implemented, such as adjusting the appearance and adding interactive learning elements. Media validation showed a total score of 83 and

89, with a feasibility percentage of 90% and 96%, which was also stated as very feasible, with the addition of a quiz on the video according to the validator's suggestion.

The product trial was conducted in three stages: individual, small group, and large group. In the individual trial with three students, the learning media obtained a total score of 54, 56, and 56, with a feasibility percentage of 96% and 100%, respectively, which was stated as very feasible. The small group trial involved six students and showed a total score between 53 and 55, with a feasibility percentage of 94%, 98%, and 96%, which was also stated as very feasible. In the large group trial with 32 grade VII students at SMPN 8 Jangkang, the total score ranged from 51 to 56, with a very high feasibility percentage, indicating that this learning media is very feasible to use in the learning process. Through the stages of development, validation, and testing, the computer hardware learning video was declared very suitable for use as a learning medium in junior high schools, with various improvements that have been implemented according to expert suggestions and trial results.

By comparing pretest and posttest data, one may determine how effective learning films are by examining variations in student learning outcomes. Data on student learning outcomes is gathered via daily tasks separated into pretest and posttest categories. The pretest is given before the learning video, and the posttest results are evaluated following the course of therapy. The pretest findings for the experimental group's frequency distribution, with the mode falling from 0 to 50, demonstrate that student learning outcomes are still below average. However, in the posttest, there was an increase in scores, especially in the interval 73-83, which is the mode with the highest frequency. Pretest and post-test data were also collected from the control group that did not use learning videos, showing a slightly significant increase in the post-test. The post-test data shows that the experimental class had an average score of 74.84 while the control class had 54.06.

In the learning carried out on April 23, 2024, with the material "Computer Hardware," several essential aspects of the learning process have been observed and evaluated. Teacher Teodora Yanti A.Md Kom in class VII for Informatics performed well in various aspects. The teacher explained the learning objectives well and prepared students well. During the demonstration of the learning video, students were invited to watch the video using a laptop and smartphone. The teacher also reviewed the video that was shown previously very well. Students learned to recognize computer hardware well by doing tests or practicing questions in groups. Finally, the teacher reviewed cases and discussed the students' answers well. Overall, the learning took place effectively, with most aspects of learning being considered very good.

Descriptive analysis was done to explain the variations in learning results before and after the therapy. Both groups' pretest and posttest average values revealed a statistically significant rise. The pretest and posttest data from both groups (the experimental and control groups) were not normally distributed, according to the findings of the data normality test performed using the Shapiro-Wilk test. The significance value (sig), which is less than the commonly used alpha value of 0.05, indicates this. The next step is to employ

a non-parametric test, specifically the Mann-Whitney test, because the data does not fulfill the normality assumption.

The experimental group, which utilized learning videos, and the control group, which did not use learning videos, were compared using the Mann-Whitney test. With a substantial p-value (0.001), the test findings indicated a significant difference between the two groups. This shows a discernible variation in the learning results between students who utilize instructional films and those who don't. Furthermore, an effect size test was carried out using the Cohen method to determine the magnitude of the influence or difference between the two groups. The usage of instructional videos significantly influences student learning outcomes, as seen by the effect size value of 5.44. This effect size value describes how big the difference is between the two groups in standard deviation units. The interpretation of the effect size value, according to [Hobri \(2014\)](#), is that a value above 1.00 indicates a strong effect. Thus, this high effect size confirms that the use of learning videos significantly improves understanding of computer hardware material. Therefore, overall, the results of this analysis indicate that the use of learning videos substantially impacts student learning outcomes on computer hardware material, compared to conventional learning methods ([Rahman et al., 2023](#); [Rice et al., 2024](#); [Privitera & Ahlgrim-Delzell, 2018](#)).

After the treatment and implementation of the learning media, students were asked to respond to the learning media. Researchers used a questionnaire sheet based on the Technology Acceptance Model (TAM) to see student responses. The questionnaire contains aspects and indicators of ease of use and usefulness. Aspects of ease of use include the availability of offline videos, the suitability of practice questions in the learning video with the material presented, ease of accessing learning videos on the YouTube platform, readability of the letters used in the video, attractive video displays, suitability of format, color, and image resolution in the video, and the language used in the video that is easy to understand. Aspects of the usefulness of use include how learning videos make learning more enjoyable, help students to learn independently, provide good audio and visual quality and material that is easy to understand and interesting for viewers, and help facilitate understanding of learning materials.

The results of the student response questionnaire showed that the scores obtained varied, with the total value of each student ranging from 54 to 60. To analyze the results of student responses, researchers used a psychological scale formula and grouped the measurement results into three categories: low, medium, and high. The lowest response value is 15 (X_{\min}), and the highest is 60 (X_{\max}). The range of the data is $60 - 15 = 45$. With a typical curve of 6 standard deviations, each standard deviation is worth $45/6 = 7.5$. The mean or average value is $(60 + 15)/2 = 37.5$. After knowing the range, mean, and standard deviation, the student response categories are determined as follows: response values less than 30 are in the low category, values between 30 and 45 are in the medium category, and values greater than 45 are in the high category. From the table analysis, it can be concluded that all 32 respondents gave values or responses in the high category to the video learning

media developed and applied to students. Thus, most students assessed this learning media positively and considered it useful in their learning process.

D. Conclusion

The creation of learning films on computer hardware material using the ADDIE approach at SMPN 8 Angkang has succeeded in achieving the research objectives with very satisfactory results. Validation by six experts showed a very high level of practicality, confirming that this learning film is worthy of being used as an effective teaching medium. Efficacy testing through a comparison of pretest and posttest scores showed a significant increase in student learning outcomes, reflecting the success of this media in helping students understand the material in depth. Student responses to the learning film, as measured through questionnaires and observations using the Technology Acceptance Model (TAM), also showed excellent acceptance, with consistently high response scores between 54 and 60. These findings confirm that the developed learning film is practical and efficient and has a significant impact on improving the quality of learning.

This study proves that the ADDIE approach is practical for developing technology-based learning media. The resulting learning films not only improve student understanding but also support the achievement of learning objectives more effectively. These findings directly affect the world of education, especially in encouraging technology as an integral part of the learning process. Teachers can adapt this model to develop similar media for various subjects to make learning more innovative and engaging. In addition, implications at the policy level emphasize the importance of investing in teacher training and the development of technology-based learning media to create learning environments that are relevant to the needs of the 21st century.

For further research, it is recommended that similar learning media be developed in other subjects to explore the effectiveness of the ADDIE approach in various learning contexts. In addition, using more sophisticated technologies, such as augmented reality (AR) or virtual reality (VR), can be an alternative to enhance a more immersive learning experience. Further research also needs to conduct longitudinal studies to evaluate the long-term impact of using this learning media on students' critical thinking, analysis, and creativity skills. It is also recommended that the effectiveness of this media be tested in environments with different levels of technology access to assess its suitability and flexibility in various educational conditions. Finally, exploring the integration of learning films with other learning methods, such as project-based learning or collaborative learning, can provide further insights into how to improve student learning outcomes more comprehensively.

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